Final

Environmental Impact Statement

for a

Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada

Volume III
Comment-Response Document
Part 4 - Chapters 8 through 13

U.S. Department of Energy
Office of Civilian Radioactive Waste Management

DOE/EIS-0250

February 2002

ACRONYMS AND ABBREVIATIONS

To ensure a more reader-friendly document, the U.S. Department of Energy (DOE) limited the use of acronyms and abbreviations in this environmental impact statement. In addition, acronyms and abbreviations are defined the first time they are used. The most common acronyms and abbreviations used in the text of this document are listed below.

CFR	Code of Federal Regulations
DOE	U.S. Department of Energy (also called *the Department*)
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
FR	*Federal Register*
LCF	latent cancer fatality
MTHM	metric tons of heavy metal
NEPA	National Environmental Policy Act, as amended
NRC	U.S. Nuclear Regulatory Commission
NWPA	Nuclear Waste Policy Act, as amended
PM_{10}	particulate matter with an aerodynamic diameter of 10 micrometers or less
$PM_{2.5}$	particulate matter with an aerodynamic diameter of 2.5 micrometers or less
REMI	Regional Economic Models, Inc.
RMEI	reasonably maximally exposed individual
Stat.	United States Statutes
TSPA	Total System Performance Assessment
U.S.C.	United States Code

UNDERSTANDING SCIENTIFIC NOTATION

DOE has used scientific notation in this EIS to express numbers that are so large or so small that they can be difficult to read or write. Scientific notation is based on the use of positive and negative powers of 10. The number written in scientific notation is expressed as the product of a number between 1 and 10 and a positive or negative power of 10. Examples include the following:

Positive Powers of 10
$10^1 = 10 \times 1 = 10$
$10^2 = 10 \times 10 = 100$
and so on, therefore,
$10^6 = 1,000,000$ (or 1 million)

Negative Powers of 10
$10^{-1} = 1/10 = 0.1$
$10^{-2} = 1/100 = 0.01$
and so on, therefore,
$10^{-6} = 0.000001$ (or 1 in 1 million)

Probability is expressed as a number between 0 and 1 (0 to 100 percent likelihood of the occurrence of an event). The notation 3×10^{-6} can be read 0.000003, which means that there are three chances in 1,000,000 that the associated result (for example, a fatal cancer) will occur in the period covered by the analysis.

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Transportation Modes, Routes, Affected Environment, and Impacts

8. TRANSPORTATION MODES, ROUTES, AFFECTED ENVIRONMENT, AND IMPACTS

DOE received many comments stating that the transportation portions of the Draft EIS did not provide sufficient information or analysis, and that the analyses relied on incomplete and outdated information. Commenters concluded, therefore, that the transportation-related analyses were inadequate, and substantively and legally deficient.

DOE believes that the EIS adequately analyzes the environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

For the reasons discussed above, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in the State of Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

If the Yucca Mountain site was recommended and approved, at some future date DOE would issue a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), in Nevada DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event DOE selected heavy-haul truck as its mode of transportation in the State of Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

Nevertheless, because of the public's interest in transportation in general and in the related information and analyses, the Department has included in this Final EIS descriptive information (for example, Appendix, M, *Supplemental Transportation Information*), and maps and tables that show the analyzed routes and estimated health and safety impacts for each state through which the shipments would pass. Appendix M provides general background information about transportation-related topics, such as transportation operations, cask testing requirements, and emergency response.

DOE has revised the analyses to respond to comments and to reflect new information that has become available since publication of the Draft EIS. For example, as requested by commenters, DOE has analyzed the effects of different mixes of rail and truck shipments and has scaled impacts upward to reflect the relative state-by-state population growth to 2035, using 2000 Census data. In addition, new information has led DOE to revise, for instance, the transportation accident analyses to reflect the Nuclear Regulatory Commission document *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000).

Many of the following comments indicate dissatisfaction with the adequacy of the transportation analyses. However, for ease of reading and to facilitate understanding of the Department's responses in this chapter, DOE has elected not to repeat the above response. Rather, the reader is referred to this chapter introduction for additional information.

8 (158)
Comment - 56 Comments Summarized
Commenters stated that spent nuclear fuel and high-level radioactive waste could be transported safely to Yucca Mountain, with negligible radiological impacts to public health and safety and the environment. As evidence for this belief, commenters cited such things as the safe record of nuclear-materials transportation over the past 50 years; stringent shipping regulations; extensive testing and certification of shipping casks; robust cast construction; careful training of drivers; special safety features of trucks; and sophisticated tracking of shipments and communications.

Response
The results of the analyses presented in Chapter 6 and Appendix J of the EIS are consistent with the observations of the commenters.

8 (3801)
Comment - EIS001282 / 0003
The Draft Environmental Impact Statement fails to provide essential details about the modes and routes of transportation of the spent nuclear fuel and high-level radioactive waste. The public deserves full disclosure about the amounts, frequency, and types of materials that would pass through the cities where they live, work, and enjoy recreational activities.

Response
In response to public comments, Appendix J of the EIS has been revised to provide state-by-state maps of routes used in the analysis. These maps contain tables that show the numbers of shipments originating in and passing through each state by mode and provides the impacts from the shipments in each state. These numbers should be considered preliminary, as there are many factors that could cause the modes and routes to change, including waste generator site operations, trading of pickup allocations, selection of a different transportation mode for shipments by the site operator, or recommendation of alternate routes by states and tribes. Impacts in individual states could be different if the actual routes from generator sites to Yucca Mountain are different from those analyzed. However, it is not likely that the total impacts from transportation would be changed significantly or that any particular route connecting an origin/designation pair would present a significant difference in impact from any other.

DOE used two analytical scenarios—mostly legal-weight truck and mostly rail—as the basis for estimating the number of shipments of spent nuclear fuel and high-level radioactive waste from 72 commercial and 5 DOE sites. DOE selected the scenarios because, about 10 years before the proposed start of operations at the repository, it cannot accurately predict the actual mix of rail and truck shipments (mode) that would occur from the 77 sites. Similarly, routes used in the analysis of transportation impacts are highways and rail lines that DOE anticipates it could use for shipments to the repository. However, at this time, about 10 years before start of operations at the repository, specific routes have not been determined. Until such time as a repository site is approved, specific routes and the number of shipments along those routes cannot be determined. Additional discussion of routing can be found in Section M.3 of the EIS.

8 (3897)
Comment - EIS001286 / 0007
In addition to concerns about packaging degradation, we must raise concerns about degraded fuel. DOE must study the fuel from the Perry plant and other nuclear power plants that have fuel rods leaking radioactivity. According to some scientists, this leaking fuel poses a serious threat to public safety and violates the operating licenses. Although it is a violation of federal regulations and a severe health risk for nuclear plants to continue operating with known fuel damage, the plants continue to operate with leaking reactor cores. This leaking fuel has been attributed to debris fretting or to undetected manufacturing defects-the fuel has pin point holes, bad end cap welds and axial cracks. GE believes that the root cause of the failures is undetected manufacturing defects, possibly exacerbated by the Perry operating practice of using control rod movement rather than flow control for minor power adjustments. What is going to happen when this fuel hits the road? DOE should evaluate fuel for undetected defects.

Response
The EIS does consider the issue of degraded fuel. Fuel with identified leaks would be shipped to the site in disposable canisters that have been sealed at the site of generation. These canisters wold be placed directly in the

disposal container (which becomes the waste package after it is filled, sealed and tested) without being opened at the repository.

DOE recognizes that some fuel rods would have undetected flaws and that there might be releases to the interior of the transportation canisters and casks. However, the shipping casks would be sealed during transportation and leaks to the exterior of the cask are highly unlikely. The surface handling facilities at the repository are designed to contain any contamination that might be released during transportation. Chapter 2 and Chapter 4 address surface facility operations and wastes generated from decontamination of canisters used in transportation, as well as the management of wastes from the treatment of water in the fuel handling pools.

Degraded fuel rods should have no impact on transportation in terms of radiation exposures or potential releases of radioactive materials associated with accidents or sabotage.

Finally, the studies of long term performance of the repository do assume some cladding failure at the beginning of the analysis period. This is further discussed in Section K.2.1.4 of the EIS.

The issues raised by the commentator concerning the risks of continued operations of nuclear powerplants with known fuel damage is not a subject of this EIS, nor is it a subject that is under the control of the Department of Energy. Operating commercial nuclear reactor licenses and safety concerns are the purview of the Nuclear Regulatory Commission.

8 (6949)
Comment - EIS000390 / 0003
An adequate environmental review of the proposed repository program must absolutely address the deadly nature of the waste to be shipped and buried, yet DOE barely touches on the radiological risks posed by highly irradiated nuclear fuel. Information on the total activity (in curies) and the surface dose rate (in rems per hour) of the assemblies of irradiated fuel is essential for the assessment of risks posed by the transportation and burial of radioactive waste, yet DOE does not provide such data.

According to the State of Nevada, a typical assembly from a pressurized water reactor will contain, even after 26 years of cooling, 31,000 curies of cesium-137 and 21,000 curies of strontium-90, and is a powerful source of penetrating gamma and neutron radiation. One unshielded assembly would have enough radiation to give a person standing next to it a dose of at least 100 rem per minute. After only two minutes of such exposure, cancer risk would roughly double, and symptoms of radiation sickness would probably appear. Ten minutes exposure would be enough to deliver a speedy but painful death to virtually all people exposed. Furthermore, shipping waste as fresh as five years old to the repository is contemplated, and should therefore have been included in the DEIS as a possible scenario, one which would carry even greater radiological risk.

Response
DOE did not estimate the consequences for persons or the environment that could be exposed to bare spent nuclear fuel outside shipping casks because transportation accidents severe enough to eject spent nuclear fuel from shipping casks are not reasonably foreseeable. Bare spent nuclear fuel assemblies represent a powerful source of penetrating radiation. However, because of its high radiation dose rate, heavy shielding, which can include several feet of water shielding, concrete structural shielding for remote-operated hot cells, or massive metal containers such as shipping casks, is always provided for spent nuclear fuel. During shipment, spent nuclear fuel and high-level radioactive waste would be contained within heavily shielded shipping casks that comply with Nuclear Regulatory Commission (NRC) regulations for performance under normal conditions of transportation and accidents. The shipping casks provide the shielding necessary to reduce the radiation dose rate emitted from the shipping cask to safe levels under both normal and accident conditions. Chapter 6 of the EIS presents DOE estimates of risks and consequences of accidents in transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain using such NRC certified shipping casks. DOE estimated the risks and consequences using information from an NRC study (DIRS 152476-Sprung et al. 2000), which analyzed performance of casks and spent nuclear fuel contents in severe transportation accidents. Although the NRC study evaluated a range of severe accidents, including very unlikely ones that would release radioactive materials from shipping casks, it did not project even the most extreme accidents would eject spent nuclear fuel from a shipping cask where persons or the environment could be directly exposed.

The commenter pointed out that the assumptions used in the EIS for the age and radiological characteristics of spent nuclear fuel in the maximum reasonably foreseeable accident scenarios could understate the transportation risks. It is true that DOE could ship some spent nuclear fuel that is more radioactive than the 26 year-old pressurized water reactor spent nuclear fuel analyzed in the scenario. Based on comments received and DOE's additional review of technical documents and conduct of hazard analyses, the basis for the transportation impact analysis has been revised to consider commercial spent nuclear fuel that has median hazard. Spent nuclear fuel having median hazard would be discharged from a reactor approximately 14 years before shipment to Yucca Mountain. The radionuclide inventories of the representative spent nuclear fuel used in the analysis are presented in Tables A-8 and A-9 of the EIS. If any 5-year old or 10-year old spent nuclear fuel were to be shipped to the repository, it would be a small fraction of the total shipments. This is a case in which "average" data is used in the EIS as opposed to bounding assumptions. Consistent with Council on Environmental Quality regulations (40 CFR 1502.22), DOE is attempting to avoid compounding conservatisms, yielding unrealistic results, in analyzing accident scenarios. Other elements of the impact analyses (for example, radiation dose rates, atmospheric dispersion modeling, release fractions) are such that the transportation impact results presented in the EIS are bounding yet not so conservative that the true differences among alternatives are masked.

8 (8491)
Comment - EIS010150 / 0005
Clearly there are other aspects of the Draft Environmental Impact Statement that has changed and will continue to change since the draft was released. Transportation significantly needs to be rewritten, and hearings on this issue need to be held in the communities that would be affected, some of which were not identified by the draft but now are likely to be affected by transportation.

To conclude, from the perspective of public health and safety, these issues should be of serious concern because we do not know at the end of the day, we do not have an assessment of the environmental impacts of the repository proposal.

Response
The Draft EIS discussed ongoing site characterization activities and design evaluations, and the potential for resulting changes to repository design. Since DOE issued the Draft EIS, it has acquired an improved understanding of the interactions of potential repository features with the natural environment, and the advantages of a number of design features (such as titanium drip shields) to enhance waste containment and isolation. DOE issued the Supplement to the Draft EIS to provide the updated information to the public. While aspects of the design have evolved, the basic elements of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository at Yucca Mountain (such as transportation of spent nuclear fuel and high-level radioactive waste) remain unchanged. For this reason, the Supplement focused on the most recent design enhancements, including various operating modes to manage heat generated by emplaced spent nuclear fuel and high-level radioactive waste.

Because the Supplement focused primarily on matters involving repository design, the Department held three public hearings in Nevada during the comment period. Commenters nationwide were encouraged to submit comments at public hearings and by mail, facsimile, and the Internet during the comment periods. DOE used means comparable to those used for the Draft EIS (advertisements, releases, announcements) to notify the public.

DOE believes that the EIS adequately analyzes the environmental impacts that could result from either the Proposed Action or the No-Action Alternative. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts that could occur, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist.

8 (9209)
Comment - EIS002140 / 0006
Area 5. We're bringing in nuclear waste like crazy out there. I can remember working in Area 5 when certain shipments came in from submarines, so on and so forth and we couldn't even get near it. When the guys with guns would come out, we'd unload it and bury it in Area 5. It's been going on for years and years. This is -- shipping nuclear waste to Yucca Mountain is not a new thing.

Response
The comment is correct that the Nevada Test Site is a disposal site for low-level radioactive waste from around the DOE complex, and will continue to fulfill that role in the future. Chapter 8 of the EIS discusses how impacts from these disposal activities could contribute to cumulative impacts related to the proposed repository at Yucca Mountain.

The *Final Waste Management Programmatic Environmental Impact Statement For Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DIRS 101816-DOE 1997) and the *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DIRS 101811-DOE 1996) and their respective Records of Decision describe low-level radioactive waste disposal at the Nevada Test Site.

8 (9662)
Comment - EIS002074 / 0007
With respect to transportation, too, I might also add that the maps that were given out in the handouts today and also the maps that are inclusive in the EIS, they clearly illustrate county boundaries and state boundaries, but they don't illustrate tribal boundaries. And so we may recommend that the maps be expanded, especially due to the special relationships and recognition that's given, that are afforded to tribes, that those boundaries be indicated in there as well as to give a clear and concise picture.

Response
In response to public comments, DOE has revised Appendix J of the EIS to include maps of the rail and truck routes, the number of shipments, and the impacts for each state through which spent nuclear fuel and high-level radioactive waste shipments was analyzed. These are estimates used for analyzing transportation impacts; the actual routes and number of shipments made through a state could be different depending on the routes actually. Native American lands within each state are indicated on both the state transportation maps in Appendix J and on the national transportation maps used throughout the EIS.

8 (10992)
Comment - EIS001952 / 0006
PUCO's [Public Utilities Commission of Ohio] transportation director has also just described the planning, strategy sessions, and citizens surveys for future land use and zoning currently being implemented (from 600 residents of Brown County selected from voter registration records). PUCO has issued grant which Ohio State University (OSU) is currently implementing. The implementation phase currently in progress Brown County most certainly indicates that transportation routing decisions have, in fact, already been made. Full participation by the public, as described by PUCC, appears to be re-invented as meetings to which the public is invited where questions and/or objections may be stated after-the-fact and too late to do any good.

Response
In the context of the letter that included this comment, the commenter is describing the actions of the Public Utilities Commission of Ohio in relation to the routing of spent nuclear fuel and high-level radioactive waste shipments through Brown County, Ohio, to the proposed repository at Yucca Mountain. Section 6.2 of the EIS discusses the transportation of these materials from the 77 generator sites to the State of Nevada.

The comment mentions public participation "as described by PUCO." Typically, the Department of Energy uses Federal publications (for example, the *Federal Register*) and public media (for example, newspapers, web sites, and radio and television stations). Individuals and organizations can add their names to the DOE mailing list to receive notifications of information availability and upcoming events. DOE has no control over how or when other organizations choose to notify their stakeholders.

8 (12090)
Comment - EIS002307 / 0004
Section 6 of the DEIS is incorrect in the evaluation of transportation risks because the DEIS uses outdated models (RISKIND and RADTRAN4) to compute the risk factors.

Response
The RISKIND code has been used widely and is generally accepted as appropriate for estimating the consequences of transportation accidents that could release radioactive materials. RADTRAN 5 was used for the analyses in the Final EIS.

8 (12273)
Comment - EIS010096 / 0017
Figure 2-4 of the SUPPLEMENT TO THE DRAFT EIS refers only to direct rail access and heavy-haul access to the site. The text on Page 2-12 refers to legal-weight trucks. It is not clear if DOE anticipates legal-weight trucks being used to transport waste directly to the Yucca Mountain site.

Response
Even though DOE has expressed a preference for rail, both nationally and in Nevada, the repository design would facilitate the ability to receive spent nuclear fuel or high-level radioactive waste delivered by legal-weight truck.

8 (12415)
Comment - EIS010279 / 0004
Although transportation issues were not discussed in the Supplement to the Draft EIS, the DOE recently informed the Timbisha Shoshone Tribe that the proposed *Carlin/Caliente Bonnie Claire Option* for a rail corridor to Yucca Mountain goes right through the Scottys Junction Trust Parcel of the Tribe (see attached map). Let it be on record that the Timbisha Shoshone Tribe strongly opposes this proposed rail corridor because of its potential threat to the land, the safety of tribal members, and the adverse effects it would have on the Tribe's economic development. The inadequate, small scale map in the DEIS (p. 6-42) did not show this occurrence even though *The Timbisha Shoshone Tribal Homeland: A Draft Secretarial Report to Congress to Establish a Permanent Tribal Land Base and Related Cooperative Activities* indicated the location of the proposed Trust land parcel (p. 35) and was published in April 1999, three months before the publication of the DEIS for Yucca Mountain.

Response
The Department acknowledges the Timbisha Shoshone Tribe's opposition to the Bonnie Claire option of the Carlin and Caliente Corridors. At this time, DOE has not identified a preference for a specific rail corridor within Nevada. DOE would identify a preferred corridor only if the Yucca Mountain site were approved under the NWPA, and then only after consultation with affected stakeholders, particularly the Timbisha Shoshone Tribe.

Section J.3.1.3 of the EIS contains a discussion of the land-use conflicts with each of the evaluated rail corridors, including the Bonnie Clare Alternate. Detailed corridor maps included in this section show the Timbisha Shoshone Trust Lands and the proposed alignment.

8.1 General Opposition to Transporting Spent Nuclear Fuel and High-Level Radioactive Waste

8.1 (170)
Comment - 589 comments summarized
Commenters stated their opposition to the transportation of spent nuclear fuel and high-level radioactive waste to Yucca Mountain by rail, heavy-haul truck, or legal-weight truck. In many cases, reasons for the opposition were not specified or were very broad in scope. Examples include broad, nonspecific impacts to the environment and ecosystem; generic accidents with catastrophic consequences; incidental and cumulative radiation exposure to millions of people along the transport routes during decades of transport; sabotage and terrorist attacks; and natural disasters.

Many commenters expressed opposition to spent nuclear fuel and high-level radioactive waste transport through specific neighborhoods, cities, heavily populated areas, specific states, and other areas. Reasons for the opposition included the proximity of potential routes to specific structures and areas such as private residences, schools, hospitals, lakes, rivers, and Native American tribal lands. Some commenters stated that the EIS does not provide adequate detail regarding transportation risks along designated nationwide routes and specific cities and communities. Others were opposed because of the disproportionate share of shipments that would travel through a particular neighborhood, city, or state. Still others were opposed because they believe their quality of life would be adversely affected due to the large number of shipments over many years.

Commenters were also opposed to spent nuclear fuel and high-level radioactive waste transport because of site-specific concerns about emergency preparedness training, cleanup costs after an accident, and predicted damages to property values if an accident occurred.

Response

Based on the results of the impact analyses presented in Chapter 6 and Appendix J of the EIS, as well as the results published in numerous other studies and environmental impact analyses cited in the EIS, DOE is confident that spent nuclear fuel and high-level radioactive waste could be and would be safely transported to Yucca Mountain. DOE believes, as the EIS reports, that the potential impacts of this transportation would be so low for individuals who lived and worked along the routes that these individual impacts would not be discernible even if the corresponding doses could be measured. The analysis presented in the EIS factored in the characteristics of spent nuclear fuel and high-level radioactive waste, the integrity of shipping casks that would be used for transportation, and the regulatory and programmatic controls that would be imposed on shipping operations (see Appendix M). The EIS analytical results are supported by numerous technical and scientific studies that have been compiled through decades of research and development by DOE and other Federal agencies of the United States, including the Nuclear Regulatory Commission and the U.S. Department of Transportation, as well as by the international community, including the International Atomic Energy Agency.

DOE believes that the EIS adequately analyzes the environmental impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site was recommended and approved. See the introduction to Chapter 8 of this Comment-Response Document for more information.

DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

In this EIS, DOE has used computer models it has used in previous EISs and other studies. These models are widely accepted by the national and international scientific and regulatory communities. For instance, DOE selected the RADTRAN 5 computer program to estimate radiological impacts to populations from incident-free transportation and from accidents. RADTRAN, which was originally developed by Sandia National Laboratories in the late 1970s, has been used in many other DOE EISs, and it has undergone periodic review and revision. In 1995, a review of RADTRAN 4 (immediate predecessor of RADTRAN 5) demonstrated that it yielded acceptable results when compared to “hand” calculations. More recently, a review found that RADTRAN 5 overestimates the measured radiation dose to an individual from moving radiation sources.

To ensure that the EIS analyses reflect the latest reasonably available information, DOE has either incorporated information that has become available since the publication of the Draft EIS or modified existing information to accommodate conditions likely to be encountered over the life of the Proposed Action. For example, the analysis in the Draft EIS relied on population information from the 1990 Census. In this Final EIS, DOE has scaled impacts upward to reflect the relative state-by-state population growth to 2035, using 2000 Census data.

Transportation by legal-weight truck would involve shipments along Interstate System highways, beltways, and bypasses, where available, in accordance with U.S. Department of Transportation regulations (49 CFR 397.101). These regulations allow states and tribes to designate alternate routes in accordance with U.S. Department of Transportation guidelines (49 CFR 397.103). Thus, states and tribes would have the opportunity to designate eligible routes that they prefer to be used.

There are no Federal regulations pertaining to rail routes for shipment of spent nuclear fuel or high-level radioactive waste. The shipper and railroad companies (carriers) determine rail routes based on best available trackage, schedule efficiency, and cost-effectiveness. This includes selecting routes that result in minimum time in transit, minimum interchanges, and maximum use of mainline tracks. The routes must be submitted in advance to the Nuclear Regulatory Commission for approval. In addition, DOE has developed operational protocols (see Section M.3 of the EIS) that include guidelines for selecting rail routes. DOE applied the guidelines in identifying routes for analysis in the EIS.

Section 6.2.4 of the EIS provides results of analyses from postulated transportation accidents and Section J.1.4 provides details of the methods and data used in the analyses. The analysis of impacts to populations along shipment routes assumed that an accident could occur at any location along the route. Given the number of shipments, traffic accidents probably would occur, although DOE does not believe that any of the accidents would be severe enough to result in the release of radioactive material, primarily because of the structural integrity of the casks in which the material would be transported.

"Real-life" transportation accidents involve a myriad of collisions, such as with other vehicles and obstacles, that could result in fires and explosions, inundation or burial of a cask containing spent nuclear fuel and high-level radioactive waste. These accidents would be initiated by a variety of events including human error, mechanical failure, or natural causes, such as earthquakes or landslides. Accidents could occur in different places such as mountain passes, urban areas, on Interstate Highways in rural areas, or rail switchyards.

The combinations of accident conditions, initiating events, and locations is very large. Analyzing an extensive array of accident scenarios is neither practical nor meaningful. However, it is meaningful to analyze a range of reasonably foreseeable accident scenarios that consider, in effect, common initiating events and conditions having similar characteristics. Thus, for example, the EIS analyzes the impacts of various collision accidents in which a cask would be exposed to a range of impact velocities (see Section J.1.4.2.1).

The EIS also analyzes a maximum reasonably foreseeable accident, an accident with a probability of occurrence of about 3 in 10 million per year. To put this in perspective, this accident would occur once in the course of about 5 billion legal-weight truck shipments. In this scenario, a truck cask, not involved in a collision, would be engulfed in a fire with temperatures between 750°C and 1,000°C (1,400°F to 1,800°F) (see Section 6.2.4.2 of the EIS). The conditions of the maximum reasonably foreseeable accident analyzed in the EIS envelop conditions reported for the Baltimore Tunnel fire (a train derailment and fire that occurred in July 2001 in a tunnel in Baltimore, Maryland). Temperatures in that fire were reported to be as high as 820°C (1,500°F), and the fire was reported to have burned for up to 5 days.

DOE could decide to use a dedicated train that carried only the material to be shipped to Yucca Mountain, or could elect to move the spent nuclear fuel and high-level radioactive waste by general freight. If the material was shipped as general freight, the position of the spent nuclear fuel or high-level radioactive waste car in the train would be regulated by 49 CFR 174.85. This regulation requires that railcars placarded "radioactive" must be separated from a locomotive, occupied caboose, or carload of undeveloped film by at least one nonplacarded car, and it may not be placed next to other placarded railcars of other hazard classes.

Since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000, all). DOE has concluded that the models used for analysis in the Draft EIS relied on assumptions about spent nuclear fuel and cask response to accident conditions that caused an overestimation of the resulting impacts. Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents. (Of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials.) This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS reports the potential consequences for accidents that could release radioactive materials.

The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection and safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the physical protection and safeguards regulation are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons. The cask safety features that provide containment, shielding, and thermal protection also provide protection against sabotage. The casks would be massive. The spent nuclear fuel in a cask would typically be only about 10 percent of the gross weight; the remaining 90 percent would be shielding and structure.

It is not possible to predict whether sabotage events would occur, and if they did the nature of such events, nevertheless, DOE examined various accidents, including an aircraft crash into a transportation cask. The consequences of both the maximum reasonably foreseeable accident and the aircraft crash are presented in the EIS for the mostly truck and mostly rail transportation scenarios and can provide an approximation of the types of consequences that could occur from a sabotage event. In addition, DOE analyzed the potential consequences of sabotage against a truck or rail cask (see Section 6.2.4.2.3 of the EIS). The results of this analysis indicate that the risk of the maximally exposed individual incurring a fatal cancer would increase from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the terrorist attack of September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions the Department would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for addressing emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using a planning grant and based on availability of funds in annual Program budgets specified by Congress. Additional Federal response capabilities, such as expert services from the Radiological Assistance Program Team, could be activated, as requested by states and tribes. The schedule in the proposed policy and procedures (63 *FR* 23753; April 30, 1998) for implementation of Section 180(c) of the NWPA is designed to provide adequate time for training of first responders in advance of the first shipments. If there was a decision to proceed with the development of a repository at Yucca Mountain, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. See Section M.6 of the EIS for a discussion of the DOE Section 180(c) Policy and Procedures.

The Price-Anderson Act establishes a system of financial protection (compensation for personal injury and property damage, including loss of use of property) for the public in a nuclear accident, regardless of who causes the damage. The Price-Anderson Act would indemnify any person held liable for damage, including cleanup of released radioactive materials. Persons indemnified would include DOE contractors, subcontractors, suppliers, state, local or tribal governments, emergency response workers, health care workers, other workers, victims, and other citizens who might be held liable. See Section M.8 of the EIS for a discussion of the Price-Anderson Act.

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since the scoping process for this EIS to enable DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Section 2.5.4 and Appendix N of the EIS). Of particular interest were scientific and social studies performed in the past few years that relate directly either to Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty.

- Much of the uncertainty is irreducible.

- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as serious accidents, would not expect such accidents to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in the Final EIS.

8.1 (259)
Comment - 125 comments summarized
Many commenters expressed general opposition to the transportation of spent nuclear fuel and high-level radioactive waste through Nevada. A summary of the comments is as follows:

- Many were opposed to transportation near certain types of structures or areas, including schools, hospitals, businesses, lakes, rivers, and Native American tribal reservations.

- Some commenters were more specific, stating that the EIS does not provide adequate detail about the risks and impacts of spent nuclear fuel and high-level radioactive waste transport to specific towns and cities in Nevada and of impacts to areas through which the largest number of shipments would pass. Specific areas and issues mentioned by commenters include:

  - The Las Vegas Valley, including impacts on tourism
  - Impacts to communities near Yucca Mountain
  - The effects on property values along transportation routes
  - Impacts of using specific routes such as State Route 160 in Pahrump Valley
  - Impacts to specific communities such as the town of Enterprise;
  - Impacts to land use and access across a branch rail line

Impacts of heavy-haul truck shipments from Caliente and the feasibility of using U.S. 95 because of steep grades, curves with a radius of less than 240 meters (800 feet), and critical side slopes and steep dropoffs that would increase the probability of accidents and complicate subsequent clean up

- Some commenters were opposed to the Caliente and Caliente-Chalk Mountain Corridors through Garden Valley, stating that the use of existing roads would be less wasteful and better from an environmental standpoint.

- The hot springs near the northern end of the Carlin Corridor, as well as the seasonal playa lakes in the area, were cited as reasons not to select the Carlin Corridor. Other commenters, however, said that the Carlin Corridor would be the best because it would avoid many towns and cities in Nevada.

Some questioned the overall suitability of roads and highways in Nevada to transport spent nuclear fuel and high-level radioactive waste, including the potential for transportation accidents. Many commenters had specific concerns about the use of the Las Vegas Beltway for truck shipments to Yucca Mountain. These concerns included:

- The possibility that the Beltway would not meet Interstate Highway System standards until 2023, which is many years after shipments would begin and the use of the U.S. Highway 95/I-15 interchange (the "Spaghetti Bowl") while the Beltway is being completed

- The costs of accelerated construction of the Beltway;

- The future population that would be exposed to spent nuclear fuel and high-level radioactive waste shipments along and near the Beltway, including expected heavily populated residential and commercial areas along the beltway in the City of North Las Vegas and in the Summerlin area on the west side of Las Vegas, and the use of projected traffic volumes on the Beltway in the future.

- Figure S-12 incorrectly shows secondary roads not extending to the vicinity of the Las Vegas Beltway when these roads already extend well beyond the beltway.

Others commenters were concerned about terrorist attacks, sabotage, and security issues; inexperienced drivers; evacuation measures; emergency response; radiation exposure; compensation for injuries; advance notice of shipments; local control of routing and time-of-day restrictions; bad weather; and the presence of Native American tribal populations along the routes.

Response

Based on the results of the impact analyses presented in Chapter 6 and Appendix J of the EIS, as well as the results published in numerous other studies and environmental impact analyses cited in the EIS, DOE is confident spent nuclear fuel and high-level radioactive waste can be and would be safely transported to Yucca Mountain. DOE believes, as the EIS reports, that the potential impacts of this transportation would be so low for individuals who live and work along the routes that these individual impacts would not be discernible even if the corresponding doses could be measured. The analysis presented in the EIS factored in the characteristics of spent nuclear fuel and high-level radioactive waste, the integrity of shipping casks that would be used for transportation, and the regulatory and programmatic controls that would be imposed on shipping operations (see Appendix M). The EIS analytical results are supported by numerous technical and scientific studies that have been compiled through decades of research and development by DOE and other Federal agencies, including the Nuclear Regulatory Commission and the U.S. Department of Transportation, as well as by the international community, including the International Atomic Energy Agency.

DOE believes that the EIS adequately analyzes the environmental impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site was recommended and approved. See the introduction to Chapter 8 of this Comment-Response Document for more information.

DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

In this EIS, DOE has used computer models it has used in previous EISs and other studies. These models are widely accepted by the national and international scientific and regulatory communities. For instance, DOE selected the RADTRAN 5 computer program to estimate radiological impacts to populations from incident-free transportation and from accidents. RADTRAN, which was originally developed by Sandia National Laboratories in the late 1970s, has been used in many DOE EISs, and it has undergone periodic review and revision. In 1995, an independent review of RADTRAN 4 (immediate predecessor to RADTRAN 5) demonstrated that it yielded acceptable results when compared to "hand" calculations. More recently, an independent review found that RADTRAN 5 overestimates the measured radiation dose to an individual from moving radiation sources.

To ensure that the EIS analyses reflect the latest reasonably available information, DOE has either incorporated information that has become available since the publication of the Draft EIS or modified existing information to accommodate conditions likely to be encountered over the life of the Proposed Action. For example, the analysis in the Draft EIS relied on population information from the 1990 Census. In this Final EIS, DOE has scaled impacts upward to reflect the relative state-by-state population growth to 2035, using 2000 Census data.

Spent nuclear fuel and high-level radioactive waste can be harmful to human health and the environment because they emit radiation as the elements in them decay. For this reason, Nuclear Regulatory Commission and U.S. Department of Transportation regulations, as well as DOE's own internal Orders, specify containment, shielding, thermal, and nuclear safety requirements for shipping containers (casks). These regulations are designed to preclude even a remote chance of direct exposure. In addition, spent nuclear fuel and high-level radioactive waste are not easily dispersed; they do not readily dissolve in water; they are not liquids or gases that can be easily spilled or leaked, and radiation from them does not make other materials radioactive. Spent nuclear fuel and high-level radioactive waste are solids. They are hard, tough, and dense ceramics, metals, or glasses contained within tough metal barriers.

The shipping casks used to transport these materials are massive, with design features that comply with strict regulatory requirements to ensure that the casks are fault-tolerant. That is, the casks must perform their safety functions even when damaged. Numerous tests and extensive analyses, using the most advanced analytical methods available, have demonstrated that these types of shipping casks would provide containment and shielding even under the most severe kinds of accidents. Since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000, all). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents. (Of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials.) This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS reports potential consequences for accidents that could release radioactive materials.

Although the risk of releasing radioactive materials from a shipping cask in an accident would be small, the U.S. Department of Transportation requires highway shipments to use preferred routes that reduce time in transit (49 CFR 397.101). The Department of Transportation regulations provide for states and tribes to designate alternate preferred routes. These regulations require a state or tribe to consider overall public safety in designating routes that would be in lieu of or in addition to routes specified by the Department of Transportation regulations. For example, under current Federal regulations, before DOE highway shipments of spent nuclear fuel and high-level radioactive waste could use U.S. 95 through Mineral County, Nevada, the State would need to designate this route as an alternate route. The Department of Transportation requirements and the planned completion of the Las Vegas Beltway led DOE to assume, for purposes of analysis in the EIS, that legal-weight truck shipments would not enter the Spaghetti Bowl interchange of Interstate-15 and U.S. 95. Nevertheless, to assess how potential impacts would be different from those of using the Las Vegas Beltway, DOE analyzed the impacts for legal-weight trucks to travel through the Spaghetti Bowl interchange (see Section J.3.1.3 of the EIS for an analysis of the impacts of using different routes in Nevada). DOE did not analyze transportation by heavy-haul trucks through the Spaghetti Bowl interchange because use of the interchange would not be practical. The high volume of traffic through the interchange combined with the slow progression of the trucks through the turns and the over-length configurations of the vehicles would create excessive disruptions of traffic flow.

DOE revised maps in the EIS to represent streets and roads correctly in the Las Vegas Valley and illustrate that many extend to and beyond the Las Vegas Beltway.

The U.S. Department of Transportation routing requirements, along with regulatory requirements to limit radiation dose external to a shipping cask, would help to ensure that radiation doses to persons residing along the routes would be low. The analysis in Chapter 6 of the EIS for the mostly legal-weight truck scenario estimates the dose to persons who would drive alongside the trucks as they traveled on the highways, who would be stopped in locales where truck shipments stopped, and who lived along the routes that would be used. In response to public comments, DOE forecasted growth in populations along routes to estimate potential impacts that could occur in the future when shipments would occur. However, the estimated dose to an individual living along a route would not change with changes in population—only the integrated dose to the whole population would change. The dose for a maximally exposed individual who lived along a route would be an average of about .25 millirem per year. This is about 400 times less than the maximum dose permitted for members of the public in 10 CFR Part 20 (100 millirem).

Based on public comments, the Final EIS includes estimated public health along transportation routes. This analysis accounted for factors such as the locations of intersections, commercial establishments and residences, and traffic signals. The impacts of incident-free transportation would be so low for individuals who lived and worked along the routes that these individual impacts would not be discernible even if the doses could be measured. The total impacts of transportation would be similar for different routes that might be used.

To calculate the potential impacts to a maximally exposed individual, DOE used information and assumptions from a report sponsored by the City of North Las Vegas, Nevada, because DOE believes it to be the only source of the information (DIRS 155112-Berger Group 2000). However, DOE considers the exposure assumptions presented in the report to be extreme and very unlikely to occur (see text box in Section 6.2.1 of the EIS for additional information). The DOE analysis of dose, using information and assumptions presented in the report, estimated a maximally exposed individual in Nevada would receive a dose of about 530 millirem over 24 years. This is an annual dose of about 22 millirem, which is about 6 percent of a 1-year exposure to natural background radiation, and 22 percent of the limit for members of the public listed in Nuclear Regulatory Commission regulations (10 CFR Part 20). A dose of 530 millirem would increase an individual's risk of a fatal cancer by about 1 chance in 4,000 over the person's lifetime. For perspective, an individual's lifetime risk of a fatal cancer from all other causes is about 1 in 4. So, even using the unlikely exposure assumptions contained in the Berger Group report shows that the dose to a maximally exposed individual would be well below that received from natural background radiation, would not be discernible, and would not add measurably to other impacts that an individual could incur.

Nuclear Regulatory Commission and U.S. Department of Transportation regulations (10 CFR Part 73 and 49 CFR Part 173, respectively) include requirements to ensure the physical security and protection of shipments from diversion and attack. For the Final EIS, DOE reexamined, for both rail and truck casks, the consequences of an attack that results in a release of material (in other words, the cask's shield wall would be penetrated) (see Section 6.2.4.2.3 of the EIS), and estimated consequences exceeded those presented in the Draft EIS. Differences in the consequences between the Draft EIS and the Final EIS are due to using "representative" spent nuclear fuel (rather than "typical" fuel in the Draft EIS) and an escalation of impacts to represent population growth to 2035. In addition, in the Draft EIS the consequences of the sabotage event were bounded by those of the maximum reasonably foreseeable accident.

The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection and safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the physical protection and safeguards regulation are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons. The cask safety features that provide containment, shielding, and thermal protection also provide protection against sabotage. The casks would be massive. The spent nuclear fuel in a cask would typically be only about 10 percent of the gross weight; the remaining 90 percent would be shielding and structure.

It is not possible to predict whether sabotage events would occur, and if they did the nature of such events, nevertheless, DOE examined various accidents, including an aircraft crash into a transportation cask. The consequences of both the maximum reasonably foreseeable accident and the aircraft crash are presented in the EIS for the mostly truck and mostly rail transportation scenarios and can provide an approximation of the types of consequences that could occur from a sabotage event. In addition, DOE analyzed the potential consequences of sabotage against a truck or rail cask (see Section 6.2.4.2.3 of the EIS). The results of this analysis indicate that the risk of the maximally exposed individual incurring a fatal cancer would increase from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the terrorist attack of September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

Although DOE anticipates accidents would occur in transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain, it does not anticipate that an accident would lead to a release of radioactive materials from a shipping cask. Nevertheless, the Price-Anderson Act provides for indemnification of liability up to $9.43 billion to cover claims that might arise from an accident in which radioactive materials were released or one in which an authorized precautionary evacuation was made (see Section M.8 of the EIS for a more complete discussion of the Price-Anderson Act). If the damage from a nuclear incident appeared likely to exceed that amount, the Price-Anderson Act contains a Congressional commitment to thoroughly review the particular incident and take whatever action is determined necessary to provide full and prompt compensation to the public.

U.S. Department of Transportation regulations in Volume 49 of the Code of Federal Regulations and DOE's own Transportation Practices (see Appendix M of the EIS) would apply to shipments of spent nuclear fuel and high-level radioactive waste. Included are requirements for training of transportation personnel who are responsible for the safety of shipments, safety of vehicles, shipping documentation, financial responsibility of transportation carriers, emergency response notification, driving and parking requirements (including DOE requirements for transportation during severe weather conditions), and other requirements.

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions the Department would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for addressing emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using a planning grant and based on availability of funds in annual Program budgets specified by Congress. Additional Federal response capabilities, such as expert services from the Radiological Assistance Program Team, could be activated, as requested by states and tribes. The schedule in the proposed policy and procedures for implementation of Section 180(c) of the NWPA (63 *FR* 23753; April 30, 1998) is designed to provide adequate time for training of first responders in advance of the first shipments. If there was a decision to proceed with the development of a repository at Yucca Mountain, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. See Section M.6 of the EIS for a discussion of the DOE Section 180(c) policy and procedures.

In addition, DOE would employ satellite tracking and, in accordance with Nuclear Regulatory Commission regulations, provide advance notification to state, tribal (subject to Nuclear Regulatory Commission approval), and local officials for each shipment of spent nuclear fuel. DOE maintains a national radiological emergency response capability that is available to assist states and tribes in the event of a transportation accident (see Appendix M of the EIS).

DOE investigated the potential impacts of transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain would have on multiple resource areas not related to human health and safety: land use; air quality; biological resources and soils; hydrology; cultural resources; socioeconomics; noise; aesthetics; waste management; utilities, energy, and materials; and environmental justice (see Chapter 6 of the EIS). The Department concluded that the impacts in these resource areas from nationwide transportation (outside Nevada) would not be discernible because shipments would use existing highways and railroads and would contribute only minimally to the volume of national transportation (0.007 percent of railcar kilometers and 0.008 percent of truck kilometers). Although radiological health and traffic fatality impacts would be adverse, because these potential impacts nationwide would not be high for any individual or identifiable group, including Native American tribes, DOE also concluded that transportation of these materials would not raise environmental justice concerns.

As discussed in the EIS, to provide for transportation of rail casks to Yucca Mountain, DOE could construct a branch rail line in one of five candidate rail corridors or could work with the State of Nevada to upgrade one of five highway routes for heavy-haul trucks and, in that case, construct an intermodal transfer facility. For three of the candidate routes for heavy-haul trucks and for purposes of analysis of socioeconomic impacts of heavy-haul truck shipments in Nevada, DOE assumed availability of loaned funds from sources external to Nevada to assist in accelerating construction of the Las Vegas Beltway, if needed. Heavy-haul truck shipments would not travel through the Spaghetti Bowl interchange of Interstate-15 and U.S. 95 in Las Vegas. For the three alternative routes that would pass through the Las Vegas Valley, these trucks would need to use a section of the Las Vegas Beltway to transit from Interstate-15 to U.S. 95 before continuing to Yucca Mountain. DOE's analysis of potential impacts in Section 6.3.3.1 considered the likelihood that large, heavy-haul trucks would affect traffic flow on roads that they would use, including causing delays to traffic on the Las Vegas Beltway. These shipments would be made under permits issued by the State of Nevada that would contain restrictions designed to minimize the effects on traffic of the large trucks.

In its evaluation of potential impacts of constructing a branch rail line in each rail corridor and of upgrading highways for use by heavy-haul trucks and constructing an intermodal transfer station in Nevada, DOE considered the potential impacts that could occur both to the natural environment and to communities, such as Caliente, that would be nearby (see Sections 6.3.2 and 6.3.3 of the EIS). For example, in the Garden Valley west of Pioche in northeastern Nye County, DOE biologists found the Welsh's catseye plant, classified as a sensitive species by the Bureau of Land Management, about 2.7 kilometers (1.7 miles) from a potential alignment of the Caliente Corridor (DIRS 104593 CRWMS M&O 1999). In this area, DOE identified potential variations in the Caliente Corridor alignment that could avoid a sensitive environmental feature or other feature that could affect the engineering or construction of the route. In the Carlin Corridor, DOE identified numerous springs within 5 kilometers (3 miles) of the alignment of a branch rail line. At the north end of this corridor, DOE biologists identified a hot spring approximately 0.5 kilometer (0.31 mile) east of Nevada Route 306 about 5 kilometers south of Interstate-80. DOE would locate the alignment of a branch rail line to minimize the potential to affect springs and wet areas.

If a corridor was selected for construction of a branch rail line, DOE would conduct field studies along the corridor that would identify sensitive ecological, and cultural resources, and specific land uses to be avoided. DOE would minimize land-use impacts and would avoid private land to the maximum possible extent. DOE would determine how to best avoid detrimental impacts; for example, in some areas, fences could be recommended to protect livestock and open culverts could allow access to both sides of the track.

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since the scoping process for the EIS to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Section 2.5.4 and Appendix N of the EIS). Of particular interest were scientific and social studies conducted in the past few years that relate directly either to Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. In addition, DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty.
- Much of the uncertainty is irreducible.
- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as serious accidents, would not expect such accidents to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

8.1 (518)
Comment - EIS000253 / 0002
The DEIS does not adequately detail proposed shipping routes or the training and equipment necessary for local emergency response personnel in communities along the routes. COPEEN is concerned about the number of shipments that would travel along the I-70 corridor. These shipments would pass through communities that are already overburdened by exposure to numerous hazardous and toxic materials. These Northeast Denver communities are lower-income communities of color who are exposed to higher than average environmental hazards-shipments to Yucca Mountain would only increase their exposure. COPEEN demands that the Department of Energy propose alternative transportation routes. Additionally, COPEEN expects to see detailed training and community education plans regarding the Yucca Mountain shipments. Local emergency response personnel must be adequately trained on how to handle a situation should one arise.

Response
Appendix J in the EIS includes state maps of the routes used in the analysis of national transportation. Although these are the routes that were used to analyze potential impacts, these are not necessarily the routes that would be used for the transport of high-level radioactive waste and spent nuclear fuel to a repository at Yucca Mountain. As stated in the EIS (see Section 2.1.3.2.2), a truck carrying a shipping cask of high-level radioactive waste or spent nuclear fuel would travel to the repository in accordance with U.S. Department of Transportation regulations

(49 CFR 397.101), which require the use of preferred routes. These routes include the Interstate Highway System, including beltways and bypasses. Alternate routes could be designated by states and Native American tribes following Federal regulations (49 CFR 397.103) that require consideration of the overall risk to the public and prior consultation with affected local jurisdictions and with any other affected states and tribes. The highway routes that would be used would be selected in accordance with these Federal transportation regulations and would not be selected by DOE. However, in accordance with Federal regulations, states, including Colorado, may propose alternate routes to better meet local or regional conditions. The process for selecting and approving routes, including state and tribal consultation, is described in Section M.3 of the EIS.

DOE believes that the mostly rail case, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. To reach this conclusion, DOE considered whether sites are able to handle larger (rail) casks, distances to suitable railheads, and historic precedent in actual shipments of fuel, waste, or other large reactor-related components. DOE also has considered relevant information published by knowledgeable sources such as the Nuclear Energy Institute and the State of Nevada. The analysis has confirmed DOE's belief that the mostly legal-weight truck and mostly rail scenarios provide the range (lower and upper bound) of environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste.

The potential environmental justice impacts of transportation activities are discussed in Section 6.1.2.12 of the EIS.

In response to comments, the EIS has been revised and now provides information about emergency response capabilities in Appendix M. With respect to emergency response training, as required by Section 180(c) of the NWPA, DOE would provide technical assistance and funds to states for assessing the need for and training for public safety officials of appropriate units of local government and Native American tribal governments through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. Training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would institute this training before beginning shipments to the repository. In the event of an incident involving high-level radioactive waste or spent nuclear fuel, the transportation vehicle crew would notify local authorities and the central communications station monitoring the shipment. DOE would make resources available to local authorities, if requested, to respond to such an incident. However, state and tribal governments have a primary responsibility to respond to and protect the public health and safety in their jurisdictions in accidents involving radioactive materials. The EIS does not include detailed training and community education plans. Such plans would be developed by state, local, and tribal agencies and governments.

8.1 (1378)
Comment - EIS000432 / 0006
The next problem I have with the proposal is the transportation. The idea of having radioactive waste on our highways does not seem like a good one. If an accident occurred in a major city and the radioactive waste was spilled what would happen? I didn't find any information on what the DOE or the government would do if this occurred. All I found was possible impacts that didn't make sense. From 1 to 4 traffic fatalities would be likely to occur due to traffic accidents? That's what the DOE said. But if a traffic accident occurred and radioactive waste was spilled I think there is a much higher potential for deaths. Furthermore, the DOE is planning on 49,500 trucks shipments from different plants across the country to the Yucca Mountain site in Nevada. With this many trucks on the highways I think there is substantial potential for an accident; along with trucks they have proposed to use railways as a source of transportation. Maybe the railways might be safer, but if there are 300 shipments there is a possibility for a major accident as well.

Response
Although, given the number of shipments, traffic accidents would be probable, DOE does not believe that any accident would result in the release of radioactive material, primarily because of the structural integrity of the casks in which the material would be transported. The EIS contains a discussion of potential impacts from accidents in both the mostly legal-weight truck scenario and the mostly rail scenario (see Section 6.2.4.2). Though an accident resulting in release of radioactive material is not expected to occur, the Department analyzed the maximum reasonably foreseeable accident that would involve the release of radioactive material from a transportation cask. Since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). DOE has concluded that the models used for analysis

in the Draft EIS relied on assumptions about spent nuclear fuel and cask response to accident conditions that caused an overestimation of the resulting impacts. Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments of spent nuclear fuel in the United States over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

8.1 (1656)
Comment - EIS000359 / 0002
There's also been a lot of discussion this afternoon, as is correct to have this amount of discussion, on nuclear waste transportation. It's the issue that affects most of the country, with highways and railroads going past all of our communities. And I think all parties can agree that public health and safety and protection of the environment are vitally important. And that is a primary goal that I saw in the Draft Environmental Impact Statement.

Response
Chapter 6 and Appendix J of the EIS does provide a comprehensive analysis of worker and public health and safety and Section 6.3 provides a comprehensive assessment of potential environmental impacts. The results are that impacts would be small for national and Nevada transportation of spent nuclear fuel and high-level radioactive waste.

The Department agrees that sufficient information on public health and safety and environmental protection of the national and Nevada transportation and their potential impacts is provided in the EIS to support current decisionmaking.

8.1 (2218)
Comment - EIS000621 / 0008
Will the Crescent Valley airport be restricted? It goes right into the quarter mile corridor.

Response
Until DOE selected a corridor and determined the alignment of a route in that corridor, it would be unclear if there was a potential for repository-related transportation activities to affect specific land uses. On the other hand, DOE would consider existing uses both in its selection among the alternative corridors and the final alignment of the route in the corridor. The Department would endeavor to minimize the consequences of its routing decisions on existing uses in the selected corridor. It is unlikely that restrictions would be placed on use of the Crescent Valley airport because of DOE shipments on a branch rail line in the Carlin Corridor.

8.1 (2265)
Comment - EIS000394 / 0002
The transportation of spent nuclear fuel and high-level waste from the various points of generation to a national repository is of keen interest to Georgia. Public acceptance of transportation of spent nuclear fuel in the U.S. is not a given, as media reports of recent and upcoming shipment campaigns will attest. Public acceptance of the risks of transporting spent nuclear fuel and high-level radioactive waste, however small or large they are, or are perceived to be, is critical to the success of this program. A strong, credible education and public outreach program is essential to achieving some measure of public acceptance for this program, as is the existence of knowledgeable emergency response personnel at the state and local level, armed with both the training and equipment which would be required to respond to a transportation incident involving spent nuclear fuel or high-level radioactive waste.

Response
DOE conducted 21 public hearings across the nation to solicit input on this EIS during a 199-day comment period. In addition to announcements in the *Federal Register*, the Department placed advertisements for each hearing in local or regional newspapers and provided notices to local media outlets, public service announcements on radio and television stations, and notices to state senators and congressional representatives, governors, mayors, and county commissions. As part of continuing its efforts to inform the public about the Proposed Action, DOE placed maps of

the routes analyzed in the EIS on the Yucca Mountain Project web site and added them to the Final EIS. (As noted throughout the EIS, the analyzed routes might not be the routes used for shipment to the repository. DOE would identify actual routes about 5 years before shipments would begin.)

A major element of the Yucca Mountain Project has been to ensure that stakeholders, the media, and the public have an opportunity to participate in and acquire the information they need to make informed decisions about the project. This effort focuses on building and maintaining relationships with stakeholders, the public, and the media through regular interaction and provision of project information. The program develops public information products, including permanent and portable field exhibits, information materials, exhibits and models, audiovisuals, electronic media, publications, and public outreach announcements. These sources are available at science centers in Las Vegas, Pahrump, and Beatty, Nevada; on the Yucca Mountain and Office of Civilian Radioactive Waste Management Internet sites (*www.ymp.gov* and *www.rw.doe.gov*); through public meetings and hearings on Yucca Mountain topics; and during public tours of the Yucca Mountain site, as well as by specific inquiries and requests for information materials. DOE provides speakers and technical experts to local, state, national, and international technical groups, community groups, professional organizations, students, and other audiences on Yucca Mountain topics, and has created programs and materials to enhance the awareness of area educators and students on issues related to the disposal of spent nuclear fuel and high-level radioactive waste. Information on Yucca Mountain public outreach activities is available at 1-702-295-1312 or 1-800-225-6972.

As to emergency response capabilities, DOE is required by Section 180(c) of the NWPA to provide technical and financial assistance to states and Native American tribes to support training for emergency responders. Part of this support is the determination of needed training that is based on plans developed by responsible jurisdictions. Additional information on Section 180(c) requirements and other emergency response capabilities and responsibilities are provided in Sections M.6 and M.5 of the EIS.

DOE believes that sufficient information on transportation of spent nuclear fuel and high-level radioactive waste has been and continues to be provided to the public and responsible authorities. The Department also believes that sufficient information on emergency preparedness training and equipment is provided in the EIS to support current decisionmaking.

8.1 (2315)
Comment - EIS000571 / 0002
In the previous session I was informed that this waste would be traveling over the Donner overpass. Well, what happens to the people, because there are houses by the Donner overpass?

So what happens if, say, a truck or something else is traveling down the road and perhaps they wreck or they derail, depending on what it is, and these tubes go down rolling down the hill? They are going at very fast speed when they are going down the hill, and they are round. Perhaps they are going 60, 70 miles down the hill and they crash into a tree or something. What happens if they crack [casks] and somehow this radioactivity gets out into our public and then it will start harming people.

Response
Section J.1.2 of the EIS provides maps and tables that indicate the number and routing that DOE used for analysis in the EIS of shipments from 77 sites in the United States to Yucca Mountain. Many tables in this section indicate the origin, miles to be shipped, and number of shipments that the Department has estimated would originate in and pass through each state. The tables in the maps include potential impacts in each state associated with a national campaign to transport high-level radioactive waste and spent nuclear fuel to the proposed repository at Yucca Mountain (see Section 6.2.3). Section 6.3.1.3 discusses the impacts to maximally exposed persons along a legal-weight truck route. The estimated impact would be about 6 millirem. The average background radiation dose in the United States is about 300 millirem, indicating that the maximally exposed person receives a small dose and the dose to the average person along a legal-weight truck route would be much smaller.

The EIS contains a discussion of potential impacts from accidents in both the mostly legal-weight truck scenario and the mostly rail scenario (see Section 6.2.4.2). Though an accident resulting in release of radioactive material is not expected to occur, the Department analyzed the maximum reasonably foreseeable accident that would involve the release of material from a transportation cask. Since the publication of the Draft EIS, the Nuclear Regulatory

Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). DOE has concluded that the models used for analysis in the Draft EIS relied on assumptions about spent nuclear fuel and cask response to accident conditions that caused an overestimation of the resulting impacts. Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

8.1 (2819)
Comment - EIS000935 / 0001
I live in Kirkland between two railroads only one mile apart from each other. I feel a great threat to my life and for my family. I do not want to see another Times Beach story of evacuation. Not even a Francis Howell episode. These town were destroy[ed] by Gov. contamination. Has not Missouri had enough radioactive or chemical problems.

This is the Madrid fault area for earthquakes. Train derailment is going to happen.

There should be another alternative.

The unsinkable Titanic sank. The construction of the cast could shield us but not 100%.

Response
A transportation accident that would involve the release of radioactive material from a transportation cask is not expected to occur during the transportation campaign. The Department analyzed the maximum reasonably foreseeable accident that would involve the release of material from a transportation cask. Since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). DOE has concluded that the models used for analysis in the Draft EIS relied on assumptions about spent nuclear fuel and cask response to accident conditions that caused an overestimation of the resulting impacts. Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

Although it is extremely unlikely, the EIS does include a discussion of potential impacts from accidents (including those induced by an earthquake) in both the mostly legal-weight truck scenario and the mostly rail scenario (see Section 6.2.4.2).

8.1 (3146)
Comment - EIS000642 / 0003
Will mining claims be divided and access restricted? There are many claim holders out here, people who are looking for additional mineral deposits. We feel that it is inadequately addressed in the EIS.

Will the Cortez Mine be given its own railroad overpass to continue its daily operations? As one can see on the map on the wall, the corridor goes right through their operations. They have a mill on each side of the valley, and these things are inadequate. They have not been addressed in the EIS, the Draft EIS.

Response
If the repository proposal proceeds, final corridor selection and alignment would be necessary before determinations could be made regarding the nature and locations of crossings and other facilities. Alignment decisions could result in route locations that do not impede the operation of existing facilities.

At this time, definitive information is not available on specific tracts of land that could be required for a given transportation alternative. For any land that would be required or otherwise affected, the Department would fairly compensate landowners under Federal acquisition procedures. Should DOE be required to exercise its right of eminent domain, it would do so pursuant to applicable laws and regulations.

8.1 (3297)
Comment - EIS000986 / 0003
In addition, the DOE informs me that it will take approximately 24 years to complete all the waste shipments from these commercial and DOE facilities to the repository at Yucca Mountain. Given that extensive period of time and the thousands of required shipments, it is highly unlikely that this transport will be completed within an accident. Our region simply cannot afford to have this waste travel through the area. The risks to the public health are much too great.

Response
The risks of transporting spent nuclear fuel and high-level radioactive waste to a repository have been analyzed and the results of the analyses are presented in Chapter 6 of the EIS. The conclusions reached are that the risks and impacts are almost negligible. Of the thousands of shipments of spent nuclear fuel completed over the last 30 years, none has resulted in an identifiable injury from the release of radioactive material.

The EIS acknowledges that transportation accidents are likely to occur during the transport of radioactive materials to the proposed Yucca Mountain Repository. In Section J.1.4.2.3.2, the EIS estimates the number of accidents under the mostly legal-weight truck shipping scenario and accidents under the mostly rail scenario. A recent study concluded that only a tiny fraction of all accidents, less than one in 10,000, would be severe enough to cause a failure in a spent nuclear fuel shipping cask (DIRS 152476-Sprung et al. 2000). The reason for this is the rigorous design, performance, and testing requirements (see 10 CFR Part 71) for spent nuclear fuel and high-level radioactive waste shipping casks. Based on these statistics, DOE does not expect an accident to occur that would result in a radiological release and subsequent environmental cleanup. For additional information on the regulations, practices, and equipment which have contributed to this safety record and would be followed and utilized in the future, see Appendix M.

8.1 (4121)
Comment - EIS002239 / 0007
Looking at the mostly truck scenario, a hundred percent truck; and mostly rail, 95 percent truck. Neither of those is realistic.

What's realistic -- and if you look at realistic, I'm relating it not just to this document, but to the way the Department of Energy has planned to privatize the transportation system. Private sector corporations have to be able to make money moving this stuff.

When you look at all of those considerations, it's most likely that about 60 percent of the waste can be moved by rail, and 40 percent will move by truck. We have got a scenario where we have modeled this -- we call it the current capabilities scenario.

The Draft EIS fails to bound the full impacts of transportation. Now, this may sound strange until you actually model it, but a combination of 60 percent rail and 40 percent truck actually has more impact than 100 percent either way, and that's because you have more routes in more states, more Indian tribes and more counties affected; and at the very least, the amount of expenditures and concerns we have for emergency response training goes up.

Response
The EIS considers two national transportation scenarios, mostly legal-weight truck and mostly rail (see Sections 2.1.3.2.1 and 6.2). As shown in Section J.3.1.3, these scenarios illustrate the broadest range of operating conditions

relevant to potential impacts to human health and the environment. Sensitivity studies, described in this section, indicate that there is little difference in impacts for a wide variety of alternative legal-weight truck routes. The Department does not anticipate that either the mostly legal-weight truck or the mostly rail scenario represents the actual mix of truck or rail transportation modes it would use. Rather, these two scenarios represent the two extremes in the possible mix of transportation modes. The analysis of the potential impacts associated with each of these scenarios provides DOE with an envelop of impacts to understand all of the potential impacts associated with Proposed Action and to make future decisions regarding a transportation mode. DOE believes that the mostly rail case, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. As stated in the EIS, DOE has identified mostly rail as the preferred national mode of transportation.

8.1 (4440)
Comment - EIS001038 / 0007
He [Senator Richard Bryan of Nevada] cited DOT statistics that "over a 10 year period there were more than 99,000 transport accidents releasing hazardous materials." Accidents happen. And where? So far, most of the country can only guess.

Response
The EIS contains a discussion of potential impacts from accidents in both the mostly legal-weight truck scenario and the mostly rail scenario (see Section 6.2.4.2). Though an accident resulting in release of radioactive material is not expected to occur, the Department analyzed the maximum reasonably foreseeable accident that would involve the release of materials from a transportation cask. Since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). DOE has concluded that the models used for analysis in the Draft EIS relied on assumptions about spent nuclear fuel and cask response to accident conditions that caused an overestimation of the resulting impacts. Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

8.1 (4663)
Comment - EIS001372 / 0006
Another critical component of the Yucca Mountain Project is the transportation issue. Nearly 100,000 metric tons of nuclear waste on as many as 79,300 truck and 12,600 rail shipments would travel by rail and highway through 43 states, within a half-mile of 52 million people in casks that have not been fully or safely tested for a 30 year period. There are a great many concerns about this aspect of the proposal. First, according to government figures, approximately 50-260 accidents would occur and 250-900 "incidents" would be expected over the 30-year period. How can we afford to even have one accident occur during the transportation of high-level radioactive waste! We cannot! It is evident from reading the DEIS that this aspect is very shortsighted.

Response
As stated in Section 2.1.3.2 of the EIS, under the mostly legal-weight truck scenario about 53,000 shipments of spent nuclear fuel and high-level radioactive waste would travel on the Interstate Highway System over a 24-year period. For the mostly rail scenario, approximately 9,600 railcars would travel on the nationwide rail network over the same period. Although traffic accidents would be probable given the number of shipments, DOE does not believe any accident would result in the release of radioactive material, primarily because of the structural integrity of the casks in which it would transport the material. In the more than 2,700 shipments involving spent nuclear fuel over the past 3 decades, there has not been a release of radioactive materials to the environment.

The EIS discusses potential impacts from accidents under the mostly legal-weight truck and mostly rail scenarios (see Section 6.2.4.2). Approximately five traffic fatalities could occur in transporting spent nuclear fuel and high-level radioactive waste under the mostly legal-weight truck scenario during the 24 years of operation and 350 million kilometers (220 million miles) of highway travel. In the mostly rail scenario, there could be approximately three traffic and train accident fatalities. The maximum reasonably foreseeable accident would involve the release of material from a transportation cask. The shipping casks used to transport these spent nuclear fuel and high-level radioactive waste are massive and tough with design features that comply with strict regulatory requirements that ensure the casks perform their safety functions even when damaged. Numerous tests and extensive analyses have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents. In addition, since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents. This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

With respect to costs associated with an accident involving nuclear waste, the Price-Anderson Act, as discussed in Section M.8 of the EIS, establishes a system of financial protection for persons who might be liable for or injured by a nuclear accident or incident. The Price-Anderson Act provides liability coverage to DOE activities (including transportation) involving spent nuclear fuel, high-level radioactive waste, and transuranic waste. Specifically, the Act establishes a system of private insurance and Federal indemnification that generally ensures that as much as $9.43 billion is available to compensate for damages suffered by the public, regardless of who causes the damages. The liability of all responsible parties is limited to the amount of coverage provided by the Price-Anderson system. State, local, and tribal governments cannot be required to provide additional compensation. Price-Anderson indemnification would apply to the operators of a repository at Yucca Mountain and to transporters of nuclear waste from commercial and DOE sites to the repository.

In addition to Price-Anderson indemnification, the Motor Carrier Act of 1980 and its implementing regulations (49 CFR Part 387) require vehicles carrying spent nuclear fuel or high-level radioactive waste to maintain financial responsibility of at least $5 million, which would be available to cover public liability from a non-nuclear incident and for environmental restoration. Federal law does not require rail, barge, or air carriers of radioactive materials to maintain liability coverage, although these carriers often voluntarily carry such insurance. Regardless of whether the carrier had insurance, an incident involving these carriers would be subject to state law applicable for any type of accident.

The Nuclear Regulatory Commission would certify casks used for the transport of spent nuclear fuel and high-level radioactive waste (10 CFR Part 71). Section M.4 of the EIS provides more details on the Commission testing and certification program for transportation casks.

8.1 (5912)
Comment - EIS001622 / 0028
Some routes leading to the Nevada Test Site/Yucca Mountain area are heavily traveled tourist and recreational routes. These routes can be greatly impacted by increased truck traffic. Increased truck traffic (especially those hauling nuclear waste) could influence the safety, reliability and congestion characteristics of these routes. Additionally, none of these non-Interstate routes are suitable for the safe and efficient transport of HLNW. None of these routes were designed for heavy trucks, high truck volumes, or quick emergency response.

Response
The EIS analyzed the potential impacts in Nevada of the mostly legal-weight truck scenario and the use of heavy-haul trucks under the mostly rail scenario (see Section 6.3). Under the mostly legal-weight truck scenario, highway shipments would be restricted to specific routes that satisfy the regulations of the U.S. Department of Transportation (49 CFR Part 397). Because the State of Nevada has not designated preferred alternate routes, only one combination of routes for legal-weight truck shipments would satisfy U.S. Department of Transportation routing regulations (Interstate-15 to U.S. 95 to Yucca Mountain). Legal-weight truck shipments in Nevada of spent nuclear fuel and high-level radioactive waste to the Yucca Mountain site would be a very small fraction of the total traffic [less than 1.2 million kilometers (750 thousand miles) per year for legal-weight truck shipments in Nevada in comparison to an estimated 1.2 billion kilometers per year of commercial vehicle traffic on Interstate-15 and U.S. 95 in Southern Nevada].

DOE recognizes that use of heavy-haul trucks would require upgrading of some Nevada highways, and has included the potential environmental impacts and costs of such upgrades in the EIS (see Section 6.3.3). Upgrades would include reconstruction of some highway sections, new turnout lanes at frequent intervals, widening of highway shoulders, and improvement of road surfaces.

With respect to quick emergency response, as required by Section 180(c) of the NWPA, DOE would provide technical assistance and funds to states and tribes for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions DOE would transport spent nuclear fuel and high-level radioactive waste. Training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would institute this training before beginning shipments to the repository. In the event of an incident involving high-level radioactive waste or spent nuclear fuel, the transportation vehicle crew would notify local authorities and the central communications station monitoring the shipment. DOE would make resources available to local authorities as appropriate to mitigate such an incident. Additional information on the requirements and implementation of Section 180(c) is provided in Sections M.6 and M.7 of the EIS.

8.1 (6092)
Comment - EIS001265 / 0001
This plan has already been implemented so your next step is to discuss the safest way to transport this nuclear waste through your "valley." This should be your primary reason for meeting and discussion. Being realistic about this is the only way to be, all the yes's and no's mean nothing they are only words it is action to assure the safety of this transportation that counts.

Response
DOE has made no decision regarding the proposed monitored geologic repository at Yucca Mountain. After the EIS has been completed, the Secretary of Energy will decide whether to recommend approval of the development of a monitored geologic repository at Yucca Mountain to the President.

The Secretary of Energy will consider the potential impacts associated with transportation of high-level radioactive waste and spent nuclear fuel when determining whether to recommend Yucca Mountain as the site of the monitored geologic repository. Although no transportation decisions would be made until after completion of the Site Recommendation process, DOE believes that the EIS provides the information necessary to make decisions regarding the basic approaches (for example, mostly rail or mostly truck shipments), as well as the choice among alternative rail corridors in Nevada.

With respect to transportation safety, DOE agrees that the ability to safely transport high-level radioactive waste and spent nuclear fuel to the proposed repository is an integral part of the determination on whether to recommend Yucca Mountain as a site for a repository. The protocols to be used by the Regional Servicing Contractors are listed in Section M.3 of the EIS. These protocols meet the statement made by DOE in Section 2.1.3.2 that the transportation of spent nuclear fuel and high-level radioactive waste would comply with all applicable regulations of the U.S. Department of Transportation and the Nuclear Regulatory Commission.

8.1 (6565)
Comment - EIS001632 / 0052
Section 6.2.1: This section describes how the EIS bounds the impacts to human health, safety and the environment from transportation by examining the two extremes of transportation possibilities mostly rail and mostly legal-weight truck. Based on DOE's analysis, EPA [the Environmental Protection Agency] agrees with DOE's overall assessment that radiological impacts to the public from transportation of wastes to Yucca Mountain will be small.

Response
Thank you for your comment.

8.1 (6793)
Comment - EIS001905 / 0005
The highway routes used in the DEIS make Ohio a major corridor state for truck shipments to Yucca Mountain. Three of the principal truck routes from Eastern reactors enter Ohio from Pennsylvania on I-90, I-80, and I-76;

converge on the Ohio Turnpike (I-80/I-90) at Elyria; and then continue west through Indiana, Illinois, and Iowa on I-80. These routes traverse the Cleveland and Toledo metropolitan areas, and more than 300 miles on rural Ohio interstate highways. Under the mostly truck scenario, proposed action, about 11,200 truck shipments of high-level nuclear waste (about 22% of the total) traverse Ohio over 24 years. Under the mostly truck scenario, modules 1 & 2, about 18,900 truckloads of high-level nuclear waste (about 20% of the total) traverse Ohio over 39 years. Under either scenario, an average of 1.3 trucks per day would travel through Ohio every day for decades.

Response
Considering the number of shipments described in Section 6.1.1 of the EIS and potential routes of shipments described in Section J.1.2, only a fraction of the total volume of spent nuclear fuel and high-level radioactive waste (especially that currently located in the Northeastern United States) would travel through Ohio. Appendix J of the EIS contains maps of individual states and tables for each state listing the number of shipments that DOE estimates would originate and pass through the state and the impacts of those shipments. Assuming the 22 percent figure used by the commenter is correct, less than two additional truck shipments would pass through Ohio on a daily basis. Given the amount of truck travel that already occurs on U.S. highways, including those in Ohio, the additional daily truck shipments would not be expected to cause additional impacts as a result of incident-free transportation.

The EIS addresses the potential impacts associated with a national campaign to transport high-level radioactive waste and spent nuclear fuel to the proposed repository at Yucca Mountain (see Section 6.2.3). DOE believes that the mostly rail case, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. In reaching this conclusion, DOE considered whether sites are able to handle larger (rail) casks, distances to suitable railheads, and historic precedent in actual shipments of fuel, waste or other large reactor-related components. DOE also has considered relevant information published by knowledgeable sources such as the Nuclear Energy Institute and the State of Nevada. The analysis has confirmed DOE's belief that the mostly legal-weight truck and mostly rail scenarios provide the range (lower and upper bound) of environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste.

8.1 (6795)
Comment - EIS001905 / 0006
Rail shipments to Yucca Mountain would also heavily impact Ohio. The DEIS evaluated four rail routing scenarios using the INTERLINE model. Under the DEIS routing scenarios, two major streams of rail shipments to Yucca Mountain converge in Cleveland, at the interchange of Conrail mainlines from Buffalo and Harrisburg. A smaller number of shipments travel the Norfolk Southern from Cleveland to Chicago, the Norfolk Southern from West Virginia to Kansas City via Portsmouth, and the CSXT from Pennsylvania to Chicago via Youngstown and Akron. Rail shipments along these routes total almost 1,000 route miles in Ohio. Under the mostly rail scenario, proposed action, about 2,700 rail shipments (about 25% of the total) traverse Ohio over 24 years. Under the mostly rail scenario, modules 1 & 2, about 4,200 rail shipments (about 21% of the total) traverse Ohio over 39 years.

Response
Considering the number of shipments described in Section 6.1.1 of the EIS and potential routes of shipments described in Section J.1.2, only a fraction of the total volume of spent nuclear fuel and high-level radioactive waste (especially that currently located in the Northeastern United States) would travel through Ohio. Appendix J of the EIS contains maps of individual states and tables for each state listing the number of shipments that DOE estimates would originate and pass through the state and the impacts of those shipments. Given the amount of rail traffic that already occurs on U.S. railways, including those in Ohio, the additional rail shipments would not be expected to cause additional impacts as a result of incident-free transportation.

DOE believes that the mostly rail case, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments of spent nuclear fuel and high-level radioactive waste. To determine this mix, DOE considered whether sites are able to handle larger (rail) casks, distances to suitable railheads, and historic precedent in actual shipments of fuel, waste or other large reactor-related components. In addition, DOE considered relevant information published by knowledgeable sources such as the Nuclear Energy Institute and the State of Nevada. The analysis has confirmed DOE's belief that the mostly legal-weight truck and mostly rail scenarios provide the range (lower and upper bound) of environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste.

The EIS addresses the potential impacts associated with a national campaign to transport high-level radioactive waste and spent nuclear fuel to the proposed repository at Yucca Mountain (see Section 6.2.3).

8.1 (7148)
Comment - EIS001337 / 0045
During EIS scoping, Lincoln County and the City of Caliente provided DOE with evidence that rail condition can affect accident rates. Reference to County and City sponsored research regular assessments of rail condition along the UP mainline[13] was provided to DOE. The County and City encouraged DOE to an assessment of pre-waste shipment track condition and use within the DEIS. The DEIS is silent on the issue of existing rail condition and implications of rail condition for transportation safety.

[13] ETS Pacific, Inc., Pilot Study and Analysis of 46 Mile Rail Corridor in Lincoln County, Nevada, prepared for the Board of Lincoln County Commissioners, October 1986. See also ETS Pacific, Inc., Condition Update of 46 Mile Rail Corridor in Lincoln County, Nevada, prepared for the Board of Lincoln County Commissioners, June 1989.

Response
DOE recognizes that rail conditions could affect accident rates. The analysis in the EIS used state-specific accident rates and data from a recent Nuclear Regulatory Commission study (see Section J.1.4.2.3.1 of the EIS) of the adequacy of its transportation regulations in 10 CFR Part 71 to estimate the likelihood and severity of transportation accidents. The data from these studies are based on national data collected from actual accidents. Thus, the analysis presented in the EIS uses data derived from accidents where unique local conditions were contributing factors, including the Union Pacific mainline in Nevada.

8.1 (7405)
Comment - EIS001957 / 0025
Section 6.0 Environmental Impacts of Transportation -- The NPS [National Park Service] objects to transportation of nuclear waste materials in and near the boundaries of its management units. Hazardous waste contamination of park land from ancillary transportation is already a major problem. Each year millions of dollars and unnecessary employee time is expended on these issues. These costs drain important funding from areas and projects necessary for the maintenance of park units. The possibility of the spill or inadvertent release of radionuclides within or neighboring a park unit is unacceptable.

State highways adjoin or are adjacent to Death Valley and Great Basin NP's [National Parks] and Lake Mead NRA [National Recreation Area]. Any accidental spills arising from transportation will directly affect the parks. Not only will park resources be affected, but park emergency response staff will be necessarily deployed. The proposed Yucca Mountain transportation plan does not provide for adequate trained emergency response staff or other resources to deal with highway accidents affecting the parks. Relying on NPS [National Park Service] staff to respond to highway accidents involving high-level nuclear waste is unacceptable.

For example, California Highway 127 parallels the drainage of the Amargosa River over a great distance in proximity to Death Valley NP [National Park]. Flow measurements published by the U.S. Geological Survey give evidence of periodic surface flows in that drainage. Flows may originate at Oasis Valley, Forty Mile Wash, or a host of other locations and continue to the terminus of the system at Badwater Basin in the park. The draft EIS provides neither any discussion of the outcome should an accident occur releasing material into the park along this route, nor a risk analysis of this possibility.

The supplemental EIS must address this omission with regard to both Nevada State Highway 95 and California State Highway 127, identifying and assessing scenarios for Great Basin NP [National Park] and Lake Mead NRA [National Recreation Area] (in addition to Death Valley NP [National Park]).

Response
Transportation of spent nuclear fuel and high-level radioactive waste is an integral part of the ultimate disposition of these wastes in a geologic repository and the EIS addresses the potential impacts associated with a transportation

campaign (see Chapter 6). In determining whether to recommend the Yucca Mountain site to the President, the Secretary of Energy would take transportation impacts, including potential impacts to national parks and recreation areas, into account.

Transportation by legal-weight truck would involve shipments along Interstate System highways in accordance with U.S. Department of Transportation regulations (49 CFR Part 397). These regulations limit shipments of hazardous materials such as nuclear waste to Interstate System highways and require shippers to use beltways and bypasses where available. DOE recognizes that even an incident-free transportation campaign could adversely affect people who live, work, or recreate near transportation routes. DOE also recognizes the potential for transportation accidents and analyzed impacts resulting from transportation accidents in the EIS, including contamination of water and food. Given the number of shipments, traffic accidents would be probable. DOE does not believe that any accident would result in the release of radioactive material, primarily because of the structural integrity of the casks (see Section M.5 of the EIS for a discussion of cask safety and testing) in which the material would be transported. In the more than 2,700 shipments involving spent nuclear fuel over the past 3 decades, there have been four accidents, with no release of radioactive materials to the environment.

As required by Section 180(c) of the NWPA, DOE would provide technical assistance and funds to states for training for public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions DOE would transport spent nuclear fuel and high-level radioactive waste. Training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. D OE would institute this training before beginning shipments to the repository. In the event of an incident involving high-level radioactive waste or spent nuclear fuel, the transportation vehicle crew would notify local authorities and the central communications station monitoring the shipment. DOE would make resources available to local authorities as appropriate to mitigate such an incident. Additional information on the elements and implementation of Section 180(c) of the NWPA act is provided in Section M.6 of the EIS.

8.1 (7485)
<u>Comment</u> - EIS001775 / 0002
I sat through four hours of the hearing this morning eager to learn all I could about this project. What I did learn was alarming. Those who have knowledge of nuclear waste and know what questions to ask could not get their questions answered. You kept saying that congress did not require you to address a number of issues. When you were asked about transportation, you said congress told you didn't have to address it. Excuse me? To us here in the midwest, this is about transportation, the transportation of deadly nuclear waste through our streets and cities where our families live, over the rivers where we get our drinking water.

<u>Response</u>
Transportation of spent nuclear fuel and high-level radioactive waste is an integral part of the ultimate disposition of these wastes in a geologic repository and the EIS addresses the potential impacts associated with a transportation campaign (see Chapter 6 and Appendix J of the EIS). In determining whether to recommend the Yucca Mountain site to the President, the Secretary of Energy will take transportation impacts into account.

Transportation by legal-weight truck would involve shipments along Interstate System highways in accordance with U.S. Department of Transportation regulations (49 CFR Part 397). These regulations limit shipments of highly radioactive materials such as nuclear waste to Interstate System highways and require carriers to use beltways and bypasses where available. DOE recognizes that even an incident-free transportation campaign could adversely affect people who live or work near transportation routes. Section 6.2.3.1 of the EIS presents the number of latent cancer fatalities from legal-weight truck transport of spent nuclear fuel and high-level radioactive waste for the 24-years of operation. DOE also recognizes the potential for transportation accidents and analyzed impacts resulting from transportation accidents in Section 6.2.4. Although, traffic accidents would be probable given the number of shipments, DOE does not believe that any accident would result in the release of radioactive material, primarily because of the structural integrity of the casks in which the material would be transported. In the more than 2,700 shipments involving spent nuclear fuel over the past 3 decades, there have been four accidents, with no release of radioactive materials to the environment.

The EIS states that approximately five traffic fatalities could occur in the course of transporting high-level radioactive waste and spent nuclear fuel under the mostly legal-weight truck scenario during the 24 years of operation and 350 million kilometers (220 million miles) of highway travel. In the mostly rail scenario, there could be approximately three traffic and train accident fatalities. Though an accident resulting in release of radioactive material is not expected to occur, DOE analyzed the maximum reasonably foreseeable accident would involve the release of material from a transportation cask. The shipping casks used to transport these spent nuclear fuel and high-level radioactive waste would be massive and tough with design features that complied with strict regulatory requirements that ensure the casks performed their safety functions even when damaged. Numerous tests and extensive analyses have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents. In addition, since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that, of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each with less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

8.1 (8925)
Comment - EIS001028 / 0001
I am concerned about the danger inherent in transporting vast amounts of radioactive waste through 43 states over a period of 25 years through population centers such as St. Louis.

I am not satisfied that the NRC [Nuclear Regulatory Commission] has conducted satisfactory tests to determine the safety of transporting the waste. Amy Shollenberger, senior policy analyst for Critical Mass, has charged that the NRC is relying on computer-simulated tests, rather than on tests of real transportation containers. She recommends that the NRC change it testing methods to ensure it gets an accurate idea of the dangers involved.

Response
To transport spent nuclear fuel or high-level radioactive waste to the proposed repository, DOE would use shipping casks that met Nuclear Regulatory Commission regulations (10 CFR Part 71). DOE is required to comply with these regulations. The extent to which the Nuclear Regulatory Commission should reexamine the methodology it uses to certify casks as adequately protective of public health and safety is beyond the scope of the EIS. However, Section M.4 of the EIS provides additional information about the modeling and testing and the safety of transportation casks for spent nuclear fuel and high-level radioactive waste.

Section 6.2.3 of the EIS describes the impacts of transporting spent nuclear fuel and high-level radioactive waste on national highways and rail lines, including transport through urban, suburban, and rural populations. Section J.1.2.2 describes the basis for and methods used to determine the number of miles, speeds, and populations in each of these three areas for each route used in the analysis. These data were used in the analysis for public collective, public resident, and maximally exposed individual doses recorded in Section 6.2.3.

8.1 (9411)
Comment - EIS001888 / 0106
Maps presented in the DEIS are also fundamentally misleading. No national routes are depicted in the report. Many of the people who are most affected by the program, therefore, will not be aware of the impact based on the report's contents.

Response
Appendix J of the EIS includes maps of each state through which shipments of spent nuclear fuel and high-level radioactive waste could originate or pass. The maps identify the routes used in the analysis of national transportation. In addition, the maps contain tables listing the number of shipments that DOE estimates would originate in and pass through the state along with the impacts for each state based on the numbers and routes of shipments. The impacts in each state were estimated using route specific information such as projected number of shipments, along-route populations; route lengths in urban, suburban, and rural areas; and state-specific accident rates. Although these are the routes that were used to analyze potential impacts, these are not necessarily the routes that would be used for the transport of high-level radioactive waste and spent nuclear fuel to a repository at Yucca

Mountain. As stated in Section 2.1.3.2.2 of the EIS, a truck carrying a shipping cask of high-level radioactive waste or spent nuclear fuel would travel to the repository in accordance with U.S. Department of Transportation regulations (49 CFR 397.101), which require the use of preferred routes. These routes include the Interstate Highway System, including beltways and bypasses. Alternate routes could be designated by states and Native American tribes following Department of Transportation regulations (49 CFR 397.103) that require consideration of the overall risk to the public and prior consultation with affected local jurisdictions and with any other affected states and tribes. The highway routes would be selected in accordance with these Federal transportation regulations and would be approved by the Nuclear Regulatory Commission.

DOE believes that the mostly rail case, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. In reaching this conclusion, DOE considered whether sites are able to handle larger (rail) casks, distances to suitable railheads, and historic precedent in actual shipments of fuel, waste or other large reactor-related components. DOE also considered relevant information published by knowledgeable sources such as the Nuclear Energy Institute and the State of Nevada. The analysis has confirmed DOE's belief that the mostly legal-weight truck and mostly rail scenarios provide the range (lower and upper bound) of environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste.

8.1 (9495)
Comment - EIS001888 / 0155
[Summary of comments noted by Clark County Nuclear Waste Division staff at various citizens' meetings.]

One person felt that it was a good thing because it would bring high paying trucking jobs to the community. He didn't think there was a radiological risk and cited his knowledge of a mine in Canada that was so radioactive that it made the stuff that would be coming to Yucca Mountain looks like spit - the stuff in Canada was magnitudes of times greater in radioactivity. He said that if we didn't want the waste shipped here, Canada would take it there and reap the economic benefits.

Response
Chapter 6 and Appendix J of the EIS provides a comprehensive analysis of worker and public health and safety risks. The results are that impacts would be small for national and Nevada transportation of spent nuclear fuel and high-level radioactive waste.

8.1 (9557)
Comment - EIS001888 / 0230
Other data is also apparently flawed. In 1998, Clark County received geographic data files from DOE. These data files were for the proposed implementing alternatives through Nevada to Yucca Mountain. Cartographers from Clark County's Geographic Information Systems Department found that the files provided by the DOE incorrectly located major features (e.g. Interstate 15).

Response
Appendix J of the EIS contains state maps for all states where shipments of spent nuclear fuel and high-level radioactive waste could originate or through which they could pass. The maps include numbers of shipments, alternative routes, and impacts by state. The routes designated on the maps are those used for the impact analysis in the EIS and are similar to the results given in Chapter 6. The impacts in each state were estimated using route specific information such as projected number of shipments, along-route populations; route lengths in urban, suburban, and rural areas; and state-specific accident rates.

8.1 (9594)
Comment - EIS001888 / 0268
Maintenance Facilities and Support Operations

Hazardous materials transporters currently have elaborate, effective agreements for managing maintenance and support operations. These agreements have served the HAZMAT [hazardous materials] industry well for many years, however, it is not clear that the same institutional architecture will be adequate to service the specialized equipment used to transport SNF [spent nuclear fuel]. The DEIS should provide a clear description of arrangements that will be made to provide en route maintenance and support.

Response
The EIS includes a discussion of TRANSCOM, the satellite-based transportation tracking and communications system that DOE developed to provide continuous tracking and communication with truck and rail shipments of radioactive materials (see Section 2.1.3.2). In addition, the EIS describes the procedures that would be used by the Regional Servicing Contractors to perform the planning and implementation of legal-weight truck and rail shipments nationally and with Nevada. Section M.3 lists the protocols that the Regional Servicing Contractors would use to carry out planning, tracking, acquisition of casks, from shippers, en-route management, emergency management, response to weather and other unexpected conditions, and postshipment reviews, maintenance and record keeping. All of these activities would be performed in compliance with all applicable regulations of the U.S. Department of Transportation and the Nuclear Regulatory Commission, as stated in Section 2.1.3.2.

8.1 (10039)
Comment - EIS001888 / 0526
[Clark County summary of comments it has received from the public.]

The UP mainline is the major link between So. CA & Midwest. Freight transport was 8.7 Million in 1994 up from 6 million in 1990. 80% through traffic, 15% off-loaded & 5% onloaded. This could be hurt by the repository.

Response
As indicated in Section 6.1.1 of the EIS, the proposed shipment of nuclear waste to a repository at Yucca Mountain would involve up to 400 rail shipments per year, over a 24-year period, under the mostly rail transportation scenario. Under the mostly legal-weight truck scenario, there would be approximately 13 additional rail shipments per year (see Section 6.1.1). Because not all rail shipments would travel on the same routes or through the same rail transfer points, the actual number of shipments passing a particular point would be less than the total estimated. This relatively small additional amount of traffic on the rail lines would not be expected to adversely affect existing rail shipments. The extent to which shippers might be reluctant to ship products because of the existence of spent nuclear fuel and high-level radioactive waste on the rail lines is speculative and was not analyzed by DOE.

8.1 (10104)
Comment - EIS002168 / 0001
Where is waste from Cleveland and the East Coast currently being shipped?

Response
Section 2.1.3.2 of the EIS identifies the nuclear utility and Department of Energy sites from which shipments of spent nuclear fuel and high-level radioactive waste would be shipped. Figures in this section identify the Interstate Highway System and national rail system in relation to these sites. Spent nuclear fuel and high-level radioactive wastes are currently mostly stored onsite at 72 commercial locations and 5 DOE sites.

8.1 (10291)
Comment - EIS000936 / 0003
Transporting material from current locations to Yucca Mt. exposes people along the truck routes to potential disastrous accidents. It seems we want to shift the problem from its current locations to another place at tremendous potential damage along the way while gaining nothing from it. So why do it?

Response
The Nuclear Waste Policy Act of 1982 gives the Federal Government the responsibility to dispose permanently of spent nuclear fuel and high-level radioactive waste to protect the health and safety and the environment. The decision to evaluate and use, if suitable, a geologic repository at Yucca Mountain for the disposal of spent nuclear fuel and high-level radioactive waste was a national policy initiative embodied in the Nuclear Waste Policy Amendments Act of 1987. Through the passage of that Act, Congress redirected DOE's implementation of the original Act in several ways, including directing DOE to study only the Yucca Mountain site to determine its suitability as a repository. The Act does not direct DOE to examine any other methods of disposal.

In 1980, the Department published the *Final Environmental Impact Statement, Management of Commercially Generated Radioactive Waste* (DIRS 104832-DOE 1980). This EIS examined both geologic disposal and alternatives to geologic disposal, including deep seabed disposal, ice sheet disposal, disposal in deep boreholes, transmutation, and disposal in outer space. The Record of Decision for this EIS concluded, in agreement with the National Academy of Sciences, that deep geologic disposal was the preferred alternative, and that the alternatives to geologic disposal other than continued storage were not technologically viable at the time. The Department agrees with the National Academy of Sciences and therefore does not consider continued storage a solution. Continued storage is viable and safe, but simply postpones the decision to the future in the hope that technology to solve the problem would be developed.

8.1 (10374)
Comment - EIS001371 / 0007
Legal trucks weights are 80,000 pounds per single unit, and there are tandem units which compound the problems. Interstates are built to withstand that weight, and the fees the trucks must pay help the states maintain their highways. Not knowing how heavy the illegal trucks are makes it impossible to gauge speed and other risk factors which could make that truck more prone to an accident. How can DOE calculate the impact of a collision of 80,000 pound tractor trailer? Not to mention the additional risk of possible drug use. These are risks that every motorist takes every time they get on interstate highways. Just the size and the speed of the interstate trucking industry creates and unthinkable environment for DOE to even consider shipping the most hazardous waste in the world through the heartland of America.

Response
In analyzing the potential for transportation accidents involving legal-weight trucks, DOE used national truck accident data (see Section J.1.4.2.3.1 of the EIS). Thus, the analysis has taken into account current conditions on the Nation's highways, including human factors (for example, drug use), as discussed in Section J.1.4.2.1. This risk analysis is contained in Section 6.2.4. Overweight (heavy-haul) trucks would not be used on national highways. They would be used in Nevada under the mostly rail scenario where branch rail lines do not exist to complete transportation to Yucca Mountain.

The EIS states that approximately four traffic fatalities could occur in the course of transporting high-level radioactive waste and spent nuclear fuel under the mostly legal-weight truck scenario during the 24 years of operation and 350 million kilometers (220 million miles) of highway travel. The maximum reasonably foreseeable accident would involve the release of material from a transportation cask. The shipping casks used to transport these spent nuclear fuel and high-level radioactive waste would be massive and tough with design features that complied with strict regulatory requirements that would ensure the casks performed their safety functions even when damaged. Numerous tests and extensive analyses have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents. In addition, since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

8.1 (10625)
Comment - EIS002220 / 0010
"Armed guards and radiation experts escort a truck transporting a nuclear waste cask from an indoor storage pool at Calvert Cliffs Nuclear Power Plant to an outdoor storage bunker nearby."

Now, you tell me that it's safe and it takes armed guards and radiation experts to escort one truck, one truck, and folks, they're not talking about bringing this for one year. They're talking about 30 years, folks.

You think they're not going to have a whole bunch of accidents in 30 years? And you know if they get it out there, it won't be 30 years because they'll keep generating it back East and they'll be shipping it out to the west. It won't be just 30 years.

Response

The EIS includes a discussion of TRANSCOM, the satellite-based transportation tracking and communications system that DOE developed to track truck and rail shipments of radioactive materials (see Section 2.1.3.2). In addition, Appendix M of the EIS describes the protocols and procedures that would be used for both legal-weight truck and rail shipments. Appendix M describes the protocols and regulations that would be implemented to ensure safe transport of radioactive materials.

While spent nuclear fuel and high-level radioactive waste could continue to be generated, there is a statutory limit (Nuclear Waste Policy Act of 1982) on the mass (weight) of waste that can be emplaced in the first repository (70,000 metric tons of heavy metal). Given this limit, the shipment of spent nuclear fuel and high-level radioactive waste would occur over a 24-year period.

Transportation by legal-weight truck would involve shipments along inter Interstate System highways in accordance with U.S. Department of Transportation regulations (49 CFR Part 397). These regulations limit shipments of highly radioactive materials such as nuclear waste to Interstate System highways and require carriers to use beltways and bypasses where available. DOE recognizes the potential for transportation accidents and analyzed impacts resulting from transportation accidents in Section 6.2.4.2. Given the number of shipments, traffic accidents would be probable. DOE does not believe that any accident would result in the release of radioactive material, primarily because of the structural integrity of the casks in which the material would be transported (see Section M.4 for additional information on cask safety and testing). In the more than 2,700 shipments involving spent nuclear fuel over the past 3 decades, there have been four accidents, with no release of radioactive materials to the environment.

Section 6.2.4.2 of the EIS states that approximately 5 traffic fatalities could occur in the course of transporting high-level radioactive waste and spent nuclear fuel under the mostly legal-weight truck scenario during the 24 years of operation and 350 million kilometers (220 million miles) of highway travel. In the mostly rail scenario, there could be approximately 3 traffic and train accident fatalities. The maximum reasonably foreseeable accident would involve the release of material from a transportation cask. The shipping casks used to transport these spent nuclear fuel and high-level radioactive waste are massive and tough with design features that comply with strict regulatory requirements that ensure the casks perform their safety functions even when damaged. Numerous tests and extensive analyses have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents. In addition, since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

As required by Section 180(c) of the NWPA, DOE would provide technical assistance and funds to states for training for public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions DOE would transport spent nuclear fuel and high-level radioactive waste. Training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would institute this training before beginning shipments to the repository. In the event of an incident involving high-level radioactive waste or spent nuclear fuel, the transportation vehicle crew would notify local authorities and the central communications station monitoring the shipment. DOE would make resources available to local authorities as appropriate to mitigate such an incident. Additional information on emergency response and implementation of Section 180(c) of the NWPA is provided in Appendix M of the EIS.

8.1 (10887)
Comment - EIS000762 / 0003
After considerable effort and a frustrating trial and error exercise, the State of Nevada managed to extract DOE's shipment routes, modes, and shipment numbers from the raw data contained in draft EIS reference materials. (One Nevada transportation consultant employed to assist with the review of the draft EIS likened it to breaking the Japanese military codes during World War II.)

Under DOE's shipping scenario, Utah would be the most heavily affected corridor state for truck shipments to Yucca Mountain. Yet the DEIS makes no particular reference to transportation impacts in Utah. Three major truck routes to Yucca Mountain traverse Utah:

I-15 from Idaho to Arizona (405 miles in Utah);
I-80, I-215, and I-15 from Wyoming to Arizona (381 miles in Utah); and
I-70 and I-15 from Colorado to Arizona (364 miles in Utah).

Depending upon the scenarios evaluated in the draft EIS, between 43,000 and 80,000 truck shipments traverse Utah over 24 years. Under either scenario, an average of 5 to 6 trucks per day would travel through Utah every day for decades. Additionally, Utah would be impacted by about 300 rail cask-shipments of naval reactor spent fuel and about 2,500 truckloads of miscellaneous radioactive wastes during the same time period. (See Table 1 for additional detail on the truck shipments scenario.)

Response
Section J.1.2 of the EIS provides maps of each state, including Utah, and tables that indicate the number and routing of shipments from 77 sites in the United States to Yucca Mountain. Many tables in this section indicate the origin, miles to be shipped, and number of shipments originating in and passing through each state. The impacts in each state were estimated using route specific information such as projected number of shipments; populations along route; route lengths in urban, suburban, and rural areas; and state-specific accident rates. The tables in Section J.1.3 list potential impacts in each state associated with a national campaign to transport spent nuclear fuel and high-level radioactive waste to the proposed repository at Yucca Mountain (see Section 6.2.3).

As stated in Section 2.1.3.2.2 of the EIS, under a mostly legal-weight truck scenario about 53,000 shipments of high-level radioactive waste and spent nuclear fuel would travel on the Interstate Highway System during a 24-year period. Most of these shipments would traverse Utah.

8.1 (11177)
Comment - EIS000232 / 0010
The first you can do right now. You are sitting just a few meters from the railroad tracks over which you propose to transport high-level nuclear waste. Now, transport yourself back in time to New Years Eve 1910. Floodwaters would be twisting those railroad tracks to pretzels. Millions of tons of rock would be raining down from the hillsides onto the railroad. You would be sitting up to your necks in mud the consistency of pancake batter.

The second should wait until tomorrow as you commute back to Las Vegas. Try to envision making the trip on that narrow, curvy road between here and Alamo in a truck that's 270 feet long, has forty wheels, two engines and two drivers, and weighs almost 300 thousand pounds.

Then go back to Washington DC and tell someone they need to re-think their transportation plan.

Response
Shipments of spent nuclear fuel by rail have taken place for over 4 decades without an accident that resulted in breaching of the transportation casks. Over the years, rail safety has improved dramatically using the latest technology (communications, weather reports, etc.) to assist in controlling train traffic to adjust to weather-related problems.

Regarding the comment on using heavy-haul truck on the Caliente-Las Vegas route, most of the road segments are negotiable with a heavy-haul truck at a speed of 40 to 64 kilometers (25 to 40 miles) per hour. This assumes that identified road upgrades have been implemented. At present, approximately 40 heavy-haul vehicles with payloads in excess of 68 metric tons (75 tons) that are permitted by the Nevada Department of Transportation travel this segment of U.S. 93 each year.

8.1 (11384)
Comment - EIS002230 / 0005
The controversy of such transportation has focused on the adequacy of the Nuclear Regulatory Commission system for shipping the casks, the potential consequences of transportation accidents, and the routes that nuclear waste shipments are to follow.

Response
As stated in Section 2.1.3.2 of the EIS, DOE would comply with all applicable regulations of the Nuclear Regulatory Commission and U.S. Department of Transportation for the transportation of spent nuclear fuel and high-level radioactive waste. These regulations were promulgated to protect public health and safety. DOE recognizes the potential for transportation accidents and analyzed impacts resulting from transportation accidents in Section 6.2.4.2. In response to comments, the EIS has been revised (Section 6.2.4.2) to describe the maximum reasonably foreseeable accident in terms of cask failure mechanisms, range of impact velocities, and temperature range for the accident. Based on the revised analyses, DOE has concluded in the EIS that casks would continue to fully contain spent nuclear fuel in more than 99.99 percent of all accidents. This means that there would be less than a 1 percent chance over 24 years of transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain by truck of an accident that could result in a release of radioactive material from a cask. The chance of a rail accident that would cause a release from a cask is even less. The corresponding chance that such an accident would occur in any particular locale would be much less than 1 percent. Although given the number of shipments traffic accidents would be probable, DOE does not believe that any accident would result in the release of radioactive material, primarily because of the structural integrity of the casks in which the material would be transported. See Section M.4 for more information on cask safety and testing. In the more than 2,700 shipments involving spent nuclear fuel over the past 3 decades, there have been four accidents, with no release of radioactive materials to the environment.

In relation to shipping the casks, DOE expects to hire commercial companies to act as Regional Servicing Contractors in accordance with the NWPA, as amended. The process for procuring these contractors is described in Section M.3 of the EIS and the detailed protocols to be used in loading, shipping and generally managing the transportation activities are described in this section. These protocols are based on the processes developed and implemented for shipments to the Waste Isolation Pilot Project and comply with all applicable U.S. Department of Transportation and Nuclear Regulatory Commission regulations.

With respect to routes, Appendix J in the EIS includes state-by-state maps of the routes and the estimated number of shipments that would originate and pass through each state. These are the routes and shipments used in the analysis of national transportation. Although these are the routes that were used to analyze potential impacts, they are not necessarily the routes that would be used for the transport of high-level radioactive waste and spent nuclear fuel to a repository at Yucca Mountain. As stated in the EIS (see Section 2.1.3.2.2), a truck carrying a shipping cask of high-level radioactive waste or spent nuclear fuel would travel to the repository in accordance with U.S. Department of Transportation regulations (49 CFR 397.101), which require the use of preferred routes. These routes include the Interstate Highway System, including beltways and bypasses. Alternate routes could be designated by states and Native American tribes following Department of Transportation regulations (49 CFR 397.103) that require consideration of the overall risk to the public and prior consultation with affected local jurisdictions and with any other affected states and tribes. The highway routes that would be used would be selected in accordance with these Federal transportation regulations and would need to be approved by the Nuclear Regulatory Commission.

DOE believes that the mostly rail case, in which 95 percent of the spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. To determine this mix DOE considered whether sites are able to handle larger (rail) casks, distances to suitable railheads, and historic precedent in actual shipments of fuel, waste or other large reactor-related components. DOE also considered relevant information published by knowledgeable sources such as the Nuclear Energy Institute and the State of Nevada. The analysis has confirmed DOE's belief that the mostly legal-weight truck and mostly rail scenarios provide the range (lower and upper bound) of environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste.

8.1 (11533)
Comment - EIS002248 / 0003
If there is some kind of a breakdown in Needles on the railroad, there is no way to transport the shipment, except by highway, out of there. There's no other alternative. So you are going to have to use the roads as an alternative, at least, and it needs to be appraised in the environmental document.

Response
In the event of a breakdown on the railroad at Needles or any other location in the United States, the railroads would initiate their routine recovery procedures. The contractor making the shipment for DOE would have the responsibility to plan for and respond to disruptions, whether incident-free or involving incidents. DOE has defined a set of operational procedures that would be followed by the contractor. These procedures are discussed in more detail in Appendix M of the EIS.

8.1 (11573)
Comment - EIS002281 / 0003
I have heard that the government proposes that the waste be transported in unmarked vehicles, so that saboteurs couldn't know what is being transported.

Well, if the saboteurs don't know, how can emergency people know what's being transported? If this is true, boy, our tax dollars at work, folks.

Response
The shipments would have proper labels and vehicle placards (hazard identification) as required by U.S. Department of Transportation regulations (49 CFR Part 172. Further, DOE would use a satellite-based transportation tracking and communications system such as TRANSCOM to track all shipments. Using this system, DOE would monitor shipments to the repository and, consistent with requirements in Nuclear Regulatory Commission regulations, would provide state and tribal governments with information regarding shipments. In heavily populated areas, armed escorts would be required for highway and rail shipments. For additional details on notification, communication, tracking, security, and emergency response, see Sections M.3 and M.5 of the EIS.

8.1 (11621)
Comment - EIS002239 / 0001
Now, it's true that there are some specific routes that might be used for actual deliveries to Yucca Mountain, where the State of Nevada and the State of California have differences of opinion.

For example, we would like to use 127, 373, from Baker through Death Valley Junction. We think that's the least-risk route if there are going to be large numbers of truck shipments.

California, of course, sees it differently. Other routes that have been talked about are State Route 160 in order to avoid shipments through downtown Las Vegas. So I don't mean to say that there aren't still some controversies to be resolved over routing, but on the big routes, the routes that are going to be the cross Country feeders from the east to the west, we have known all along that the choices are I-70, I-80, and I-40, as DOE does. It's a rail shipment. They are the Union Pacific lines through Nebraska and Wyoming, or the Burlington Northern Santa Fe lines that come into California from Arizona.

Response
Sections 2.1.3.2.1 and 2.1.3.2.2 describe the national and Nevada shipping scenarios, respectively, analyzed by DOE for the actions proposed in the EIS. DOE would select highway modes and routes in consultation with responsible agencies and jurisdictions, and stakeholders and in accordance with U.S. Department of Transportation regulations in 10 CFR 397.101. In the absence of state and tribal designated alternate routes, these regulations require the use of Interstate System highways. The states and tribes can designate alternate routes in accordance with 10 CFR 397.103 that includes a provision for continuity of routes. Section 103(a) states in part:

"Designations must be preceded by substantive consultation with affected local jurisdictions and with any other affected States to ensure consideration of all impacts and continuity of designated routes."

Therefore, any differences of opinion between Nevada and California will have to be resolved by consultation if either or both States designate alternate routes.

8.1 (11677)
Comment - EIS000295 / 0002
Our good friends at the Nevada Agency for Nuclear Projects completed a study in 1995, which could have been used by the DOE in this analysis, which reveals that there are 821 waste shipments via rail through North Carolina, 917 shipments via rail through South Carolina, 3,866 waste shipments via rail and highway through Tennessee and 2,650 shipments via rail and highway through Georgia. Why did the DOE not use that to do a realistic analysis of these shipments?

Response
Section J.1.2 of the EIS provides maps and tables that indicate the number and routing of shipments from 77 sites in the United States to Yucca Mountain. Many tables in this section indicate the origin, miles to be shipped, and number of shipments originating in each state. The tables in Section J.1.3 include the potential impacts associated with a national campaign to transport high-level radioactive waste and spent nuclear fuel to the proposed repository at Yucca Mountain (also see Section 6.2.3).

DOE believes that the mostly rail case, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. To reach this conclusion, DOE considered whether sites are able to handle larger (rail) casks, distances to suitable railheads, and historic precedent in actual shipments of fuel, waste, or other large reactor-related components. DOE also considered relevant information published by knowledgeable sources such as the Nuclear Energy Institute and the State of Nevada. The analysis has confirmed DOE's belief that the mostly legal-weight truck and mostly rail scenarios provide the range (lower and upper bound) of environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste.

8.1 (11801)
Comment - EIS000792 / 0001
I recently concluded the highly successful Napalm Recovery Outreach Effort, this after a shaky start similar to what is occurring with your project. As a Captain in the Naval Reserve, I spent 15 months managing the community relations outreach efforts as the Navy fought off opposition of the movement of napalm from our Fallbrook storage facility to Texas and then on to Louisiana. The napalm is moving east on a regular schedule now, with over one-third of the controversial product safely moved with no visible opposition along the way.

Your project is going down the same road that the initial effort of the [Department] of the Navy moved along in early 1998. Before it is too late, you should be talking to those that have had the experience, moving trains through the same area that you are now receiving complaints from.

I am now retired from the Navy and am in a position to offer your effort the many years of community relations experience I have, not only in the Navy on a variety of matters, but as a 44 year active resident (business and elected official) of the high desert portion of San Bernardino County.

Obviously I am watching your efforts daily in the headlines of our regional newspapers. Give me a call.

Response
DOE has spent considerable time and effort reaching out to Federal, state, tribal, and local agencies, and has provided information to the public in a variety of forums. Appendix C of the EIS delineates the interagency and intergovernmental interactions in which the Department has been involved for the Proposed Action. As the Yucca Mountain program moves forward, DOE will intensify these interactions and public outreach forums. Thank you for your offer of assistance.

8.1 (11811)
Comment - EIS001765 / 0001
I don't know if this material can be stored on site or not. If it can, I too would like to see that. But at this stage with the amount of money already spent, maybe it's better if we do move it. Now, how do you move it? It's got to go by

rail or highway, so it has to move through cities like ours. I'm sure safety is the number one priority of all involved in the moving. Somewhere along the line you have to trust others, and I'm sure that if moved, all will be concerned and careful.

Response
As stated in Section 2.1.3.2 of the EIS, the transportation of spent nuclear fuel and high-level radioactive waste would comply with all applicable regulations of the U.S. Department of Transportation and the Nuclear Regulatory Commission. These requirements have been expressed in the protocols established for the Regional Servicing Contractors as outlined in Section M.3. DOE's goal is to provide safe transport and ultimate disposition of these wastes in a geologic repository, regardless of its location. As discussed in Section 2.2, while implementation of the No-Action Alternative (continued onsite storage) would not involve transportation, it would pose other risks. For example, the risks associated with sabotage and materials diversion in relation to the fissionable material stored at the 77 sites would be much greater than they would be if the fissionable materials were stored in a monitored deep geologic repository. Implementation of the No-Action Alternative (Scenario 1) would cost nearly $600 million per year for 9,900 years. DOE agrees, however, that the ability to safely transport high-level radioactive waste and spent nuclear fuel to the proposed repository is an integral part of the determination on whether to recommend Yucca Mountain as a site for a repository.

8.1 (11820)
Comment - EIS002031 / 0006
When moving nuclear waste material from the eastern coast what will the safety precautions be? How do we even know nuclear waste transportation is safe?

Response
Transportation by legal-weight truck would involve shipments along Interstate System highways in accordance with U.S. Department of Transportation regulations (49 CFR Part 397). These regulations limit shipments of hazardous materials such as nuclear waste to Interstate System highways and require shippers to use beltways and bypasses where available. There would be an estimated 3 latent cancer fatalities in the general public from incident-free legal-weight truck transport over the 24-year campaign and 1 latent cancer fatality from rail transport over the same period. DOE also recognizes the potential for transportation accidents and analyzed impacts resulting from transportation accidents in the EIS (see Section 6.6.2.4.2). Although, traffic accidents would be probable given the number of shipments, DOE does not believe that any accident would result in the release of radioactive material, primarily because of the structural integrity of the casks in which the material would be transported (see Section M.4). In the more than 2,700 shipments involving spent nuclear fuel over the past 3 decades, there have been four accidents, with no release of radioactive materials to the environment.

The EIS includes a discussion of TRANSCOM, the satellite-based transportation tracking and communications system that DOE developed to track truck and rail shipments of radioactive materials (see Section 2.1.3.2). In addition, the EIS describes the procedures that would be used by the Regional Servicing Contractors for both legal-weight truck and rail shipments in Section M.3. Additional information on transportation physical protection is provided in Section M.7.

As required by Section 180(c) of the NWPA, DOE would provide technical assistance and funds to states for training for public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. Training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would institute this training before beginning shipments to the repository. In the event of an incident involving high-level radioactive waste or spent nuclear fuel, the transportation vehicle crew would notify local authorities and the central communications station monitoring the shipment. DOE would make resources available to local authorities as appropriate to mitigate such an incident. Additional information on the elements and implementation of Section 180(c) is provided in Section M.6 of the EIS.

8.2 Number of Shipments

8.2 (3255)
Comment - EIS000981 / 0003
What quantities of nuclear waste will be shipped via highway and on rail shipments? What is the quantity per shipment? What do the vehicles look like (trailer and rail) and what safety precautions will be taken to the transportation vehicles?

Response
See Table J-1 of the EIS for estimated numbers of shipments for the various inventory and national transportation analysis combinations. In response to public comments, DOE has included the maps of the representative highway routes and rail lines for the 45 states it used for analysis in the EIS (see Section J.4). Section J.4 includes potential health and safety impacts associated with shipments for each state through which shipments could pass. For the Proposed Action, the estimated number of truck shipments under the mostly legal-weight scenario would be 52,786 (with an additional 300 rail shipments) and under the mostly rail scenario there would be an estimated 9,646 rail shipments plus an additional 1,079 legal-weight truck shipments. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

Truck shipments could be made using a cask that holds four spent nuclear fuel assemblies that would weigh about 2.7 metric tons (3 tons). The truck cask itself would weigh about 24 metric tons (26 tons). Rail shipments would be made using a cask that holds about 26 spent nuclear fuel assemblies that would weigh about 18 metric tons (20 tons). The rail cask itself would weigh about 140 metric tons (150 tons). Figures J-3 and J-4 of the EIS show these casks on a trailer and a railcar.

Many safety precautions are taken during the transport of spent nuclear fuel and include U.S. Department of Transportation and Nuclear Regulatory Commission requirements for driver training, packaging, placarding of vehicles, escorting, communications, security, and routing. Because of the public's interest in transportation in general, the Department has included Appendix M in the EIS. Appendix M provides background information about transportation-related topics, such as transportation operations, cask testing requirements, and emergency response.

8.2 (4408)
Comment - EIS001511 / 0001
The Department continues to respond to inquiries from reporters prompted by repository opponents fanning the public's fears of transportation disasters around the country. This is of course exacerbated by the state of Nevada's press releases pointing out that according to the DEIS nearly all spent fuel shipments from across the country will pass through Illinois in route to Yucca Mountain. If the proposed repository is established, the number of spent nuclear fuel shipments passing through Illinois undoubtedly will increase. However, the fiction fostered by the estimates of the frequency which these shipments will transit Illinois as presented in the DEIS needs to be corrected. While Illinois' extensive experience and expertise gained from its unique program for inspecting and escorting spent fuel shipments will make the transition to heavier shipment volume manageable, no constructive purpose is served by distorting the expected shipment load at this time.

Response
In response to public comments, DOE has included the maps of the representative highway routes and rail lines for the 45 states it used for analysis in the EIS (see Figure J-42 of the EIS for the representative Illinois routes analyzed). It also included potential health and safety impacts associated with shipments for each state through which shipments could pass. Table J-82 lists the estimated number of legal-weight truck shipments of spent nuclear fuel and high-level radioactive waste that would enter Nevada from Illinois in the mostly legal-weight truck scenario. The table also lists the estimated number of rail shipment through Illinois in the mostly rail scenario for each of the proposed Nevada rail corridors and heavy-haul truck routes.

If the Yucca Mountain site was approved, under the mostly legal-weight truck scenario, the total number of truck shipments through Illinois was estimated to be 38,549 over 24 years, which is approximately 4 truck shipments per day. There would be no rail shipments.

The estimated numbers of shipments entering Nevada from Illinois under the mostly rail scenario are less than the mostly legal-weight truck scenario. According to Table J-82, the number of rail shipments would range from 6,825 to 7,027, depending on the mode (rail or heavy-haul truck) and corresponding corridor/route selected in Nevada. This is less than 1 rail shipment per day over 24 years. In addition, there would be approximately 1,071 legal-weight truck shipments through Illinois. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began. At this time, many years before shipments could begin, it is impossible to predict accurately which highway routes or rail lines DOE could use. Before such shipments began, states and tribes could designate alternate preferred highway shipping routes, and highways and rail lines could be built or modified.

8.2 (7528)
Comment - EIS001723 / 0002
You've got to get the waste to the site from all over the country, Maine to Florida, California to Washington. Got to get here some way (passing through 43 states I'm told).

Right now, looks like your best plan is by truck. Rather impractical if you ask me. You are so vague about the use of rail, I don't know how heavily this aspect has been studied? You at least know, you will have to build some rail lines (one would go right through Pahrump, if you were to use the Jean Corridor). If this were the case, how many train loads of Nuclear Garbage would come through our town?

I don't know enough about trains to make a comment, but I'll bet it'll be more than one!

Response
In response to public comments, DOE has included maps of the representative highway routes and rail lines for the 45 states it used for analysis in the EIS (see Figure J-53 of the EIS for the representative Nevada routes analyzed). It also included potential health and safety impacts associated with shipments for each state through which shipments could pass. Table J-93 lists the estimated number of legal-weight truck shipments of spent nuclear fuel and high-level radioactive waste that would enter Nevada in the mostly legal-weight truck scenario. The table also lists the estimated number of rail shipments in Nevada in the mostly rail scenario for each of the proposed rail corridors and heavy-haul truck routes.

If the Yucca Mountain site was approved, under the mostly legal-weight truck scenario, the estimated total number of truck shipments in Nevada would be 52,786 over 24 years, approximately 6 truck shipments per day. In addition, there would be approximately 300 rail shipments over the 24-year period.

The estimated numbers of shipments in Nevada under the mostly rail scenario are less than the mostly legal-weight truck scenario. According to Table J-93, the number of rail shipments would be 9,646, no matter which mode (rail or heavy-haul truck) and corresponding corridor/route selected in Nevada. This is slightly more than 1 rail shipment per day over 24 years. In addition, there would be approximately 1,079 legal-weight truck shipments in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began. At this time, many years before shipments could begin, it is impossible to predict accurately which highway routes or rail lines DOE could use. Before such shipments began, states and tribes could designate alternate preferred highway shipping routes, and highways and rail lines could be built or modified.

8.2 (7530)
Comment - EIS001723 / 0003
All things being equal, let's say you decide the use of trucks are the best bet for transporting this garbage. What are we speaking of here? Let's speak only of what you refer to as "Light Haul" trucks. Most of us would recognize

these as what are commonly referred to as 18 wheelers. So, let's use them for our example. And let's use 40,000 lbs. Per load. I seem to remember this weight as being a "legal weight" in most states. We won't even speak of what you refer to as "Heavy Haul" trucks. That'll scare most folks right out of their skin!

OK, we've got 77,000 metric tons of garbage to move. Remember a metric ton is 2200 lbs., so we are to move 169,000,000 lbs. Of waste to Yucca Mountain. 40,000 lbs. Per load (bulk, not counting the weight of the canisters), does that come out to 4,840,000 truck loads? Even more, if you count the weight of the canisters!

Response
See Table J-1 of the EIS for estimated numbers of shipments for the various inventory and national transportation analysis combinations. In response to public comments, DOE has included maps of the representative highway routes and rail lines for the 45 states it used for analysis in the EIS (see Section J.4). Section J.4 includes potential health and safety impacts associated with shipments for each state through which shipments could pass. For the Proposed Action, the estimated number of truck shipments under the mostly legal-weight scenario would be 52,786 with 300 rail shipments, and under the mostly rail scenario there would be an estimated 9,646 rail shipments with 1,079 legal-weight truck shipments. A legal-weight truck is 36 metric tons (40 tons or 80,000 pounds), which includes the weight of the vehicle and the weight of the spent nuclear fuel and shipping casks.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

8.2 (9417)
Comment - EIS001888 / 0112
The DEIS did not describe the volumes of waste that may travel on each highway or rail route.

Response
In response to public comments, DOE has included maps of the representative highway routes and rail lines for the 45 states it used for analysis in the EIS (see Section J.4 of the EIS). Section J.4 includes potential health and safety impacts associated with shipments for each state through which shipments could pass.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began. At this time, many years before shipments could begin, it is impossible to predict accurately which highway routes or rail lines DOE could use. Before such shipments began, states and tribes could designate alternate preferred highway shipping routes, and highways and rail lines could be built or modified.

The amount of spent nuclear fuel and high-level radioactive waste destined for the repository is discussed in Appendix A of the EIS.

8.2 (9540)
Comment - EIS001888 / 0201
[Summary of comments noted by Clark County Nuclear Waste Division staff at various citizens' meetings.]

Questions were asked about the number of potential shipments.

Response
See Table J-1 of the EIS for estimated numbers of shipments for the various inventory and national transportation analysis combinations. In response to public comments, DOE has included maps of the representative highway routes and rail lines for the 45 states it used for analysis in the EIS (see Section J.4). Section J.4 includes potential health and safety impacts associated with shipments for each state through which shipments could pass. For the Proposed Action, the estimated number of truck shipments under the mostly legal-weight scenario would be 52,786 with 300 rail shipments, and under the mostly rail scenario there would be an estimated 9,646 rail shipments plus 1,079 legal-weight truck shipments.

8.2 (10072)
Comment - EIS001888 / 0548
[Clark County summary of a comment it received from a member of the public.]

A commenter stated that the number of shipments used for the impacts analysis should be estimated based on single assembly casks, in order to provide an upper bound on the number of shipments.

Response
Single assembly casks are generally necessary for shipments of spent nuclear fuel that have very short decay times, about 150 days, or are used when a few spent nuclear fuel assemblies must be moved. It is highly unlikely that single assembly casks would be used for shipments to the repository because shipments to the repository involve a large number of spent nuclear fuel assemblies and these assemblies have decay times of 5 years or more. Therefore, the numbers of truck and rail shipments were based on current generation casks that have the ability to hold more than one spent nuclear fuel assembly.

See Table J-1 of the EIS for estimated numbers of shipments for the various inventory and national transportation analysis combinations. In response to public comments, DOE has included maps of the representative highway routes and rail lines for the 45 states it used for analysis in the EIS (see Section J.4).

8.2 (10888)
Comment - EIS000762 / 0004
Rail shipments to Yucca Mountain would also heavily impact Utah. Under the routing scenarios DOE used in the draft EIS, rail shipments of highly radioactive materials will traverse Utah on four rail lines:

- The Union Pacific from Grand Junction, Colorado, to Southern Nevada (461 miles in Utah);
- The Union Pacific from Granger, Wyoming to Southern Nevada (390 miles in Utah);
- The Union Pacific from Pocatello, Idaho to Southern Nevada (381 miles); and
- From Colorado, Idaho, or Wyoming to Wells, Nevada, via Ogden.

Under the mostly rail scenarios, between 10,600 and 18,400 rail shipments traverse Utah over 24 years, which is an average of 8 to 9 rail casks per week every week for decades. Additionally, even with most shipments coming by rail, Utah would also be impacted by an average of two truck shipments per week during the same time period. (See Table 2 for additional information on rail shipments.)

The information presented above is not found anywhere in the draft EIS.

Response
In response to public comments, DOE has included maps of the representative highway routes and rail lines for the 45 states it used for analysis in the EIS (see Figure J-52 of the EIS for the representative Utah routes). It also included potential health and safety impacts associated with shipments for each state through which shipments could pass. Table J-89 lists the estimated number of legal-weight truck shipments of spent nuclear fuel and high-level radioactive waste that would enter Nevada from Utah on Interstate-15 in the mostly legal-weight truck scenario. The table also lists the estimated number of rail shipment through Utah in the mostly rail scenario for each of the proposed Nevada rail corridors and heavy-haul truck routes.

If the Yucca Mountain site was approved, under the mostly legal-weight truck scenario, the estimated total number of truck shipments through Utah would be 45,919 over 24 years, approximately 5 truck shipment per day. In addition, there would be approximately 300 rail shipments over the 24-year period.

The estimated numbers of shipments entering Nevada from Utah under the mostly rail scenario are less than the mostly legal-weight truck scenario. According to Table J-92, the number of rail shipments would range from 8,181 to 9,134 depending on the mode (rail or heavy-haul truck) and corresponding corridor/route selected in Nevada. This is slightly more than 7 rail shipment per week over 24 years. In addition, there would be approximately 1,079 legal-weight truck shipments through Utah, which is slightly less than 1 per week. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began. At this time, many years before shipments could begin, it is impossible to predict accurately which highway routes or rail lines DOE could use. Before such shipments began, states and tribes could designate alternate preferred highway shipping routes, and highways and rail lines could be built or modified.

8.3 Transportation Modes and Routes

8.3 (60)

Comment - 27 comments summarized

Commenters expressed concern and opposition to routing shipments of spent nuclear fuel and high-level radioactive waste through heavily populated areas and along some of the busiest and most congested freeways and rail lines in the United States, stating little or no effort has been made to avoid densely populated areas, reduce unnecessary risks to persons and property, or provide for the equitable distribution of shipping routes among a much larger number of possible routes. Commenters stated that DOE should coordinate closely with state and local governments to minimize transportation routing through populated areas.

A commenter stated that although routes would be selected in accordance with 49 CFR 397.101, these paths [the Interstate Highway System] have the highest population density. The commenter stated that DOE should have to consider an alternative that maximized the avoidance of dense urban areas.

Response

In response to comments on the Draft EIS, DOE prepared Appendix M to provide additional information on transportation regulations and the operational aspects of spent nuclear fuel and high-level radioactive waste transportation (see Sections M.2 and M.3 of the EIS). This information includes more details on how DOE would select transportation routes if the Yucca Mountain site received approval. The routes selected would comply with the applicable regulations in place at the time of shipment.

If there was a decision to proceed with the development of a repository at Yucca Mountain shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict accurately which highway routes or rail lines DOE could use. Before such shipments began, states and tribes could designate alternate preferred highway shipping routes, and highways and rail lines could be built or modified.

Nevertheless, the representative highway routes identified for the EIS analysis conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, developed for transportation of Highway Route Controlled Quantities of Radioactive Materials, require such shipments to be on preferred routes selected to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or an alternate route designated by a state or tribal routing agency. Alternate routes could be designated by states and tribes under Department of Transportation regulations (49 CFR 397.103) that require consideration of the overall risk to the public and prior consultation with local jurisdictions and other states and tribes. Federal regulations do not restrict the routing of rail shipments. However, for the analysis, as discussed in Section J.1.1.3 of the EIS, DOE assumed routes for rail shipments that would provide expeditious travel and the minimum number of interchanges between railroads.

In response to public comments, DOE has included maps of the representative highway routes and rail lines it used for analysis in the EIS (see Section J.4). It also included potential health and safety impacts associated with shipments for each state through which shipments could pass.

DOE chose candidate rail corridors in Nevada to maximize the use of Federal lands (except U.S. Air Force-controlled lands), provide access to regional rail carriers, and minimize, to the extent possible, obvious land-use conflicts. As discussed in Section 6.3.2.1, all of the candidate Nevada branch rail lines would require the use of mostly Federal land and very little private land.

At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. Section M.3 of the EIS contains more information on routing regulations and operational procedures and protocols DOE would use if the Yucca Mountain site was recommended and approved. Section M.3 also contains more detail on the proposed role of the Regional Servicing Contractors.

8.3 (146)
Comment - 10 comments summarized
Commenters stated that the EIS does not identify and analyze specific national transportation routes for rail and highway shipments. Instead, DOE performed a limited generic analysis of modes and routes that avoided analysis of specific conditions, impacts, and hazards along specific routes. Commenters stated transportation issues should be considered in separate transportation EISs for each area to fully evaluate the impacts of transportation of spent nuclear fuel and high-level radioactive waste. In conjunction with new EISs, commenters want DOE to hold hearings to inform, address safety concerns, and solicit comments from people that live near identified routes.

Response
If there was a decision to proceed with the development of a repository at Yucca Mountain shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway routes or rail lines could be used. In the interim, states and tribes could designate alternate preferred highway routes, and highways and rail lines could be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state and tribal designated alternate) that reduce time in transit. DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for the shipment of radioactive materials.

Sections 6.2 and 6.3 of the EIS address the potential impacts of transporting spent nuclear fuel and high-level radioactive waste from facilities where it is generated to the proposed repository. Appendix J discusses the methods and data DOE used for these analyses. DOE based the analyses on representative routes, identified for purposes of analysis. Analyses in the EIS (Sections J.2 and J.3) demonstrate that the total transportation impacts would be essentially the same regardless of the routes used. These analyses indicate that because all shipments must comply with regulatory limits, the impacts would be principally proportional to the number of shipment miles. Accidents that would result in releases of radioactive materials from the casks would be extremely unlikely regardless of the routes because applicable transportation requirements prescribe that the casks must be able to withstand virtually all types of accidents without releasing their contents.

DOE believes that this EIS adequately analyzes the environmental impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site was recommended and approved. See the introduction to Chapter 8 of this Comment-Response Document for more information.

In response to public comments, DOE has added maps of the representative routes analyzed in the EIS to Appendix J (see Section J.4) . DOE used state-specific accident data in the analyses, which includes consideration of specific conditions and hazards along representative highway and rail routes.

8.3 (149)
Comment - 218 comments summarized
Commenters raised several issues about the adequacy of information and analyses in the EIS with respect to the selection of spent nuclear fuel and high-level radioactive waste transportation routes, as follows:

1. The EIS does not identify DOE's preferred transportation alternatives (mode and routes) or the maximum number of shipments that would pass through and near specific areas.

2. The EIS does not contain sufficient route-specific information on national routes to allow DOE to identify, compare, and bound the impacts of spent nuclear fuel and high-level radioactive waste transportation to make informed decisions. Commenters said that the generic transportation analyses in the EIS were inadequate, vague, and too ambiguous to support transportation-related decisions. Route-specific information requested by commenters included such things as rail and road conditions in specific cities and towns; incidental radiation exposure in specific cities and towns and the consequences of this exposure; likely places for accidents and their consequences; evaluation of specific and realistic modes and primary and secondary routes; the effects of accidents in highly populated areas, rural areas, areas where retrieval of a leaking cask would be difficult, and areas where accidents would be most likely; accidents that involve releases of radioactive materials; radiological impacts from rail cars that are parked on sidings for extended periods of time; impacts of using dedicated trains subject to speed restrictions; and bounding analyses that would allow individual communities and specific regions to compare the risks and impacts among routes and combinations of modes and routes.

3. The EIS does not contain sufficient route-specific information on alternative modes and routes in Nevada to allow DOE to identify, compare, and bound the impacts of spent nuclear fuel and high-level radioactive waste transportation and associated construction (including the siting and construction of an intermodal transfer station) to make informed decisions. Commenters said that the EIS should have acknowledged that impacts from spent nuclear fuel and high-level radioactive waste transportation would be concentrated in Nevada. Others noted that many communities in Nevada would be close enough to a branch rail line to require evacuation in the event of a severe accident or terrorist attack, yet the EIS did not describe specific impacts to Pahrump, Goldfield, and other Nevada towns. Moreover, the EIS did not list the assumptions regarding the acquisition of Nevada environmental permits, approvals, and rights-of-way; the engineering feasibility and construction requirements for transporting waste through Nevada; and the impacts to private property and grazing lands. Commenters wanted to know who would own, operate, and maintain the tracks in Nevada and whether the tracks would be fenced off from surrounding areas.

Commenters said that such route-specific information is required by the National Environmental Policy Act and by regulations of the Council on Environmental Quality. Because route-specific information is lacking, communities that would actually be affected by transport cannot begin to undertake emergency planning and preparedness and do not understand the impacts and costs to local programs. Moreover, local, state and tribal governments and their response agencies were unable to determine specific health, safety, and environmental impacts, or to develop mitigation measures. Some said that DOE had ample time to collect route-specific information for the Draft EIS, citing a DOE commitment in the 1986 Environmental Assessment of Yucca Mountain (DIRS 104731-DOE 1986) to do so and to involve responsible agencies and governmental bodies in the planning and analysis process. Some said that route-specific analyses should not be deferred to the future, requesting instead that a supplemental EIS be prepared that contains route-specific information and analyses (including field surveys, consultations, and engineering and environmental analyses). Others said that the EIS should be withdrawn and a new EIS prepared that contains route-specific information, contending that without such route-specific information and analyses, the public cannot comment on the EIS in a meaningful manner.

In contrast to the above, some commenters supported the level of detail contained in the EIS with regard to transportation.

Response

DOE believes that the EIS adequately analyzes the transportation-related impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site was recommended and approved. See the introduction to Chapter 8 of this Comment-Response Document for more information.

1. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved, DOE would issue at some future date a Record of Decision to select a mode of transportation. If, for example, DOE selected mostly rail (both nationally and in Nevada), it would then identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. A similar process would occur in the event that DOE selected heavy-haul

truck as its mode of transportation in Nevada. DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In response to public comments, DOE has included, maps of representative highway routes and rail lines it used for analysis in Appendix J of the EIS (see Section J.4). Section J.4 includes health and safety impact estimates associated with shipments for each state through which shipments could pass.

2. If there was a decision to proceed with the development of a repository at Yucca Mountain made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternate preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state and tribal designated alternate route) that reduce time in transit. DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials.

   DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

   To ensure that the EIS analyses reflect the latest reasonably available information, DOE has either incorporated information that has become available since the publication of the Draft EIS or modified existing information to accommodate conditions likely to be encountered over the life of the Proposed Action. For example, the analysis in the Draft EIS relied on population information from the 1990 Census. In this Final EIS, DOE has scaled impacts upward to reflect the relative state-by-state population growth to 2035, using 2000 Census data.

   Although the EIS analyses are based on the latest reasonably available information and state-of-the-art analytical tools, not all aspects of incident-free transportation or accident conditions can be known with absolute certainty. In such instances, DOE has relied on conservative assumptions that tend to overestimate impacts. For instance, DOE assumed that the radiation dose external to each vehicle carrying a cask during routine transportation would be the maximum allowed by U.S. Department of Transportation regulations. Similarly, DOE assumed that an individual, the "maximally exposed individual," would be a resident living 30 meters (100 feet) from a point where all truck shipments would pass. Under these circumstances, the maximally exposed individual would receive a dose of about 6 millirem from exposure to all truck shipments (6 millirem represents an increased probability of contracting a fatal cancer of 3 in 1 million). Although it can be argued that individuals could live closer to these shipments, it is highly unlikely that an individual would be exposed to all shipments over the 24-year period of shipments to the repository, even though DOE incorporated this highly conservative assumption in the analysis.

   However, in response to comments, DOE has considered locations at which individuals could reside nearer the candidate rail corridors and heavy-haul truck routes in Nevada as a way of representing conditions that could exist anywhere in potentially affected communities. For example, DOE assumed that a maximally exposed individual could reside as close as 4.9 meters (16 feet) to a candidate heavy-haul truck route. During the 24-year period of repository operations this maximally exposed individual would receive an estimated dose of about 29 millirem, resulting in an increased fatal cancer probability of 2 in 100,000.

   As stated in the EIS (see Section 2.1.3.2.2), a truck carrying a shipping cask of spent nuclear fuel or high-level radioactive waste would travel to the proposed repository in accordance with U.S. Department of Transportation regulations (49 CFR 397.101), which require the use of preferred routes that reduce time in transit. The highway routes DOE would use would be submitted to the Nuclear Regulatory Commission for final approval.

Further, the EIS contains a discussion of potential impacts from accidents in both the mostly legal-weight truck scenario and the mostly rail scenario (see Section 6.2.4.2). The accident analysis includes a description of the consequences of a release of radioactive material from a transportation cask, although such an event would be extremely unlikely. The EIS states that an accident involving a release from a transportation rail cask could result in approximately five latent cancer fatalities in an urban area. A severe accident in another population zone (for example, rural) would have lower consequences.

3. As stated above, DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. The choice of a rail corridor or intermodal transfer station location and heavy-haul truck route within Nevada would not be based solely on the potential environmental impacts identified in the EIS. DOE would consider factors such as engineering feasibility, safety, input from the State of Nevada and surrounding communities, and cost in its decisionmaking. The extent to which the branch rail line, or parts of the branch rail line, would be fenced would be determined through additional consultations and appropriate National Environmental Policy Act reviews, including determinations on necessary mitigation measures.

At this time, DOE plans to use private industry, including railroads, to the maximum extent possible, to accomplish its transportation mission. Such an arrangement, however, would not jeopardize the relationships and agreements that have been developed between DOE and stakeholders. DOE would retain responsibility for policy decisions, stakeholder relations, final route selection, and implementing Section 180(c) of the NWPA. DOE would award contracts for acceptance of spent nuclear fuel and high-level radioactive waste and transportation services to those bidders whose proposals DOE considered to be most advantageous to DOE, with cost being only one of a variety of selection factors. One of the qualifications that must be met by a successful bidder would be to have performed a major transportation and logistics coordination project involving railroad, truck, or intermodal carriage of radioactive, toxic, or other types of hazardous materials within the past 10 years. DOE would require the transportation contractor to provide for maximum use of dedicated train service and advanced rail equipment features where this type of service or equipment can be demonstrated to enhance operating efficiency, dependability, or cost-effectiveness, or lessen the potential of adverse railroad equipment incidents.

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using a planning grant and based on availability of funds in annual Program budgets specified by Congress. Additional Federal response capabilities, such as expert services from the Radiological Assistance Program Team, could be activated, as requested by states and tribes. The schedule in the proposed policy and procedures for implementation of Section 180(c) of the NWPA (63 *FR* 23753; April 30, 1998) is designed to provide adequate time for training of first responders in advance of the first shipments. If there was a decision to proceed with the development of a repository at Yucca Mountain, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. See Section M.6 of the EIS for a discussion of the DOE Section 180(c) policy and procedures.

8.3 (160)
Comment - 6 comments summarized
Commenters stated that the EIS is deficient in its treatment of key transportation issues on a state level because it fails to evaluate a more likely and potentially heavier impact modal mix. Commenters stated the scenarios used in the EIS significantly underestimate the likely number of combined truck and rail shipments, the number and mileage of truck and rail routes, and the number of states affected by both rail and truck shipments. Commenters proposed a third transportation scenario based on the current capabilities of waste generators and storage sites, without investments to upgrade cask loading capabilities or upgrade near-site infrastructure.

Response
DOE evaluated the potential environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste from 5 DOE and 72 commercial sites to the proposed repository at Yucca Mountain. If there was a decision to proceed with the development of a repository at Yucca Mountain, shipping routes would be identified at

least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments to a repository could begin, it is impossible to predict with a reasonable degree of accuracy the exact number of shipments that would be made by either truck or rail. For this reason, DOE evaluated two scenarios for moving the materials to Nevada: (1) transportation using mostly legal-weight trucks and (2) transportation using mostly rail. DOE analyzed these scenarios to ensure that it considered the range of potential environmental impacts associated with the transportation of spent nuclear fuel and high-level radioactive waste.

DOE believes that the mostly rail scenario, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. In reaching this conclusion, DOE considered the capabilities of the sites to handle larger (rail) casks, the distances to suitable railheads, and historic experience in actual shipments of nuclear fuel, waste, or other large reactor-related components. DOE also considered relevant information published by sources such as the Nuclear Energy Institute and the State of Nevada. In addition, DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

Nevertheless, in response to comments DOE has analyzed the effects of different mixes of rail and truck shipments. The results of this analysis confirm DOE's estimate that the mostly rail and mostly legal-weight truck scenarios represent a reasonable range (lower and upper bound) of potential environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste.

DOE identified the mostly rail scenario to estimate the impacts that could occur if shipments to Yucca Mountain used rail transportation to the maximum practical extent and minimized use of legal-weight trucks. Correspondingly, DOE identified the mostly legal-weight truck scenario to estimate the greatest impacts that could occur if shipments to Yucca Mountain were made using legal-weight trucks to the maximum practical extent with only shipments of naval spent nuclear fuel being made by rail to Nevada. DOE used the CALVIN computer program (see Section J.1.1.1 of the EIS), along with data from owners of spent nuclear fuel and high-level radioactive waste collected by the Energy Information Agency and by DOE programs (see Appendix A), to estimate the number of legal-weight truck and rail shipments that would most likely be made. The CALVIN program, which uses information regarding the modal capabilities of shipping sites, and the data from owners (such as utilities) are the best tools available to DOE for estimating the number of shipments that could be made to Yucca Mountain.

To analyze the potential impacts of rail and truck shipments, DOE used the INTERLINE and HIGHWAY computer programs, respectively, to identify representative rail and highway routes that could be used for shipments from the 72 commercial and 5 DOE generator sites located across the continental United States (see Sections J.1.1.2 and J.1.1.3 of the EIS). The routes used in the analyses, which are illustrated on maps presented in Appendix J, originate in or cross 45 states and the District of Columbia. Not included are Montana, North Dakota, and Rhode Island, which are not crossed by highways or railroads identified by the analysis. Because of their geographic locations in relation to the locations of generator facilities and to likely transport routes, DOE believes that it is unlikely that shipments to Yucca Mountain would pass through these states. The INTERLINE and HIGHWAY computer programs are the best methods available for identifying representative rail and highway routes for analysis of impacts of transporting spent nuclear fuel and high-level radioactive waste.

Because transportation impacts would be proportional to the number of shipments, any mix of rail and truck shipments lying between the two extremes used in the analysis would have potential impacts that would be the sum of proportioned impacts of the two scenarios analyzed. For example, the transportation impacts of a 50-percent rail and 50-percent legal-weight truck scenario would be approximately the sum of 50 percent of the impacts presented in the EIS for the mostly rail scenario and 50 percent of the impacts for the mostly legal-weight truck scenario. Based on the results reported in the EIS, the transportation impacts for this example would lie between those for the mostly legal-weight truck and mostly rail scenarios. These impacts would be neither higher than those estimated for the mostly legal-weight truck scenario nor lower than those estimated for the mostly rail scenario. This would be the case for all possible scenarios (all combinations of rail and truck shipments that add to 100 percent) for legal-weight truck and rail transportation. Therefore, for transportation, the impacts estimated in Chapter 6 of the EIS for the mostly rail and mostly legal-weight truck scenarios consider the associated range of those that would be estimated for the different mixes of rail and legal-weight truck modes that could occur.

Section J.1.2.1.4 of the EIS discusses the sensitivity of analysis results to changes in the number of shipments. This change would occur, for example, if less material was included in each cask, causing the total number of shipments to increase. Using the information in this section, an increase of 50 percent in the number of truck shipments would result in a 50-percent increase in the estimated total distance traveled by legal-weight trucks and a 50-percent increase in impacts of incident-free transportation for this mode. For this eventuality, for the mostly legal-weight truck scenario discussed in the EIS, the public dose would increase from about 5,100 person-rem (2.6 latent cancer fatalities) to 7,700 person-rem (3.9 latent cancer fatalities). The impacts of constructing and maintaining a branch rail line or upgrading and maintaining a highway route for use by heavy-haul trucks and constructing and operating an intermodal transfer station would not be appreciably different for different mixes of rail and legal-weight truck modes that might be used.

8.3 (161)
Comment - 130 comments summarized
Commenters stated that DOE failed to identify transportation modes and the specific rail and highway routes analyzed in the EIS. The commenters observed that DOE actually selected specific routes for analysis in the Draft EIS using the HIGHWAY and INTERLINE models. The commenters note references to these data in Chapter 6 and Appendix J of the Draft EIS. Commenters stated that by not releasing this information, DOE failed to notify and inform the public of the potential impacts through their communities, provide the public an opportunity to determine the legal sufficiency of DOE's analysis, and participate in the review and public comment process. Commenters stated that DOE violated the National Environmental Policy Act by concealing crucial information that would permit affected communities to participate in the process, which should be grounds for declaring the EIS legally deficient and requiring DOE to revise and reissue a Draft EIS or issue a supplemental Draft EIS for a new round of public review and comment. Commenters stated that the attempt to publish route maps, which failed to identify shipment numbers, modal mix, and specific communities affected, 3 weeks before the end of the comment period (after 18 of the 21 public hearings had been conducted) in no way mitigated this deficiency in the Draft EIS. DOE's attempted concealment of the shipping routes is a deviation from DOE's past practice of identifying the most likely transportation routes in other National Environmental Policy Act documents, such as the Waste Isolation Pilot Plant EIS and its associated supplemental EIS.

Commenters indicated that they understand that the routes are preliminary and that states and tribes could identify alternate routes. However, DOE's argument that the routes could change is not an acceptable justification for refusing to include the specific routes used to analyze potential impacts. The commenters noted the purpose of a Draft EIS is to highlight preliminary information and examine all the alternatives available, not to withhold information.

A commenter stated that the nuclear community's greatest fear is that DOE will be forced to identify routes and then the controversy over Yucca Mountain will no longer be a Nevada issue, but will be a source of extreme and vocal outrage in hundreds of communities across the Nation. Commenters requested that the EIS identify specific primary, secondary, and emergency routes, seasonal route changes, casks, and time of day; establish baseline conditions along routes and use route specific data; provide a range of transportation-risk options and associated fiscal impact estimations, and honestly identify potential impacts along those routes, including socioeconomic and public perception.

One commenter stated that he could not believe that after 13 years DOE cannot tell the public exactly how, what time of day, and on what routes shipments would be transported. Failure to identify routes or even likely highway or rail transportation routes reduces public awareness and interest in the Draft EIS analysis and hampers overall meaningful input. Failure to identify likely routes means that the impacts on those specific communities, as well as states, have not been adequately evaluated and conceals the need to evaluate impacts to highly affected areas in the various states. A commenter stated DOE's decisionmaking process for choosing the safest available routes needs to be independent of Nevada's effort to convince the Nation that safe transportation is an impossible task. Others stated DOE needs to show a comparison of likely rail and truck shipment routes with similar information. One commenter noted that DOE will not delineate specific routes until approximately 4 years prior to shipment. However, for states and localities to access funds for providing training and getting proper equipment for responding to any accidents, DOE, by statute, has to designate what those transportation routes will be. The commenter believes the Department should identify the routes now so that communities can be assured emergency responders are trained.

A number of commenters suggested the EIS should include both maps and tables showing the specific routes and numbers of shipments expected on each route, as well as where the spent nuclear fuel and high-level radioactive waste shipped on each route would originate, and how many casks would be involved and disclose the variables and assumptions that are built into the computer models to identify routes.

Response

DOE has not attempted to conceal transportation routes. If there was a decision to proceed with the development of a repository at Yucca Mountain, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway or rail lines would be used. For example, in the interim, state or Native American tribal governments could designate alternate preferred highway routes and new highways and rail lines could be constructed or modified. Therefore, for purposes of analysis in the EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for the shipment of radioactive materials. In response to public comments, DOE has included in the EIS maps of representative highway routes and rail lines that were used for the EIS analysis (see Figures 6-11 and 6-12).

In response to public comments, DOE has added Appendix M to the EIS to provide further information on topics concerning transportation of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. These topics include liability for transportation accidents, emergency management, cask safety and testing, and transportation services acquisition and protocols.

As discussed in Sections J.1.2.2 and M.2.6 of the EIS, specific routes would be identified well before shipments in accordance with transportation protocols that would apply in the event of emergencies or other conditions that required deviation from the regular routes. As stated in the EIS (see Section 2.1.3.2.2) and noted above, a truck carrying a shipping cask of spent nuclear fuel or high-level radioactive waste would travel routes to the repository in accordance with U.S. Department of Transportation regulations (49 CFR 397.101), which require the use of preferred routes. These routes include the Interstate Highway System, including beltways and bypasses. Alternate routes may be designated by states and tribes following U.S. Department of Transportation regulations (49 CFR 397.103) that require consideration of the overall risk to the public and prior consultation with affected local jurisdictions and with any other affected states and tribes. The highway routes would be selected in accordance with these Federal transportation regulations and would be approved by DOE. As noted above, there are no Federal regulations pertaining to rail routes for shipment of spent nuclear fuel or high-level radioactive waste. The shipper and railroad companies (carriers) determine rail routes based on best available trackage, schedule efficiency, and cost-effectiveness. This includes selecting routes that result in minimum time in transit, minimum interchanges, and maximum use of mainline tracks. The routes would be submitted in advance to the Nuclear Regulatory Commission for approval. In addition, DOE has developed operational protocols (see Section M.3.2.1.2 of the EIS), that include guidelines for selecting rail routes. DOE applied the guidelines in selecting routes for analysis in the EIS. If the U.S. Department of Transportation promulgates rail routing regulations, DOE would change its operational protocols, as appropriate, to comply with the regulations.

DOE believes that the mostly rail case, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. In reaching this conclusion, DOE considered the capabilities of the sites to handle larger (rail) casks, the distances to suitable railheads, and historic experience with actual shipments of nuclear fuel, waste, or other large reactor-related components. DOE also considered relevant information published by sources such as the Nuclear Energy Institute and the State of Nevada. In addition, DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

Nevertheless, in response to comments DOE has analyzed the effects of different mixes of rail and truck shipments. The results of this analysis confirm DOE's estimate that the mostly rail and mostly legal-weight truck scenarios represent a reasonable range (lower and upper bound) of potential environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste.

As stated in the EIS, 70,000 MTHM spent nuclear fuel and high-level radioactive waste would be shipped to Yucca Mountain under the Proposed Action. Section 6.1.1 of the EIS reports the number of cask shipments that would be required for each of the two shipment scenarios analyzed – mostly rail and mostly legal-weight truck. Numbers of cask shipments are tentative, as there are many factors that could cause them to change, including selecting different transportation casks for shipments, reactor operations, and a change in the utility's priority for shipping spent nuclear fuel to a repository. For example, a utility that initially could not load a rail cask might develop that capability.

The analysis in the EIS used state-specific accident rates and data from a Nuclear Regulatory Commission study of the adequacy of its transportation regulations in 10 CFR Part 71 to estimate the likelihood and severity of transportation accidents (DIRS 152476-Sprung et al. 2000). The data from these studies are based on national data collected from actual accidents. The national data (see Section J.1.4.2 of the EIS) includes accidents in which road hazards and other local conditions were contributing factors. Thus, the analysis presented in the EIS uses data derived from accidents in which unique local conditions were contributing factors. The EIS analyzes a maximum reasonably foreseeable accident, an accident with a probability of occurrence of about 3 in 10 million per year. To put this in perspective, this accident would occur once in the course of about 5 billion legal-weight truck shipments. In this scenario, a truck cask, not involved in a collision, would be engulfed in a fire with temperatures between 750°C and 1,000°C (1,400°F to 1,800°F) (see Section 6.2.4.2 of the EIS). The conditions of the maximum reasonably foreseeable accident analyzed in the EIS envelop conditions reported for the Baltimore Tunnel fire (a train derailment and fire that occurred in July 2001 in a tunnel in Baltimore, Maryland). Temperatures in that fire were reported to be as high as 820°C (1,500°F), and the fire was reported to have burned for up to 5 days.

DOE could decide to use a dedicated train that carried only the material to be shipped to Yucca Mountain, or could elect to move the spent nuclear fuel and high-level radioactive waste in general freight. If the material was shipped as general freight, the position of the spent nuclear fuel or high-level radioactive waste car in the train would be regulated by 49 CFR 174.85. This regulation requires that railcars placarded "radioactive" must be separated from a locomotive, occupied caboose, or carload of undeveloped film by at least one nonplacarded car, and it cannot be placed next to other placarded railcars of other hazard classes.

Local health and safety impacts of transporting spent nuclear fuel and high-level radioactive waste would be a fraction of national impacts discussed in Section 6.2.3 of the EIS. The population impacts in small communities would be much less than the population impacts in metropolitan areas, though the impacts to maximally exposed individuals would be comparable.

Section 6.2 of the EIS discusses socioeconomic and other potential impacts of national transportation of spent nuclear fuel and high-level radioactive waste. Because existing rail and highway systems would be adequate for transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain, except under conditions where heavy-haul trucks would be used, infrastructure upgrades would not be necessary and therefore are not included in the analysis. The EIS assumes that sites identified as being served by a railroad would use rail and that sites that do not have rail service (for example, needing rail spur upgrades) would ship using heavy-haul trucks or barges to nearest railheads.

Nevertheless, DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties, offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since the scoping process for the EIS to enable DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. In addition, DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty.
- Much of the uncertainty is irreducible.
- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as serious accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

DOE believes that the EIS adequately analyzes the environmental impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site was recommended and approved. See the introduction to Chapter 8 of this Comment-Response Document for more information.

8.3 (201)
Comment - 51 comments summarized
Commenters stated that DOE did not reveal the process or timetable for selecting a preferred rail corridor or heavy-haul truck route or discriminating information for the alternatives. The commenters, in general, stressed the need for DOE to describe the process of selecting implementing alternatives. Several commenters requested a formal criteria document or comprehensive transportation plan describing the decision process, the criteria for selecting shipping routes, and a sound methodology for evaluating optional mixes of routes and transportation modes. Commenters noted a range of factors that should be part of the selection criteria including emergency response, population, accident rates, weather, seasonal road closures, infrastructure, health and safety, environmentally sensitive areas, and Native American tribal communities. One commenter noted that DOE should recognize (the commenter referred to Section 2.1.3.3.1 of the Draft EIS) and explain the role that states might play in routing. Another commenter stated that DOE should specifically address whether it would conduct additional National Environmental Policy Act analyses for every transport segment when route and mode mix was completed. Several commenters took issue with the role Regional Servicing Contractors or carriers could have in the route-selection process. Commenters stated that DOE needs to accept the responsibility for choosing the safest routes available and specify those routes to contractors and carriers rather than abrogating that responsibility and leaving it up to the railroads to decide routing issues.

Response
If there was a decision to proceed with the development of a repository at Yucca Mountain, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments to a repository could begin, it is impossible to predict with a reasonable degree of accuracy the exact number of shipments that would be made by either truck or rail. For this reason DOE evaluated two scenarios for moving the materials to Nevada: (1) transportation using mostly legal-weight trucks and (2) transportation using mostly rail. DOE analyzed these scenarios to ensure that it considered the range of potential environmental impacts associated with the transportation of spent nuclear fuel and high-level radioactive waste.

DOE believes that the mostly rail case, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. In reaching this conclusion, DOE considered the capabilities of the sites to handle larger (rail) casks, the distances to suitable railheads, and historic experience in actual shipments of nuclear fuel, waste, or other large reactor-related components. DOE also considered relevant information published by sources such as the Nuclear Energy Institute and the State of Nevada. In addition, DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

Nevertheless, in response to comments DOE has analyzed the effects of different mixes of rail and truck shipments. The results of this analysis confirm DOE's estimate that the mostly rail and mostly legal-weight truck scenarios represent a reasonable range (lower and upper bound) of potential environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste.

At this point, it is impossible to predict with a reasonable degree of accuracy which highway routes or rail lines could be used. In the interim, state or Native American tribal governments could designate alternate preferred highway routes, and highways and rail lines could be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route). DOE identified rail lines based on current rail practices, because there are no comparable Federal regulations applicable to the selection of rail lines for the shipment of radioactive materials.

In response to public comments, DOE has included in the EIS maps of representative highway routes and rail lines used for analysis. In addition, potential health and safety impacts associated with shipments are provided for each state through which shipments could pass (see Section J.4 of the EIS).

In response to comments, DOE has added information to the EIS (see Section M.3.2.1.2) on the route-selection process and proposed operational protocols for shipments. Current planning is that contractors providing transportation services would prepare transportation plans that would include proposed routes and modes selected according to U.S. Department of Transportation regulations and Federal Railroad Administration policy. The Department would provide those plans to the states and tribes for comment. DOE would then make final route selections and provide them to the Nuclear Regulatory Commission. The EIS has been revised to include a description of this planning process.

8.3 (213)
Comment - 28 comments summarized
Commenters noted that Section 180(c) of the NWPA requires the Federal government to provide improvements in emergency response training and capability along routes designated for the transport of spent nuclear fuel and high-level radioactive waste. The commenters stated that the costs of providing and maintaining response capability should be estimated as part of the fiscal impact analysis necessary to compare and eventually designate spent nuclear fuel and high-level radioactive waste transportation corridors for the project. Others asked what would be the source of funding for state, local, and Native American tribal inspectors and enforcement, and who would pay and oversee state and local law enforcement and emergency response training. Others questioned when funding would become available. Commenters stated that, because some of the proposed routes are in isolated areas or the roadways are unsuitable for the transportation of spent nuclear fuel and high-level radioactive waste, it would be costly to safeguard residents in these areas. These commenters stated that the Draft EIS failed to address the significant fiscal and possible significant environmental impacts of meeting those obligations and that the counties and states would be "saddled" with meeting those obligations. Others stated that funding under the NWPA would be inadequate compared to the amount of money that would be needed by local jurisdictions to prepare for transporting spent nuclear fuel and high-level radioactive waste. Other commenters urged that Congress and DOE ensure adequate national assistance and appropriations to fund emergency management activities for state and local jurisdictions through which spent nuclear fuel and high-level radioactive waste would travel well before the first shipments occurred. Others noted that DOE had engaged in constructive discussions regarding financial assistance, but that there were no commitments made in the Draft EIS for such assistance. The Final EIS needs to describe both the appropriate level of preparedness for local jurisdictions and how funding would be administered.

Response
As discussed in the EIS, accidents involving spent nuclear fuel or high-level radioactive waste shipments could occur. However, of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. Thus, the likelihood that a first responder or other emergency personnel would become contaminated or eventually fall ill, even in very severe accidents, would be

remote. Of the thousands of shipments completed in the United States over the last 30 years, none has resulted in an injury through the release of radioactive materials. Because the transportation analyses in the EIS did not take credit for the mitigation aspects of emergency response activities, the cost of emergency response planning and preparedness is not included in the EIS, although DOE intends to provide assistance and funds for emergency response training.

Nevertheless, in response to comments DOE has revised the EIS by adding Appendix M to provide additional transportation-related information, including DOE funding for improvements in emergency response training and capabilities along the routes (see Section M.5). State and Native American tribal governments have primary responsibility to respond to and to protect the public health and safety in their jurisdictions from accidents involving radioactive materials. However, Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and tribes through whose jurisdictions the Department could transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for addressing emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using a planning grant and based on availability of funds in annual Program budgets specified by Congress. Additional Federal response capabilities, such as expert services from the Radiological Assistance Program Team, could be activated, as requested by states and tribes. The schedule in the proposed policy and procedures for implementation of Section 180(c) of the NWPA (63 *FR* 23753; April 30, 1998) is designed to provide adequate time for training of first responders in advance of the first shipments. If there was a decision to proceed with the development of a repository at Yucca Mountain, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. See Section M.6 of the EIS for a discussion of the DOE Section 180(c) policy and procedures.

DOE believes that the EIS adequately analyzes the environmental impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site was recommended and approved. See the introduction to Chapter 8 of this Comment-Response Document for more information.

8.3 (362)
Comment - EIS000043 / 0003
The Draft EIS does not analyze impacts associated with specific nuclear waste transportation routes even though it's intended that the document will be used at sometime in the future to select transportation modes and routes from 75 individual waste sites to Yucca Mountain.

Residents along potential transportation routes to Yucca Mountain, through 43 states and within one-half mile of more than 50 million people, are most knowledgeable about local hazards, yet their specific knowledge is co-opted by the generic treatment of transportation risks in the Draft EIS.

Response
DOE evaluated the potential environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste from 5 DOE and 72 commercial sites to the proposed repository at Yucca Mountain. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, state or Native American tribal governments may designate alternate preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state and tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

In response to public comments, DOE has included state maps of representative highway routes and rail lines it used for analysis in Appendix J of the EIS (see Section J.4). Section J.4 includes potential health and safety impact estimates associated with shipments for each state through which shipments could pass.

DOE believes that the EIS adequately analyzes the environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

In addition, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada.

DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties, offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

8.3 (377)
Comment - EIS000040 / 0003
It certainly casts doubt on the efficiency of the transportation problem when Mesquite does not even appear on the D.O.E. maps. Further, in Nuclear Regulatory Commission NURE6-1437, dated February 1999, the city is not mentioned and the planned route does not go through Overton as stated.

Response
Maps in the EIS that depict transportation routes and corridors include the City of Mesquite, where appropriate (for example, see Figure 6-13).

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternate preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state and tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. Should a rail corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

8.3 (532)

Comment - EIS000118 / 0003

The [Nye County] Commission has also said that the only possible heavy haul route and the preferable rail route is one that avoids Nye County communities and comes across the Test Site. The EIS says that that is not the preferred alternative and the reason why is because there's a problem within the federal family. Air Force doesn't want it, and so it's not preferred.

Response

Public comments during the EIS scoping period requested that DOE evaluate routes through the Nellis Air Force Range to Yucca Mountain. In response, DOE added an implementing alternative for the transportation of spent nuclear fuel and high-level radioactive waste by rail or by heavy-haul truck to the Yucca Mountain site across the Nellis Air Force Range (the Caliente-Chalk Mountain Corridor and Caliente/Chalk Mountain heavy-haul truck route analyzed in the Draft EIS).

During preparation of the Draft EIS, DOE consulted with various organizations and agencies, including the Air Force (see Appendix C of the EIS). In a letter dated March 1999, F. Whitten Peters, Acting Secretary of the Air Force, commented that the Air Force believes that there is no route through the Nellis Air Force Range that could avoid adversely affecting classified national security activities, leading to the imposition of flight restrictions and affecting the ability for testing and training. As a consequence, DOE listed the Caliente-Chalk Mountain Corridor and Caliente/Chalk Mountain heavy-haul truck route in the Draft EIS as "nonpreferred alternatives."

In comments on the Draft EIS, the Air Force restated its position that routes across the Nevada Test and Training Range would not be consistent with its national security uses. The Air Force concluded that use of such a corridor or route could adversely affect critical and sensitive national security activities.

In response, DOE reevaluated whether the Caliente-Chalk Mountain Corridor and the Caliente/Chalk Mountain heavy-haul truck route should be eliminated from further evaluation. DOE met with the Air Force (see Appendix C of the EIS), considered the information they provided, and concluded that the Caliente-Chalk Mountain Corridor and the Caliente/Chalk Mountain heavy-haul truck route implementing alternatives should remain identified as "nonpreferred alternatives" in this Final EIS.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. Should a rail corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

8.3 (565)

Comment - EIS000106 / 0004

The EIS looks at a lot of transportation options, as Les mentioned, and it states that these are to bound future decisions on the specifics of transportation that were made in process, but what it doesn't do is tell what DOE would commit to regarding transportation.

Response

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using an up-front planning grant and based on availability of funds in annual Program budgets specified by Congress. Additional Federal response capabilities, such as expert services from the Radiological Assistance Program Team, could be activated, as requested by states and tribes. The schedule in the proposed policy and procedures (63 *FR* 23753; April 30, 1998) for implementation of Section 180(c) of the NWPA is designed to provide adequate time for training of first responders in advance of the first shipments. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. See Section M.6 of the EIS for a discussion of the DOE Section 180(c) Policy and Procedures.

DOE believes that the EIS adequately analyzes the environmental impacts that could result from the Proposed Action.

In addition, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada.

8.3 (577)
Comment - EIS000066 / 0001
The Division of Waste Management's main concern would be the routes used to transport the material. There are no permitted hazardous waste disposal sites for this type waste in Kentucky. The division may have further comments when the routes are finalized.

Response
DOE evaluated the potential environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste from 5 DOE and 72 commercial sites to the proposed repository at Yucca Mountain. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternative preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state and tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

The final routes would be selected following the requirements and protocols outlined in the Draft Request for Proposals for Regional Servicing Contractors (DIRS 153487-DOE 1998; see Section M.3.2.1.2 of the EIS). DOE and its shipping contractors would consult with the states and tribes along proposed routes for input into the route selection. DOE would submit selected routes to the Nuclear Regulatory Commission for approval.

In response to public comments, DOE has included maps of the representative highway routes and rail lines for the 45 states it used for analysis in the EIS (see Figure J-43 for the representative Kentucky routes). It also included potential health and safety impacts associated with shipments for each state through which shipments could pass (see Table J-83).

As stated in Sections 1.1 and 1.2 of the EIS, the Yucca Mountain site in Nevada is the only site being considered as a geologic repository for disposal of spent nuclear fuel and high-level radioactive waste.

8.3 (675)
Comment - EIS000110 / 0004
I personally would favor rail because it's safer, but it is more expensive. My objection to the truck routes would be mostly because of the impact on the present highways.

As I said when I'm traveling over the mountain passes, I am frequently slowed down behind legal weight trucks going as slow as 15 miles an hour. Consider heavy haul trucks and increase that number by maybe an order of magnitude, you have a big problem.

Response
DOE believes that the mostly rail scenario, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. In reaching this conclusion, DOE considered the capabilities of the sites to handle larger (rail) casks, the distances to suitable railheads, and historic experience in actual shipments of nuclear fuel, waste or other large reactor-related components. DOE also considered relevant information published by sources such as the Nuclear Energy Institute and the State of Nevada.

In addition, DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. Should a rail corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

8.3 (937)
Comment - EIS010378 / 0002
NOW THEREFORE BE IT RESOLVED, that the City of Ely supports figure 2-4 of the White Pine County Comments to the Supplemental Draft SDEIS so long as figure 2-4 is amended to read that the Nevada Northern Railroad will be considered a primary route of shipment for any waste shipped through White Pine County to the Yucca Mountain Project Sight [Site].

Response
White Pine County is requesting clarification on the transportation modes that would be used to ship spent nuclear fuel and high-level radioactive waste to the site. The text and Figure 2-4 in the White Pine County comments are unclear on whether legal-weight trucks would have access to the site.

Depending upon how a shipment of spent nuclear fuel or high-level radioactive waste would be transported from the generator sites; one of three modes of transportation would be used in Nevada, rail, heavy-haul trucks, and legal-weight trucks. Legal-weight truck shipments could continue directly to the repository following routes that satisfy the regulations of the U.S. Department of Transportation (49 CFR Part 397).

Shipments arriving in Nevada by rail would travel to the repository either directly by rail or be transferred to heavy-haul trucks at one of three possible locations along Interstate-15 in Nevada and then travel along highways to the repository. A discussion of these scenarios along with maps of the candidate routes is found in Section 2.1.3.3 of the EIS.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. Should a rail corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

8.3 (1009)
Comment - EIS000262 / 0005
Inyo County has a strong preference for a rail-focused option which offloads the bulk of the waste east of the site. Lincoln County, Nevada has already indicated its support for an intermodal transfer site within its jurisdiction. Development of this site would avoid reliance on transportation corridors in high-risk areas south and west of Yucca Mountain and place one of the major components of the project in a jurisdiction amenable to the operation.

<u>Response</u>
DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. Should a rail corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

8.3 (1271)
<u>Comment</u> - EIS000221 / 0002
The draft EIS itself fails to identify the cross Country rail and truck routes used in DOE's transportation impact analysis, and fails to identify potential transportation routes to Yucca Mountain through California. The document further fails to provide a meaningful analysis of the potential impacts on California of rail and truck transportation to the proposed repository.

<u>Response</u>
Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, state and tribal governments may designate alternate preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

In response to public comments, DOE has included maps of the representative highway routes and rail lines for the 45 states it used for analysis in the EIS (see Figure J-34 of the EIS for the representative California routes). It also included potential health and safety impacts associated with shipments for each state through which shipments could pass. Table J-74 lists the estimated number of legal-weight truck shipments of spent nuclear fuel and high-level radioactive waste that would enter Nevada from California in the mostly legal-weight truck scenario.

If the Yucca Mountain site was approved, under the mostly legal-weight truck scenario, the estimated total number of truck shipments through California would be 6,867 over 24 years, which would be approximately 6 truck shipments per week. There would be no rail shipments.

The estimated numbers of shipments entering Nevada from California under the mostly rail scenario are less than the mostly legal-weight truck scenario. According to Table J-74, the number of rail shipments would range from 512 to 1,464 depending on the mode (rail or heavy-haul truck) and corresponding corridor/route selected in Nevada. This is slightly more than 1 rail shipment per week over 24 years, at most. In addition, there would be approximately 286 legal-weight truck shipments through California, which is slightly less than 1 per month. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

8.3 (1276)
<u>Comment</u> - EIS000221 / 0003
The DEIS evaluates a mostly truck scenario and a mostly rail scenario. Nevada believes that the final EIS must evaluate a third transportation scenario based on the current transportation capabilities of reactor and storage sites. Under the "current capabilities" scenario, there could be more than 26,000 truck shipments and more than 9,800 rail shipments through California. Under this scenario, California would receive an average of two truck shipments per day and four to five rail shipments per week for 39 years.

This potential level of shipments through California certainly constitutes a significant impact which should have been identified and evaluated in the draft EIS.

Response
As stated in Section 6.2 of the EIS, DOE analyzed two feasible scenarios – mostly rail and mostly legal-weight truck – for potential impacts of transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Prior transportation analyses provide substantial evidence that truck, rail and barge modes of transportation that could be used would result in low environmental impacts (see DOE environmental impact statements listed in Table 1-1 of the EIS). Different mixes of modes from the two analyzed in the EIS (for example, a 50:50 or 60:40 truck/rail mix or a mix in which shipments from 32 commercial sites would use legal-weight trucks and shipments from 45 commercial and DOE sites would use rail) would result in impacts that would lie somewhere between those for the mostly legal-weight truck scenario and the mostly rail scenario (Section J.1.2.1.4 discusses how impacts would change for variations in the mix of transportation modes for shipments to Yucca Mountain). Thus, as mentioned above, DOE chose to analyze the mostly rail and mostly truck scenarios as a means of displaying the range of impacts that could result from different mixes of modes.

In response to public comments, DOE has included maps of the representative highway routes and rail lines for the 45 states it used for analysis in the EIS (see Figure J-34 of the EIS for the representative California routes). It also included potential health and safety impacts associated with shipments for each state through which shipments could pass. Table J-74 lists the estimated number of legal-weight truck shipments of spent nuclear fuel and high-level radioactive waste that would enter Nevada from California in the mostly legal-weight truck scenario.

If the Yucca Mountain site was approved, under the mostly legal-weight truck scenario, the total number of truck shipments through California was estimated to be 6,867 over 24 years, which is approximately 6 truck shipments per week. There would be no rail shipments.

The estimated numbers of shipments entering Nevada from California under the mostly rail scenario are less than the mostly legal-weight truck scenario. According to Table J-74, the number of rail shipments would range from 512 to 1,464 depending on the mode (rail or heavy-haul truck) and corresponding corridor/route selected in Nevada. This would be slightly more than 1 rail shipment per week over 24 years, at most. In addition, there would be approximately 286 legal-weight truck shipments through California, which would be slightly less than 1 per month.

DOE believes that the mostly rail scenario, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. In reaching this conclusion, DOE considered the capabilities of the sites to handle larger (rail) casks, the distances to suitable railheads, and historic experience in actual shipments of nuclear fuel, waste or other large reactor-related components. DOE also considered relevant information published by sources such as the Nuclear Energy Institute and the State of Nevada. In addition, DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

8.3 (1779)
Comment - EIS000392 / 0004
Transportation: The DEIS fails to select a single route or mode choice for transporting high-level radioactive waste. The route choice through Nevada is especially important. Selection of a route through the State will have national effects.

The DOE failed to address these effects in the DEIS. The DEIS gives insufficient consideration of non-radiological impacts. The considerable impacts of on road surfaces, accident rates and infrastructure improvements caused by shipping radioactive waste must be defined.

Response
DOE evaluated the potential environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste from 5 DOE and 72 commercial sites to the proposed repository at Yucca Mountain. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available

approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternate preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved, DOE would identify for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In response to public comments, DOE has included state maps of representative highway routes and rail lines it used for analysis in Appendix J of the EIS (see Figure J-53 for the Nevada map). Section J.4 includes potential health and safety impact estimates associated with shipments for each state through which shipments could pass and illustrates how these estimates change based on the selection of Nevada routes and corridors (see Table J-93 for Nevada information).

Road surface damage associated with heavy-haul truck transport is given in *Road Upgrades for Heavy Haul Routes* (DIRS 154448-CRWMS M&O 1998). The costs for maintaining surface roadways is included in the $800-million Nevada estimate given in Section 2.1.5 of the EIS.

Accident rates for nonradiological accidents associated with transportation were acquired from Federal and state data files for the general routes identified in the EIS. How this information was acquired and used in the analyses are included in the following EIS sections:

- J.1.4.2.2, Methods and Approach for Analysis of Nonradiological Impacts of Transportation Accidents
- J.1.4.2.3, Data Used to Estimate Incident Rates for Rail and Motor Carrier Accidents
- J.1.4.2.4, Transportation Accidents Involving Nonradioactive Hazardous Materials
- J.2.4.3.2, Nonradiological Accident Risks for Barge and Heavy-Haul Truck Transportation

Infrastructure improvements in Nevada associated with rail transport are described in *Rail Alignment Analysis* (DIRS 131242-CRWMS M&O 1997). Infrastructure improvements in Nevada associated with heavy-haul truck transport are included in Section J.3.1.2 of the EIS, Tables J-37 through J-41. Additional information is included in *Road Upgrades for Heavy Haul Truck Routes – Design Analysis* (DIRS 154448-CRWMS M&O 1998).

8.3 (1794)
Comment - EIS000616 / 0001
I'm not going to get into the philosophy of the federal storage area for all this waste. But should the site at Yucca Mountain be selected, I feel the safest transportation would be the rail corridors option. I don't think heavy hauling should be considered as a transportation option, and I just feel that that is an option that shouldn't be considered at all from a safety standpoint. I think the rail corridors, whichever one you select, would be the best and safest option anywhere in the United States.

And I do believe that should the corridors be selected, that multiple use should be allowed. I think the communities, the mines, the industry, and all that could be in partnership with the DOE on that, and they would support the communities.

Response
DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. Should a rail corridor be selected, additional engineering and environmental

studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

DOE identified the potential for shared use in Section 8.4.2 of the EIS as a reasonably foreseeable future action. This section states "DOE would have to consider these impacts [of shared use] in any decision it made to allow shared use of the branch rail line." If the site is approved, then decisions regarding shared use would be made.

8.3 (2202)
Comment - EIS000613 / 0001
Today our focus is on DOE's failure to identify a preferred rail access corridor to Yucca Mountain in the DEIS. The Yucca Mountain site has no access to the national rail system. The nearest rail route is in Las Vegas, almost 100 miles away.

The DEIS identifies and describes four potential corridors, one-quarter mile in width, which DOE could use to construct a rail line connecting Yucca Mountain to the Union Pacific mainline in Southern Nevada: Valley modified is 98 miles; the Jean route is 112 miles; the Caliente Chalk Mountain, 214 miles; and the Caliente, 319 miles. The DEIS designates the Caliente Chalk Mountain corridor as a nonpreferred alternative. A fifth potential corridor, Carlin, which is 323 miles, would connect Yucca Mountain with the Union Pacific mainline in north central Nevada.

The DEIS fails to identify a preferred rail corridor, and sets forth no time table for selection of a preferred rail corridor, despite DOE's assertion that the information presented is sufficient to select a preferred corridor. The DEIS states:

"Although it is uncertain at this time when DOE would make any transportation related decisions, DOE believes that the EIS provides the information necessary to make decisions regarding the basic approaches (for example, mostly rail or mostly truck shipments), as well as the choice among alternative transportation corridors." From page 6-1.

Referring specifically to the selection of implementing alternatives, such as alternative rail corridors in Nevada, the DEIS states:

"If and when it is appropriate to make such decisions, DOE believes that the EIS provides the information necessary to make these decisions." On page 6-2.

According to the DEIS, additional information, analyses, and consultations will be required "for selection of a specific rail alignment within a corridor." Page 6-1.

DOE's failure to designate a preferred rail access corridor in the DEIS violates the National Environmental Policy Act (NEPA). NEPA procedures are designated to "insure that environmental information (including information on the human environment as well as public health and safety) is available to public officials and citizens before decisions are made and before actions are taken." DOE's approach denies the affected public a meaningful opportunity to participate in the rail corridor evaluation process before DOE prepares the final EIS.

Moreover, DOE's refusal to narrow the choice of corridors extends the region of influence of the proposed action to 13 Nevada counties traversed by the five rail corridors and their existing mainline rail connections. Virtually the entire population of Nevada will be held hostage by DOE's indecision. Coupled with the absence of a time table, the resulting uncertainty, in and of itself, will cause adverse socioeconomic impacts for individuals, businesses and communities.

During the scoping process in December of 1995, the State of Nevada recommended the following process to DOE:

"The Draft EIS must present a technically credible methodology for comparative evaluation of rail spur route options. The State of Nevada believes that DOE should fully evaluate at least three feasible rail spur routes before selecting a preferred route."

Nevada also recommended specific criteria for the DEIS comparative route evaluation: Impacts on public health and safety; impacts on highly populated areas; engineering feasibility; impacts on surface and ground water resources, threatened and endangered species, and federal and state parks and refuges; cost of construction, recognizing that predictability of costs may be as important as least cost in ranking alternatives; avoidance of private lands, and potential for voluntary acquisition of private lands where necessary; impacts on Native American lands and cultural resources; potential conflicts with the U.S. Air Force facilities and operations; and economic development costs and opportunities, addressing both standard and special (risk-induced) socioeconomic impacts.

The DEIS does not reveal the process DOE plans to use in selecting a preferred rail corridor. The base line information provided in chapter 3, and the impact analysis provided in chapter 6 and appendix J, are particularly deficient regarding impacts on highly populated areas; engineering feasibility; construction costs, and cost uncertainties; potential for voluntary acquisition of private lands; impacts on Native American lands and cultural resources; and economic development costs and opportunities, including risk-induced socioeconomic impacts.

In conclusion, the State of Nevada believes that DOE's refusal to identify a preferred rail corridor in the DEIS makes a legally sufficient assessment of rail transportation risks and impacts impossible.

Response
DOE believes that EIS adequately analyzes the environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

For the reasons discussed above, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

If the Yucca Mountain site was approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

National Environmental Policy Act regulations promulgated by the Council on Environmental Quality [see 40 CFR 1502.14(e)] require an agency to identify a preferred alternative in a Draft EIS if one exists and state that an agency must identify a preferred alternative in a final EIS unless another law prohibits expression of a preference. At the time the Draft EIS was issued, DOE did not have a preference for a national transportation mode or for transportation alternatives within Nevada, however DOE did identify the Proposed Action as its preferred alternative in the Draft EIS.

8.3 (2304)
Comment - EIS000614 / 0001
On page 1-3, the DEIS states:

"Although it is uncertain at this time when DOE would make any transportation-related decisions, DOE believes that the EIS provides the information necessary to make decisions regarding the basic approaches (for example, mostly rail or mostly truck shipments), as well as the choice among alternative transportation corridors."

With respect to alternate rail corridors to Yucca Mountain, it is questionable whether DOE even has the authority to select such a corridor given that the majority of lands within the various alternative corridors are public lands under the management authority of the Bureau of Land Management.

It is at least arguable that the selection of rail route alternatives and specific alignments are subject to BLM's [Bureau of Land Management's] own environmental review and permitting process because they ultimately have the authority to grant a right-of-way for construction and operation.

We are uncertain as to what level of review or consultation took place with BLM as the alternative corridors were being developed. It does not appear that they are a cooperating agency.

The Final EIS should explain efforts to coordinate the review and selection of a proposed alternative route with BLM.

Response
As indicated in Section 3.2.2 of the EIS, a large percentage of the land through which any of the proposed rail corridors would pass is managed by the Bureau of Land Management. The Bureau was not a cooperating agency for the Yucca Mountain Repository EIS, but the interactions that the Department had with the agency are delineated in Section C.2.1.1. In addition, Appendix C does not include the many staff-level interactions that occurred between the Bureau and DOE and were necessary for the development of the EIS. Information exchanges have occurred frequently in the past and are ongoing. These range from DOE providing informal status reports to the Bureau providing specific data for analyses purposes such as Geographic Information System data for utility corridors.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada and the Bureau of Land Management. Should a rail corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

8.3 (2455)
Comment - EIS000679 / 0003
We've said plan the transportation system to maximize use of rail. Only use trucks where absolutely necessary.

Here I give them credit for actually developing a plan to maximize use of rail, but in the Draft EIS, then, they looked at the results of their computer models and said, "Well, the risk of truck isn't that much different than rail, so we can do it either way."

We strongly disagree. It's a way to maximize use of rail, and that should be the policy that they follow.

Response
DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. Should a rail corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

8.3 (3402)
Comment - EIS001393 / 0003
I request that DOE do an environmental impact statement on every route that such waste would travel along. People along the proposed routes have the right to know everything about the risks of transporting nuclear waste.

Response
DOE believes that the EIS adequately analyzes the environmental impacts that could result from the Proposed Action. In addition, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternative preferred highway routes, and highways and rail lines could be constructed or modified. In response to public comments, DOE has included state maps of representative highway routes and rail lines it used for analysis in Appendix J of the EIS (see Section J.4). Section J.4 includes potential health and safety impact estimates associated with shipments for each state through which shipments could pass.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. Should a rail corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties, offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

8.3 (3611)
Comment - EIS001031 / 0017
What routes do you propose to use? Have they been identified and studied for safety? Shouldn't the shipments be delayed until this is done and emergency response preparations are in place?

Response
Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternative preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

In response to public comments, DOE has included state maps of representative highway routes and rail lines it used for analysis in Appendix J of the EIS (see Section J.4). Section J.4 includes potential health and safety impact estimates associated with shipments for each state through which shipments could pass.

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions the

Department would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using an up-front planning grant and based on availability of funds in annual Program budgets specified by Congress. Additional Federal response capabilities, such as expert services from the Radiological Assistance Program Team, could be activated, as requested by states and tribes. The schedule in the proposed policy and procedures (63 *FR* 23753; April 30, 1998) for implementation of Section 180(c) of the NWPA is designed to provide adequate time for training of first responders in advance of the first shipments. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. See Section M.6 of the EIS for a discussion of the DOE Section 180(c) Policy and Procedures.

8.3 (4233)
Comment - EIS001160 / 0048
Examples of possible "worst case" scenarios within should be considered within the FEIS as a means to bound impact assessment and to identify reasonable mitigation measures include:

1. Nevada's Governor designates U.S. 93 south from I-80 at Wendover through Ely to U.S. 6 then south to U.S. 95 then on to the Nevada Test Site as an alternate to transportation through Las Vegas via I-15. Direct impacts include residents and visitors in the County being exposed to risk of radiological exposure. Indirect impacts include enhanced public perception of risk and related area stigmatization.

2. Nevada's Governor designates U.S. 93 south from I-80 at Wendover through Ely to U.S. 6 then south to State Highway 318 through Lund to State Highway 376 to U.S. 93 then south to I-15 to U.S. 95 north to the Nevada Test Site. Direct impacts include residents and visitors in the County being exposed to risk of radiological exposure. Indirect impacts include enhanced public perception of risk and related area stigmatization.

Response
The impacts of using the two routes discussed by the commenter are presented in Section J.3.1.3 of the EIS. The results of these analyses show that the impacts of using these routes are not very different from using routes that go through Clark County, Nevada, both on a national level and on a Nevada level. In response to public comments, DOE has included state maps of representative highway routes and rail lines it used for analysis in Appendix J of the EIS (see Figure J-53 for Nevada map). Section J.4 includes potential health and safety impact estimates associated with shipments for each state through which shipments could pass (see Table J-93).

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. In addition, DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty

- Much of the uncertainty is irreducible, and

- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents,

which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

8.3 (4341)
Comment - EIS001191 / 0004
The Draft EIS does not identify and specifically analyze particular routes for rail and highway shipments. It needs to be recognized that regular shipments of high-level radioactive waste over a 24-year period will have a major impact on communities along transportation routes, even if an accident never actually occurs.

Response
Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternative preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

In response to public comments, DOE has included, state maps of representative highway routes and rail lines it used for analysis in Appendix J of the EIS (see Section J.4). Section J.4 includes potential health and safety impact estimates associated with shipments for each state through which shipments could pass.

Based on the results of the impact analyses presented in Chapter 6 and Appendix J of the EIS, as well as the results published in numerous other studies and environmental impact analyses cited in the EIS, DOE is confident that spent nuclear fuel and high-level radioactive waste can be and would be safely transported to Yucca Mountain. DOE believes, as the EIS reports, that the potential impacts of this transportation would be so low for individuals who live and work along the routes that these individual impacts would not be discernible even if the corresponding doses could be measured. The analysis presented in the EIS factored in the characteristics of spent nuclear fuel and high-level radioactive waste, the integrity of shipping casks that would be used in transport, and the regulatory and programmatic controls that would be imposed on shipping operations (see Appendix M of the EIS). The EIS analytical results are supported by numerous technical and scientific studies which have been compiled through decades of research and development by DOE and other Federal agencies of the United States, including the Nuclear Regulatory Commission and the U.S. Department of Transportation, as well as by the international community, including the International Atomic Energy Agency.

8.3 (4958)
Comment - EIS001301 / 0002
I wouldn't exactly think it is a good idea to transport by trucks. The best way to transport the nuclear waste is to transport it by trains. Trucks would be ok, but if a truck has a wreck everyone in that area is in big trouble. If the weather gets bad then don't send any waste that day or week or month.

Response
DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. Should a rail corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. Section M.3.2 of the EIS provides a discussion of the protocols and procedures that would be implemented by a Regional Servicing Contractor and its subcontractors under adverse weather or road conditions.

8.3 (5035)
Comment - EIS001520 / 0003
The specific transportation routes assumed for the analyses of transportation impacts should be identified in the EIS.

Response
Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction (see Appendix M of the EIS). At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternative preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

In response to public comments, DOE has included, state maps of representative highway routes and rail lines it used for analysis in Appendix J of the EIS (see Section J.4). Section J.4 includes potential health and safety impact estimates associated with shipments for each state through which shipments could pass.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. Should a rail corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

8.3 (5042)
Comment - EIS001520 / 0010
Appendix J of the draft EIS describes the use of the HIGHWAY and INTERLINE computer codes to project the specific transportation routes to be used for analysis of transportation impacts when moving radioactive waste to a Yucca Mountain repository. However, the draft EIS does not report what those transportation routes are. The Board recommends that the final EIS identify the specific transportation routes that are used for analysis of transportation impacts. If the DOE has identified preferred transportation routes, those also should be identified in the final EIS. If preferred transportation routes have not been identified, the final EIS should discuss when and how such identification will occur.

Response
Appendix J of the EIS includes maps of all rail and highway routes used in the analysis of impacts presented in Chapter 6 along with tables showing the number of shipments originating in and passing through each state. Although it is likely that some commercial spent-nuclear fuel would be transported to the Yucca Mountain site using standard highway (legal-weight) trucks, the EIS indicates that DOE plans to encourage potential transportation contractors to use rail to the extent practical, consistent with Departmental planning to procure transportation services.

As discussed in Appendix M of the EIS, specific routes would be identified approximately 4 years before shipments would occur. As stated in Section 2.1.3.2.2, a truck shipment of spent-nuclear fuel or high-level radioactive waste would use routes to the repository in accordance with U.S. Department of Transportation regulations (49 CFR 397.10), which require the use of preferred routes. These routes include the Interstate Highway System, including beltways and bypasses. Alternate routes would be designated by states and tribes following Department of Transportation regulations (49 CFR 397.103) that require consideration of the overall risk to the public and prior consultation with affected local jurisdictions and affected states and tribes. The highway routes that would be used would be selected in accordance with these Federal transportation regulations and would not be selected by DOE. There are no Federal regulations for the selection of rail routes for the shipment of radioactive materials. However, DOE has developed operational protocols (Section M.3 of the EIS) which include guidelines for selecting rail routes based on current best practice. DOE applied the guidelines in selecting the routes for analysis in the EIS. If the U.S. Department of Transportation promulgates rail routing regulations, DOE's operational protocols would change to comply with the regulations.

8.3 (5052)
Comment - EIS000999 / 0002
It is my understanding that current regulations that govern the shipment of spent nuclear fuel and high-level radioactive waste require the avoidance of major population centers. In spite of this requirement, all of the potential highway and rail routes depicted in the Environmental Impact Statement through Missouri go through either the metropolitan areas of St. Louis and Kansas City, or both. These two metropolitan areas have a combined population of over 4.3 million people.

I would like to go on record at this time in opposition to the shipment of spent nuclear fuel and high-level radioactive waste through Missouri and through this state's most urbanized population centers, St. Louis and Kansas City. The potential exposure of these concentrated populations to the risks associated with the shipment of material of this nature should preclude further consideration of routes that would involve these metropolitan regions in Missouri.

Response
Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternative preferred highway routes, and highways and rail lines might be constructed or modified. The maps of highway routes through Missouri show only Interstate-70, the beltways around St. Louis and Kansas City would be used (see Figure J-47). Furthermore, the State has the authority to designate alternate routes in accordance with 49 CFR 397.103. As a consequence, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

In response to public comments, DOE has included maps of the representative highway routes and rail lines for the 45 states it used for analysis in the EIS (see Figure J-47 of the EIS for the representative Missouri routes). It also included potential health and safety impacts associated with shipments for each state through which shipments could pass. Table J-87 lists the estimated number of legal-weight truck shipments of spent nuclear fuel and high-level radioactive waste that would enter Nevada after travelling through Missouri in the mostly legal-weight truck scenario. The table also lists the estimated number of rail shipment through California in the mostly rail scenario for each of the candidate Nevada rail corridors and heavy-haul truck routes.

If the Yucca Mountain site was approved, under the mostly legal-weight truck scenario, the estimated total number of truck shipments through Missouri would be 19,142 over 24 years, approximately 2 truck shipments per day. There would be an estimated 435 rail shipments, slightly more than 1 per month.

The estimated numbers of shipments entering Nevada after travelling through Missouri under the mostly rail scenario are less than the mostly legal-weight truck scenario. According to Table J-87, the number of rail shipments would range from 4,069 to 4,126 depending on the mode (rail or heavy-haul truck) and corresponding corridor/route selected in Nevada. This is slightly more than 3 rail shipment per week over 24 years, at most. In addition, there would be approximately 71 legal-weight truck shipments through Missouri.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. Should a rail corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

8.3 (5346)
Comment - EIS001887 / 0070
Page 2-9; Section 2.1.1.4 - Nevada Transportation Scenarios and Rail and Intermodal Implementing Alternatives

Likewise, the Draft EIS fails to evaluate each of the rail spur and intermodal facility alternatives at the same level of analysis and with the same level of information. It also postpones the selection of a preferred rail spur, intermodal facility location, the identification of specific rail spur alignments, and the analysis of specific operational aspects and impacts of the rail/intermodal system to some future, undefined time. Nevada contends that there is sufficient information available now for DOE have to compared rail spur alternatives, identified a preferred alternative, identified a specific and clearly defined rail alignment within the preferred corridor, identified whether an intermodal transfer facility is needed, and, if needed, selected a preferred site for such a facility. Failing to undertake these analyses and present findings in the Draft EIS makes it impossible for potentially impacted citizens and communities to effectively participate in the NEPA [National Environmental Policy Act] process.

Response
Sections 6.3 and J.3 of the EIS describe the impacts and analyses for the five rail corridors and the five heavy-haul truck routes analyzed as alternatives for transporting large rail casks to the Yucca Mountain site. Based on public comments on the Draft EIS, DOE has acquired new information and analytical tools that contribute to an improved understanding of interactions between the potentially affected environment and proposed transportation activities in Nevada. This includes in part, newly identified potential land-use conflicts, additional information of biological resources and cultural resources, and new analyses for ground vibration and noise impacts on sensitive structures. See the introduction to Chapter 6 for additional information on changes from the Draft to the Final EIS. DOE believes that the EIS adequately analyzes the environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

For the reasons discussed above, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

If the Yucca Mountain site was approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

8.3 (5678)
Comment - EIS001887 / 0300
SECTION 6. ENVIRONMENTAL IMPACTS OF TRANSPORTATION

DOE has not demonstrated the technical, economic, or environmentally acceptable feasibility of transporting spent nuclear fuel and high-level radioactive waste to the proposed site. Absent this demonstration, DOE violates the National Environmental Policy Act by deferring transportation related decisions. Specifically, if the proposed repository is approved based upon this EIS, DOE will begin to make a substantial commitment of resources to the proposed repository, even though the method of transportation to the site has not been determined. This could force a transportation related decision that results in unacceptable, adverse impacts. This is the scenario that the NEPA [National Environmental Policy Act] process is designed to avoid.

Response
DOE believes that the EIS adequately analyzes the environmental impacts of the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

For the reasons discussed above, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

If the Yucca Mountain site was approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

8.3 (5687)
Comment - EIS001887 / 0304
On the bottom of page 6-1, the Draft EIS states: “Because the mode of transportation used to ship from each site would depend on several factors that DOE does not control (for example, future capabilities of shipping sites, rail service to shipping sites, and labor agreements), DOE recognizes that it cannot predict the specific transportation mode (truck or rail) of each shipment to the repository.” This statement is factually incorrect. The NWPA, as amended, makes DOE the shipper of record for all SNF [spent nuclear fuel] and HLW [high-level radioactive waste] shipments to the repository. As shipper of record, DOE is legally entitled to dictate the choice of mode for every shipment. Over the past decade, DOE contractor studies, such as the Near Site Transportation Infrastructure and Facility Interface Capability Assessment, have documented the technical factors which constrain modal choices at each commercial reactor site and estimated the cost of adding rail shipment capability at truck-only sites. DOE’s decision to make all transuranic waste shipments to the Waste Isolation Pilot Plant (WIPP) by truck, even though rail transportation to WIPP is feasible from major federal facilities such as Hanford and Savannah River, is a strong precedent for DOE control of repository transportation modal choice decisions. Moreover, DOE recently dictated not only the choice of mode (rail), but also the service option (dedicated trains), the port of entry (Concord), and the preferred route (Feather River Canyon) for the recent foreign research reactor SNF shipments to INEEL.

<u>Response</u>
It is the Department's opinion that the statement made in the EIS is correct. The shipments cited by the commenter were under the complete control of DOE. Waste Isolation Pilot Plant shipments are from one DOE site to another and the foreign research reactor spent nuclear fuel shipments are made by DOE contractors acting on DOE instructions. Shipments made under the NWPA are made under the terms of the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (10 CFR Part 961). Under the terms of this contract, which DOE has with each utility owning spent nuclear fuel, the utility has the right to specify the type of cask required. DOE has the responsibility to deliver a cask "suitable for use" at the utility site. Therefore, although a reactor's commercial nuclear facilities might have the capability to handle a large rail cask, the utility might prefer a truck cask and DOE would be required to accept the spent nuclear fuel using truck casks. In addition, under stipulations of the Regional Servicing Contractors Draft Request for Proposal, the Regional Servicing Contractors would work with utilities to determine the best way to service a site and integrate site planning into a regional servicing plan including modes and routes.

DOE believes that the mostly rail scenario, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. In reaching this conclusion, DOE considered the capabilities of the sites to handle larger (rail) casks, the distances to suitable railheads, and historic experience in actual shipments of nuclear fuel, waste or other large reactor-related components. DOE also considered relevant information published by sources such as the Nuclear Energy Institute and the State of Nevada. In addition, DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

8.3 (5689)
<u>Comment</u> - EIS001887 / 0305
Page 6-2; Section 6 - Environmental Impacts of Transportation

The Draft EIS fails to identify a preferred rail corridor and sets forth no timetable for selection of a preferred rail corridor, despite DOE's assertion that the information presented is sufficient to select a preferred corridor. The Draft EIS states: "Although it is uncertain at this time when DOE would make any transportation-related decisions, DOE believes that the EIS provides the information necessary to make decisions regarding the basic approaches (for example, mostly rail or mostly truck shipments), as well as the choice among alternative transportation corridors." (p. 6-1) Referring specifically to the selection of "implementing alternatives," such as "alternative rail corridors in Nevada," the Draft EIS states: "If and when it is appropriate to make such decisions, DOE believes that the EIS provides the information necessary to make these decisions." (p. 6-2) According to the Draft EIS, additional information, analyses, and consultations would be required "for selection of a specific rail alignment within a corridor." (p. 6-1)

DOE's failure to designate a preferred rail access corridor in the Draft EIS violates the National Environmental Policy Act (NEPA). NEPA procedures are designed to "insure that environmental information [including information on the human environment as well as public health and safety] is available to public officials and citizens before decisions are made and before actions are taken." DOE's approach for the Draft EIS denies the affected public a meaningful opportunity to participate in the rail corridor evaluation process before DOE prepares the Final EIS.

Moreover, DOE's refusal to narrow the choice of corridors extends the region of influence of the Proposed Action to thirteen Nevada counties traversed by the five rail corridors and their existing mainline rail connections. Virtually the entire population of Nevada will be held hostage by DOE's indecision. Coupled with the absence of a timetable, the resulting uncertainty, in and of itself, will cause adverse socioeconomic impacts for individuals, businesses, and communities.

During the scoping process in December, 1995, the State of Nevada recommended the following process to DOE: "The Draft EIS must present a technically credible methodology for comparative evaluation of rail spur route options. The State of Nevada believes that DOE should fully evaluate at least three feasible rail spur routes before selecting a preferred route." Nevada also recommended specific criteria for the Draft EIS comparative route evaluation: 1) impacts on public health and safety; 2) impacts on highly populated areas; 3) engineering feasibility;

4) impacts on surface and groundwater resources, threatened and endangered species, and federal and state parks and refuges; 5) cost of construction, recognizing that predictability of costs may be as important as least cost in ranking alternatives; 6) avoidance of private lands and potential for voluntary acquisition of private lands where necessary; 7) impacts on Native American lands and cultural resources; 8) potential conflicts with U.S. Air Force facilities and operations; and 9) economic development costs and opportunities, addressing both standard and special (risk-induced) socioeconomic impacts.

The Draft EIS does not reveal the process DOE plans to use in selecting a preferred rail corridor. The baseline information provided in Section 3 and the impact analysis provided in Section 6 and Appendix J are particularly deficient regarding impacts on highly populated areas; engineering feasibility; construction costs and cost uncertainties; potential for voluntary acquisition of private lands; impacts on Native American lands and cultural resources; and economic development costs and opportunities, including risk-induced socioeconomic impacts. Nevada believes that DOE's refusal to identify a preferred rail corridor in the Draft EIS makes a legally sufficient assessment of rail transportation risks and impacts impossible.

Response
As stated in Sections 1.1 and 2.1 of the EIS, transportation of spent nuclear fuel and high-level radioactive waste is an integral part of the Proposed Action and the EIS addresses the potential impacts associated with a national and Nevada campaign to transport radioactive waste to the proposed repository at Yucca Mountain (see Sections 6.2 and 6.3.1). DOE believes that the EIS adequately analyzes environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

For the reasons discussed above, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

If the Yucca Mountain site was approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

DOE's decisionmaking process with respect to a rail corridor selection in Nevada would take into account public health and safety; engineering feasibility; surface and groundwater resources, threatened and endangered species, Federal and State parks and refuges, cost of construction and maintenance, land use and ownership, cultural resources, potential conflicts with U.S. Air Force facilities and operations, and socioeconomic impacts. These factors are addressed for each of the five rail corridors in the EIS (see Section 6.3.2).

National Environmental Policy Act regulations promulgated by the Council on Environmental Quality [see 40 CFR 1502.14(e)] require an agency to identify a preferred alternative in a Draft EIS if one exists and states that an agency must identify a preferred alternative in a final EIS unless another law prohibits expression of a preference. At the time the Draft EIS was issued, DOE did not have a preference for a national transportation mode or for transportation alternatives within Nevada; however, DOE did identify the Proposed Action as its preferred alternative in the Draft EIS.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternative preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. In addition, DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty

- Much of the uncertainty is irreducible, and

- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

8.3 (6051)
Comment - EIS001632 / 0054
EPA [the Environmental Protection Agency] appreciates that the actual shipments of waste will not likely occur for another 10 years and understands DOE's reluctance to provide additional information on likely routes for waste transport. However, EPA sees no reason why DOE cannot commit to making this information available as the time for shipments approaches. DOE is doing this now for shipments to the Waste Isolation Pilot Plant in New Mexico. Once DOE has greater certainty about the routes along which waste shipments will travel, the Department will also be able to update and expand upon, if needed, the environmental justice or other impact analyses which are route-specific.

Response
If the Yucca Mountain site was approved for development of a repository, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction (see Section M.6 of the EIS). In accordance with 10 CFR 73.37(a)(7), actual route selection and submission to the Nuclear Regulatory Commission would occur 1 or more years before a route's use for shipment (see Section M.3.2.1.2 for more information). At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternative preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified

representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

In response to public comments, DOE has included, state maps of representative highway routes and rail lines it used for analysis in Appendix J of the EIS (see Section J.4). Section J.4 includes potential health and safety impact estimates associated with shipments for each state through which shipments could pass.

8.3 (6440)
Comment - EIS001632 / 0014
Page 2-40, Section 2.1.3.2, first paragraph: Please confirm whether only heavy-haul trucks will be used from commercial sites, or if legal-weight trucks may also be used.

Response
DOE believes that the mostly rail scenario, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, and the rest by legal-weight truck, would most closely approximate the actual mix of truck and rail shipments. In reaching this conclusion, DOE considered the capabilities of the sites to handle larger (rail) casks, the distances to suitable railheads, and historic experience in actual shipments of nuclear fuel, waste or other large reactor-related components. DOE also considered relevant information published by sources such as the Nuclear Energy Institute and the State of Nevada. In addition, DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

8.3 (6493)
Comment - EIS001774 / 0008
When will a route-specific comprehensive plan with state and local fee permit programs be implemented and established?

Response
Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction.

At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. The Department has issued a draft Request for Proposals requiring the Regional Servicing Contractor to prepare a transportation plan that describes the Contractor's operational strategy and delineates the steps it would implement to ensure compliance with all regulatory and other DOE requirements. Operational protocols and procedures would be developed with each generator by Regional Servicing Contractors as part of the planning process to be completed prior to initiation of transport of spent nuclear fuel or high-level radioactive waste from generators to the repository. Section M.3 of the EIS contains additional information on operational protocols required of the Regional Servicing Contractors.

This planning includes identification of proposed routes and associated routing considerations, coordination and communication with all participating organizations and agencies, including other Regional Servicing Contractor(s), DOE, state, tribal, and local governments, and interactions with appropriate Federal and state organizations. The route and mode determinations would be interactive.

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste.

8.3 (7185)
Comment - EIS001337 / 0077
Page 2-54 Apex/Dry Lake and Sloan/Jean Routes. The assumption here that the northern and southern legs of the beltway would be available is inappropriate. This highway will be owned by Clark County and will not necessarily be available for use by heavy-haul shipments. The analysis of routing through the Las Vegas Valley should be confined to existing roadways (I-15, U.S. 95 etc.).

Response
Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternative preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

The U.S. Department of Transportation requirements and the planned completion of the Las Vegas Beltway led DOE to assume, for purposes of analysis in the EIS, that legal-weight truck shipments would not enter the Spaghetti Bowl interchange of Interstate-15 and U.S. 95. Nonetheless, to assess how potential impacts would be different from those of using the Las Vegas Beltway, DOE analyzed the impacts for legal-weight trucks to travel through the Spaghetti Bowl interchange (see Section J.3.1.3 of the EIS for an analysis of the impacts of using different routes in Nevada).

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. Should a rail corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

If DOE selected the Apex/Dry Lake heavy-haul truck implementing alternative, it would initiate additional engineering and environmental studies, including appropriate National Environmental Policy Act reviews. It would also initiate consultations with responsible Federal, State of Nevada, tribal, and local authorities on route-specific details, impacts, and mitigative measures, and the permitting process for overdimensional and overweight heavy-haul trucks. As stated in Section 2.1.3.2 of the EIS, DOE would comply with applicable U.S. Department of Transportation and Nuclear Regulatory Commission regulations and state and local requirements. This would include Nevada regulations and conditions of the heavy-haul truck permit issued by the Nevada Department of Transportation.

8.3 (7208)
Comment - EIS001337 / 0091
Page 3-98 Section 3.2.1.1. [and Page 3-120, 3rd full paragraph] The second paragraph of this section indicates that final transportation mode and routing decisions will be made on a site-specific basis during the transportation planning process, following a decision to build a repository at Yucca Mountain. This statement implies that the Secretary of Energy’s Site Recommendation to the President will be made prior to resolution of site-specific mode and routing decisions. This would seem contradictory to the guidance contained within existing 10 CFR 960 and inconsistent with the proposed revisions to 10 CFR 960, which infer the availability of EIS-based transportation information for use, by the Secretary in preparing a Site Recommendation to the President. In the event that site-specific transportation decisions are deferred until after a decision to build Yucca Mountain is made, such transportation decisions may not be made until 2005, the year DOE anticipates receiving a construction authorization (see Figure 2-9). Such a schedule will provide DOE with just five-years to complete necessary field

studies and surveys, complete environmental documentation, complete necessary final designs, construct necessary rail and/or highway infrastructure and provide necessary training and equipment to emergency first responders along selected routes. Lincoln County and the City of Caliente do not agree with a DOE decision to defer making site-specific transportation decisions until after a decision to build Yucca Mountain is made. The County and City recommend that the DEIS include a phased schedule for making site-specific transportation decisions which begins now so as to avoid decision-making under the pressure of unnecessarily tight time constraints. Further, the County and City do not agree with the apparent DOE assumption that if a repository site is approved for construction that transportation issues will be resolved and that a satisfactory transportation route and mode will be available to serve the site. Rather, the DEIS should include a schedule and approach to making transportation decisions which will enable minimization of related risks. The current approach described (or inferred) within the DEIS does not support risk minimization.

Response

DOE believes that the EIS adequately analyzes environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

For the reasons discussed above, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada.

If the Yucca Mountain site was approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternative preferred highway routes, and highways and rail lines might be constructed or modified.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. Should a rail corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

8.3 (7290)
<u>Comment</u> - EIS001832 / 0029
Confidence in the robustness of this evaluation would be further bolstered if the following improvement was made in the FEIS:

DOE should address the fact that the mostly rail scenario is more likely than the mostly truck scenario. This is because most reactor sites, even those that do not now have the ability to handle rail casks, will likely modify cask handling capability to be able to handle 100 to 125 ton transportable storage systems. These upgrades will facilitate the use of rail casks for transportation. Nuclear Energy Institute would be pleased to provide examples of some sites that have upgraded or are in the process of upgrading sites and or plans.

<u>Response</u>
DOE believes that the mostly rail scenario, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. In reaching this conclusion, DOE considered the capabilities of the sites to handle larger (rail) casks, the distances to suitable railheads, and historic experience in actual shipments of nuclear fuel, waste or other large reactor-related components. DOE also considered relevant information published by sources such as the Nuclear Energy Institute and the State of Nevada.

In addition, DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved, DOE would identify for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada.

8.3 (7623)
<u>Comment</u> - EIS001912 / 0080
Pg. 6-35 4th para. states, “Because the state of Nevada has not designated preferred routes.... Does this statement mean that the preferred alternative for highway route in the EIS would be I-15? If no, please explain.

<u>Response</u>
Section 6.3 of the EIS describes the general scenarios for transportation of spent nuclear fuel and high-level radioactive waste through Nevada to the proposed repository and their impacts. As stated in Section 6.3, without a preferred alternate route proposed and established by the State of Nevada, the U.S. Department of Transportation regulations would be the governing regulation for selecting a route. The Department of Transportation regulations identify that the Interstate Highway System is the preferred routing, with the remainder of the transport route to be the shortest distance from the Interstate Highway System. At present, these routing requirements for highway systems identify Interstate-15 and U.S. 95 to the proposed repository as the preferred route.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternative preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations (see Figure 6-11). DOE identified rail lines based on current rail practices, because there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

The U.S. Department of Transportation regulations provide for states and tribes to designate alternative preferred routes. These regulations require a state or tribe to consider overall public safety in designating routes that would be in lieu of or addition to routes specified by the Department of Transportation regulations. For example, under current Federal regulations, before DOE highway shipments of spent nuclear fuel and high-level radioactive waste could use U.S. 95 through Mineral County, Nevada, the State would need to designate this route as an alternate route.

8.3 (7823)
Comment - EIS001653 / 0020
With respect to rail and truck shipment routes in the EIS, has DOE eliminated all other routes from consideration? If not, why not? If they are not eliminated should they be included in the DEIS?

Response
Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction (see Section M.3.2.1.2 of the EIS). At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternative preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

In response to public comments, DOE has included, state maps of representative highway routes and rail lines it used for analysis in Appendix J of the EIS (see Section J.4). Section J.4 includes potential health and safety impact estimates associated with shipments for each state through which shipments could traverse.

DOE believes that the EIS adequately analyzes environmental impacts that could result from the Proposed Action. In addition, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. Should a rail corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

8.3 (8073)
Comment - EIS000406 / 0004
It does appear from the evaluation in the DEIS that the risk associated with rail transportation is less than the risks associated with truck transportation. Under the truck transportation alternative, more than 100,000 individual truck shipments will be made to Yucca Mountain compared to approximately 25,000 rail shipments. A Yucca Mountain DEIS which is structured to support a decision to choose one modal option over the others appears contrary to current DOE transportation planning guidance and policy direction. Recently, DOE issued its draft request for proposal for the acquisition of waste acceptance and transportation services for the Office of Civilian Radioactive Waste Management, otherwise known as the privatization proposal. Under this proposal, private shipping companies called regional servicing contractors would be selected to transport waste from generator sites to Yucca Mountain. As proposed, the regional servicing contractor would make modal and route decisions with guidance from DOE. In effect, regional servicing contractors could use multiple routes and modes for waste shipments. This approach seems somewhat inconsistent with the impact results and the approach taken in the DEIS where one modal option is compared against the other. Furthermore, DOE limited its discussion of highway transportation routes to one (I-15). The Final EIS should clarify the policy direction DOE intends to take and describe how that policy direction will be reflected in future Yucca Mountain transportation logistics and planning.

Response
DOE believes that the EIS adequately analyzes environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

In addition, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. Should a rail corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. The Department has issued a draft Request for Proposals requiring the Regional Servicing Contractor to prepare a transportation plan that describes the Contractor's operational strategy and delineates the steps it would implement to ensure compliance with all regulatory and other DOE requirements. This includes identification of proposed routes and associated routing considerations, coordination and communication with all participating organizations and agencies, including other Regional Servicing Contractor(s), DOE, state, Native American tribal, and local governments, and interactions with appropriate Federal and state organizations. The route and mode determinations would be interactive. If, during the course of the mode or route determinations, one of the previously determined factors changed, the site-specific mode and route analysis would be reevaluated to ensure consistency. The Regional Servicing Contractor would consult with other Regional Servicing Contractor(s) as appropriate to ensure continuity and consistency of routes and to ensure trained emergency response personnel capability.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternative preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, because there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

8.3 (8126)
Comment - EIS001653 / 0078
Pg. 6-35 4th par states, "Because the state of Nevada has not designated preferred routes... Does this statement mean that the preferred alternative for highway route in the EIS would be I-15? If no, please explain.

Response
Section 6.3 of the EIS describes the general scenarios for transportation of spent nuclear fuel and high-level radioactive waste through Nevada to the proposed repository and their impacts. As stated in Section 6.3, without a

preferred alternate route proposed and established by the State of Nevada, the U.S. Department of Transportation regulations would be the governing regulation for selecting a route. The Department of Transportation regulations identify that the Interstate Highway System is the preferred routing, with the remainder of the transport route to be the shortest distance from the Interstate Highway System. At present, these routing requirements for highway systems identify Interstate-15 and U.S. 95 to the proposed repository as the preferred route.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternative preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

The U.S. Department of Transportation regulations provide for states and tribes to designate alternative preferred routes. These regulations require a state or tribe to consider overall public safety in designating routes that would be in lieu of or addition to routes specified by the Department of Transportation regulations. For example, under current Federal regulations, before DOE highway shipments of spent nuclear fuel and high-level radioactive waste could use U.S. 95 through Mineral County, Nevada, the State would need to designate this route as an alternate route.

8.3 (8449)
<u>Comment</u> - EIS001397 / 0017
The issue of new route construction is also barely touched. Issues of impact upon ground and surface waters, flood plains, and species habitat are barely addressed. Impacts on communities both Native and non-native, such as socioeconomic impacts on hunting, agriculture and tourism, emergency response needs, health concerns of frequent and repeated exposure, and transient worker man Camps in rural areas are not presented.

This information is so inadequate in the DEIS that unless it can be completely addressed before the final EIS of this study, a separate or supplementary study should be drafted that presents complete information once it is compiled and analyzed.

<u>Response</u>
As described in Sections 2.1.3.2 and 2.1.3.3 of the EIS, existing national highway and rail routes are adequate to support the transportation of spent nuclear fuel and high-level radioactive waste either to the repository (if legal-weight trucks are used) or to Nevada (if rail is used). If rail is used to bring large casks to Nevada, significant construction would be required only to support the construction of a branch rail line in one of the candidate corridors within Nevada. If heavy-haul truck was chosen as the mode in Nevada, Upgrades to existing highway routes, not new construction, as well as construction of an intermodal transfer facility, would be necessary. The environmental impacts of constructing branch rail lines in Nevada are presented in Sections 6.3.2 and J.3.4.2.

The EIS includes assessments of impacts of branch rail line construction and operation on land use and ownership (including access, hunting, mining, and ranching), water resources, biological resources (including endangered species), occupational health and safety, socioeconomics, noise, cultural resources, utilities and energy, flood plains, and other potential impact areas. The impacts presented in Section 6.3.2 of the EIS include the impacts of the rail construction worker camps, which would be transient and short-term and would be restored to predisturbance conditions following completion of the branch rail line.

The U.S. Department of Transportation routing requirements, along with regulatory requirements to limit radiation dose external to a shipping cask, help to ensure that radiation dose to persons who live along routes would be low. The analysis in Chapter 6 of the EIS for the mostly legal-weight truck scenario estimates the dose to persons who would drive alongside the trucks as they travel on the highways, who would be stopped in locales where truck shipments stop, and who live along the routes that would be used. The dose for an individual who lived along a route would be an average of about 0.02 millirem per year. This is 18,000 times less than average annual background radiation in the United States (360 millirem) and less than 1/500 of the dose from a chest x-ray.

In response to public comments, DOE has included, state maps of representative highway routes and rail lines it used for analysis in Appendix J of the EIS (see Section J.4). Section J.4 includes potential health and safety impact estimates associated with shipments for each state through which shipments could pass.

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. In addition, DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty

- Much of the uncertainty is irreducible, and

- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

DOE believes that the EIS adequately analyzes environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

For the reasons discussed above, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

8.3 (9403)
Comment - EIS001888 / 0101
The purpose of an EIS is to establish a basis for mitigation negotiations. To achieve this goal, an EIS must assign specific roles and responsibilities for actions that cause impacts and for those that ameliorate impacts. This was not achieved in the DEIS. For example, the DEIS failed to provide this information regarding an implementing alternative for transportation routing. At a minimum, it should have provided a specific schedule for the construction of a route to Yucca Mountain, and defined specific agency responsibilities for constructing, maintaining and operating the route to Yucca Mountain. None of this has been accomplished, and in view of these omissions, Clark County and other affected jurisdictions do not have sufficient information necessary to effectively understand effects and negotiate mitigation.

Response

As stated in Section 1.1 of the EIS, the purpose of the EIS is to provide information on potential environmental impacts that could result from the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at the Yucca Mountain site. Transportation of spent nuclear fuel and high-level radioactive waste is an integral part of the Proposed Action and the EIS addresses the potential impacts associated with a national and Nevada campaign to transport waste to the proposed repository (see Sections 6.2 and 6.3). DOE would consider the impacts of both the proposed repository and transportation, both nationally and within Nevada, in determining whether to recommend the Yucca Mountain to the President as a site for a geologic repository.

DOE believes that the EIS adequately analyzes environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

For the reasons discussed above, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada.

If the Yucca Mountain site was approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should a rail corridor be selected, other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, state, Federal, and Native American tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

Section 116(c) of the NWPA states that "the Secretary shall provide financial and technical assistance to [an affected unit of local government or the State of Nevada]… to mitigate the impact on such [an affected unit of local government or the State of Nevada] of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Any decision to provide assistance under Section 116(c) would be based in part on an evaluation of a report submitted by an affected unit of local government or the State of Nevada to document likely economic, social, public health or safety, and environmental impacts. If the proposed repository were to become operational, DOE would enter into discussions with potentially affected units of local government and consider appropriate support and mitigation measures.

After a decision is made regarding the proposed repository and transportation modes and routes, local jurisdictions would be better able to identify the likely economic, social, public health and safety, and environmental impacts that would be the basis for a request for economic assistance under Section 116(c) of the Act. Because several years would elapse between approval of the repository and start of a transportation campaign, affected units of local governments and tribal governments would have sufficient time to request and receive funding.

8.3 (9553)
Comment - EIS001888 / 0226
The purpose of an EIS is to establish a basis for mitigation negotiations. To achieve this goal, an EIS must assign specific roles and responsibilities for actions, which cause impacts, as well as those which ameliorate impacts. The DEIS fails to provide this information. For example, there is no information about how an "implementing alternative" for a route through Nevada will be chosen, when construction will begin, what agency will oversee the construction, and how the route will be maintained. Clark County, and other effected jurisdictions do not have sufficient information necessary to understand potential impacts. The DEIS should have selected an "implementing alternative" to move waste through Nevada. It should have provided a specific schedule for the construction of a route to Yucca Mountain. The DEIS should have defined specific agency responsibilities for constructing, maintaining and operating the route to Yucca Mountain. None of this has been accomplished. Indeed, none of the information necessary to describe how an implementing alternative will be selected is provided in the DEIS.

Response
As stated in Section 1.1, the purpose of the EIS is to provide information on potential environmental impacts that could result from the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at the Yucca Mountain site. Transportation of spent nuclear fuel and high-level radioactive waste is an integral part of the Proposed Action and the EIS addresses the potential impacts associated with a national and Nevada campaign to transport waste to the proposed repository (see Sections 6.2.3 and 6.3.1). DOE would consider the impacts of both the proposed repository and transportation, both nationally and in Nevada, in determining whether to recommend the Yucca Mountain to the President as a site for a geologic repository.

DOE believes that the EIS adequately analyzes environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

For the reasons discussed above, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada.

If the Yucca Mountain site was approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should a rail corridor be selected, other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and Native American tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

Section 116(c) of the NWPA states that "the Secretary shall provide financial and technical assistance to [an affected unit of local government or the State of Nevada]… to mitigate the impact on such [an affected unit of local government or the State of Nevada] of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Any decision to provide assistance under Section 116(c) would be based in part on an evaluation of a report submitted by an affected unit of local government or the State of Nevada to document likely economic, social, public health or safety, and environmental impacts. If the proposed repository was to become operational, DOE would enter into discussions with potentially affected units of local government and consider appropriate support and mitigation measures.

After a decision was made on the proposed repository and transportation modes and routes, local jurisdictions would be better able to identify the likely economic, social, public health and safety, and environmental impacts that would be the basis for a request for economic assistance under Section 116(c) of the Act. Because several years would elapse between approval of the repository and start of a transportation campaign, affected units of local governments and tribal governments would have sufficient time to request and receive funding.

8.3 (9576)
Comment - EIS001888 / 0250
There are conflicts between the proposed action analyzed by the DEIS and plans in Clark County, Nevada. The DOE's examination of these impacts was cursory and must be revised.

Response
DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and a rail corridor be selected, other transportation decisions, such as the selection of a specific rail alignment within the corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and Native American tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use. DOE would seek input from Clark County planning officials on any planning conflicts and potential mitigative measures needed due to transportation through Clark County, Nevada.

8.3 (9854)
Comment - EIS001888 / 0419
[Clark County summary of comments it has received from the public.]

Commenters believe that the EIS should be used to select specific transportation routes in consideration of the socioeconomics impacts from the public perception of risks. Socioeconomic impacts mentioned for analysis include interference with orderly and planned urban development, and unredeemable costs and burdens on local governments.

Response
Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternative preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. In addition, DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty

- Much of the uncertainty is irreducible, and

- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

Regarding costs and burdens on local governments, DOE is authorized to provide technical and financial assistance to affected units of local government to mitigate impacts associated with the repository. Section 116(c) of the NWPA states that "the Secretary shall provide financial and technical assistance to [an affected unit of local government or the State of Nevada]… to mitigate the impact on such [an affected unit of local government or the State of Nevada] of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Any decision to provide assistance under Section 116(c) would be based in part on an evaluation of a report submitted by an affected unit of local government or the State of Nevada to document likely economic, social, public health or safety, and environmental impacts. If the proposed repository were to become operational, DOE would enter into discussions with potentially affected units of local government and consider appropriate support and mitigation measures. After a decision is made regarding the proposed repository and transportation modes and routes, local jurisdictions would be better able to identify the likely economic, social, public health and safety, and environmental impacts that would be the basis for a request for economic assistance under Section 116(c) of the Act. Because several years would elapse between approval of the repository and start of a transportation campaign, affected units of local government and tribal governments would have sufficient time to request and receive funding.

8.3 (9958)

Comment - EIS001877 / 0001

OCRWM's continuing systematic denial of the need to address transportation issues is a fundamental flaw which threatens to undermine the NWPA program. We are gravely concerned that the current draft EIS does not meet the requirements of the National Environmental Policy Act (NEPA) in assessing the transportation impacts involved with shipping radioactive waste to Yucca Mountain under the NWPA. In particular, the Committee finds that the EIS completely fails to provide an adequate analysis for the selection of transportation modes and routes.

As the Committee has stated many times in the past, mode and route analysis is one of the most crucial aspects of SNF [spent nuclear fuel] / HLW [high-level radioactive waste] transportation planning. The importance of conducting timely and defensible mode and routing analysis and selection is also reflected in WGA Resolution 99-014 passed last June by the Western Governors' Association. This resolution is included in Attachment A. Until DOE establishes mode and route selection methodologies which adequately address safety issues, further crucial steps in the development of a working transportation plan, such as the provision of funding to states and tribes under Section 180(c) of the NWPA, cannot be taken.

Response

DOE believes that the EIS adequately analyzes environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

For the reasons discussed above, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

If the Yucca Mountain site was approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternative preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

In response to public comments, DOE has included, state maps of representative highway routes and rail lines it used for analysis in Appendix J of the EIS (see Section J.4). Section J.4 includes potential health and safety impact estimates associated with shipments for each state through which shipments could pass.

8.3 (9967)

Comment - EIS000463 / 0005

Nevada has asked the Commission to reexamine the requirements for advance approval of routes. Currently the Commission has regulations requiring potential carriers and shippers to submit their routes for approval, and in 1980, and since 1980, the NRC [Nuclear Regulatory Commission] has been using a regulatory guidance document which identifies five types of routes that receive special evaluation, routes through highly populated areas, routes which would place the shipment or escort vehicle in a significantly tactically disadvantageous position, for example, tunnels which would prevent the escort vehicle from maintaining continuous surveillance of the shipment vehicle, routes with marginal safety design features, for example, two-lane routes, all too common, unfortunately, in rural Nevada, absence of guardrails, et cetera, routes with limited rest and refueling locations, also abundant in rural Nevada, and routes where responses by local law enforcement agencies when requested would be swift or timely, also, unfortunately, common in rural Nevada.

Nevada believes that the Commission should specifically require shippers and carriers to identify primary and alternative routes, which minimize highway and rail shipments through heavily populated areas. We are cognizant that this will force large numbers of shipments into rural areas where these other adverse conditions pertain.

We, therefore, also believe the Commission should adopt the route selection criteria in NUREG 0561 as part of the regulations that specifically require shippers and carriers to minimize the use of routes which fail to comply with those criteria.

Response
The commenter is referring to the State of Nevada's petition for rulemaking to the Nuclear Regulatory Commission to revise the regulations applicable to in-transit physical protection of shipment of spent nuclear fuel (10 CFR 73.37). The petition and comments on the petition, both pro and con, can be found at *http://ruleforum.llnl.gov/cgi-bin/rulemake* [click on Petition for Rulemaking (PRM-73-10) State of Nevada].

DOE would follow all applicable Nuclear Regulatory Commission regulations for in-transit physical protection of shipment of spent nuclear fuel, high-level radioactive waste, and all other types of material, which could be shipped to Yucca Mountain. DOE, as stated in the comments to the Commission on the State of Nevada petition, believes the current Commission regulations are adequate.

The complete DOE comment letter is available on the Internet site noted above.

In response to comments on the Draft EIS, DOE prepared Appendix M to provide additional information on transportation regulations and the operational aspects of spent nuclear fuel and high-level radioactive waste transportation (see Sections M.2 and M.3 of the EIS).

8.3 (10196)
Comment - EIS001888 / 0567
[Clark County summary of comments it has received from the public.]

Some commenters suggested specific rail or heavy haul routes or intermodal transfer stations, which should or should not be considered by the EIS.

Response
Section 6.3 of the EIS describes the general scenarios and their impacts for transportation of spent nuclear fuel and high-level radioactive waste through Nevada to the proposed repository. Under the rail scenario, DOE would construct and operate a branch rail line in Nevada. Based on previous studies (described in Section 2.3), DOE narrowed its consideration for a new branch rail line to five candidate corridors – Caliente, Carlin, Caliente-Chalk Mountain, Jean, and Valley Modified (see Figure 6-14). In addition, the EIS includes analyses for the Nevada heavy-haul truck scenario. Under this scenario, rail shipments would go to an intermodal transfer station where the shipping cask would transfer from the railcar to a heavy-haul truck. The heavy-haul truck would travel on existing roads to the repository. DOE considered three intermodal transfer station locations and five heavy-haul truck routes.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and a rail corridor be selected, other transportation decisions, such as the selection of a specific rail alignment within the corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and Native American tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

8.3 (10237)
Comment - EIS001888 / 0586
The DEIS does not meet the letter or the spirit of NEPA [the National Environmental Policy Act]. It does not provide the information that is needed to be able to assess the real impacts, not only to the citizens of Clark County, but to the nation as a whole. For example, no national transportation routes are suggested - how can an assessment of the environmental impacts be made? Likewise, in Nevada, so many routes and modes of transportation are made - time and resources do not allow an adequate assessment of environmental impacts along the routes.

Response
DOE believes that the EIS adequately analyzes environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

In addition, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada.

In response to public comments, Appendix J of the EIS has been revised to provide state-by-state maps of routes used in the analysis. This is in addition to the route maps that were already included in the Draft EIS (see Section 2.1.3.2 for national routes and Section 2.1.3.3 for Nevada maps). These maps contain tables that show the numbers of shipments originating in and passing through each state by mode and provides the impacts from the shipments in each state.

8.3 (10311)
Comment - EIS002175 / 0004
Transportation. The DEIS fails to address the fact that the number of shipments and the amount of radioactive material that will be shipped is unprecedented in world history. About 90% of the volume would be spent fuel from nuclear power plants, and virtually none of this type of material has ever been shipped before.

Response
The United States has many years of experience in shipping spent nuclear fuel safely and efficiently. Of the thousands of shipments completed over the last 30 years, none has resulted in an identifiable injury through the release of radioactive material. Based on this experience, DOE believes that spent nuclear fuel will continue to be shipped safely and efficiently in the future. It is the Department's opinion that the EIS adequately analyzes potential impacts of the transportation alternatives.

8.3 (10348)
Comment - EIS001927 / 0006
DOE's extremely late release of transport route maps is inexcusable. Even these maps are still very vague. They have only been published on DOE's Yucca Mountain Project website, and certainly not everyone has ready access to the internet; they are hard to read (the highway route numbers are blurry); they are difficult to print because they involve so much memory; they do not show an overview of the entire nation; and they certainly do not show how many shipments would travel along a certain route, nor at what frequency.

Response
In January 2000 (during the public comment process for the Draft EIS), DOE posted state maps of the representative highway and rail line routes analyzed in the DEIS at *http://www.ymp.gov/timeline/eis/routes/routemaps.htm*. In response to public comments, DOE has included these state maps of representative highway routes and rail lines in Appendix J of the EIS (see Section J.4). Section J.4 includes potential health and safety impact estimates associated with shipments for each state through which shipments could pass.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternative preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

8.3 (10911)
Comment - EIS001115 / 0005
Ohio's only presently operating nuclear electric generating power plants are located along Lake Erie in the Cleveland, Ohio vicinity. In order to keep operating as nuclear generators, both Davis-Bessie and Perry Power Plants require "solutions," i.e., where to dispose the High-level Radioactive Waste and considerable amount of Low-Level Radioactive Waste generated. It would seem rather obvious and logical that transportation routes for both High- and Low-level Radioactive Waste will be essentially the same whether by rail, truck, and/or "hybrid" alternative using some of both modes.

Response
The NWPA directed DOE to investigate and potentially develop a permanent geologic repository at Yucca Mountain for spent nuclear fuel and high-level radioactive waste. If the Yucca Mountain Repository was approved, it would be illegal to emplace low-level radioactive waste within the facility.

Low-level waste will be shipped to whichever low-level waste disposal facility the utilities have a contract with for this service. The routes for these shipments of low-level radioactive waste will depend on the destination and some segments might coincide with the routes for shipment of spent nuclear fuel to Yucca Mountain. Additional information on low-level waste transportation can be found in Appendix M of the EIS.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternative preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

In response to public comments, DOE has included, state maps of representative highway routes and rail lines it used for analysis in Appendix J of the EIS (see Figure J-41 for Ohio map). Section J.4 includes potential health and safety impact estimates associated with shipments for each state through which shipments could pass (see Table J-81 for Ohio impacts).

8.3 (10957)
Comment - EIS001424 / 0002
DOE is considering alternate transportation routes for HLRW as well as legacy waste and "excess/surplus" nuclear weapons materials, during the same time frame that the Appalachian Regional Commission (ARC) is implementing an Appalachian Intermodal Transportation Study in three Local Development Districts (LDD's). One of these LDD's is OVRDC [the Ohio Valley Regional Development Commission] (which includes Pike County of Ohio, location of the Portsmouth Gaseous Diffusion Plant). Project goal is to:

Increase industrial/commercial traffic along the Ohio River that will establish intermodal facilities and economic activities. Such growth can result in the creation of new jobs and provide a wide array of economic, social, and community benefits to the region.

Information goals from this study (funded through ARC) are to be used to provide "the necessary research and database for us (OVRDC) to seek more substantial funding through the U.S. Department of Transportation Intermodal Planning grant program." (OVRDC Winter 2000 Newsletter, pgs. 1 & 3.) Newsletter also indicates building partnerships with public and private entities representing air, highway, and rail modes of transportation that would be vital to any Ohio River focus activity is included in grant proposal submitted to ARC by OMEGA (Ohio Mid-Eastern Governments Association). Where does Mr. Miller, OVRDC, and ARC/DOE plan to include Brown County "people in-put" in this process, and when??? DOE cannot fall to include projects and their goals funded through ARC in agency decision-making process. What regulations and standards apply to transportation of radioactive materials by air mode? Are "private entities" exempt from DOE, U.S. EPA [Environmental Protection Agency], and NRC [Nuclear Regulatory Commission] regulations, standards and applicable federal laws? Is DOE considering transport of HLRW [high-level radioactive waste], LLRW [low-level radioactive waste], Mixed Waste, and/or recycled or unrecycled "surplus nuclear materials" by air transport mode as alternative to threat of accident, incident, and sabotage posed by rail and/or truck mode?

Response
Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. The Department has issued a draft Request for Proposals requiring the Regional Servicing Contractor to prepare a transportation plan that describes the Contractor's operational strategy and delineates the steps it would implement to ensure compliance with all regulatory and other DOE requirements. This includes identification of proposed routes and associated routing considerations, coordination and communication with all participating organizations and agencies, including other Regional Servicing Contractor(s), DOE, state, Native American tribal, and local governments, and interactions with appropriate Federal and state organizations. The route and mode determinations would be interactive. If, during the course of the mode or route determinations, one of the previously determined factors changed, the site-specific mode and route analysis would be reevaluated to ensure consistency. See Section M.3.2.1.2 of the EIS for more information on route selection.

The weight of spent nuclear fuel and heavily shielded shipping casks would make transportation by air very expensive. In addition, use of air transportation would not eliminate use of land transportation. Shipments would still have to travel from generator sites to nearby airports and from an airport in Nevada to Yucca Mountain by a land transportation mode. Finally, regulatory requirements in 10 CFR Part 71 regarding air transportation of plutonium in excess of 20 curies, could preclude air transportation of spent nuclear fuel that could contain as much as 20,000 curies of plutonium per MTHM or 40,000 curies of plutonium per truck cask. Regulations in 10 CFR Part 71 address requirements prescribed by Congress regarding air transport of plutonium.

Shipments of spent nuclear fuel and high-level radioactive waste made by private entities are not exempt from U.S. Department of Transportation and Nuclear Regulatory Commission transportation regulations, which include packaging, transporting, and handling radioactive materials for all modes of transportation, and include standards for labeling, shipping papers, placarding, loading, and unloading, allowable radiation levels, and limits for contamination of packages and vehicles, among other requirements. In addition, the regulations specify training for personnel who perform handling and transport of hazardous materials, liability insurance requirements for carriers, and safety requirements for vehicles and transport operations. More details on transportation regulations are in Section M.2 of the EIS.

8.3 (10980)
Comment - EIS001115 / 0002
The so called "Golfer's Highway" from Detroit, Michigan to Charleston, South Carolina promoted years ago by the Ohio turnpike Commission is apparently being constructed in pieces and parts. The Ohio Department of Transportation recently (November 1999 in Batavia, Ohio) held hearing on a major highway construction project in the vicinity of Stonelick Lake, Clermont County, near Eastgate/Cincinnati. Should this project, by whatever name, be completed prior to DOE's selection of a truck transport route and/or as transportation to Yucca Mountain is occurring, the directly affected public along the route and motorists using the route will have no means to realize that they are sharing a highway with high-level radioactive waste transporting trucks! The route proposed years ago for "The Golfer's Highway" transversed Ohio North to South, including the Greater Cincinnati and Northern Kentucky area (with detour from the Eastgate Area of Cincinnati to Piketon, Ohio along OH State Route 32). I am most interested in the route along State Route 32 as it is within 5 miles or so of my residence. During local Ohio Turnpike Commission and other discussion "upgrades" to State Route 32 included closing off numerous local access

roads in Brown and Adams Counties of Ohio, including most local access roads in the vicinity of Sardinia and Macon, Ohio.

It would seem likely that motorists traveling the same highway routes at commercial trucks destined for Yucca Mountain would notice the over-size semi trucks, but that recognition would not necessarily provide any clue to motorists as to what was being transported. Neither would travelers stopped at restaurants and road-side rest areas have knowledge as to what radiation dose they were receiving during routine shipment (minus unintentional release and accident scenarios).

The public along the selected routes would not have means of determining what was being transported multiple times in, near, or through their communities nor the potential risks to which they were being exposed. Southern Ohio and Northern Kentucky residents have had little opportunity to become informed and issue comments on what could be of extreme interest to them so far in this process. Should DOE response to concerns raised in the Cleveland vicinity be selection of alternative routing, the public last-to-know and with least- opportunity-to-object would be “notified” too late to serve any meaningful purpose in DOE decision-making process. Decision to avoid (in areas with public comments in objection) would require selection of available alternative highways (existing at the time shipments are scheduled to begin).

Absence of comment from local emergency management, police, and fire responders in the Southern half of Ohio and Northern Kentucky seems considerable omission during DOE decision-making process.

Response

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternative preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

In response to public comments, DOE has included, state maps of representative highway routes and rail lines it used for analysis in Appendix J of the EIS (see Figure J-41 for Ohio map). Section J.4 includes potential health and safety impact estimates associated with shipments for each state through which shipments could pass (see Table J-81 for Ohio impacts).

The trucks used to transport the nuclear waste to Yucca Mountain would not be oversize or overweight (with the exception of heavy-haul trucks used in Nevada to transport rail casks). They would be placarded in accordance with U.S. Department of Transportation regulations (49 CFR 172.507, 172.527, and 172.556). Motorists and public safety officials would be able to recognize the shipments from the “Radioactive” placard found on all sides of the vehicle. Additional information on the marking of shipments can be found in Section M 2.2 of the EIS.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. Should a rail corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

8.3 (11532)
Comment - EIS002248 / 0002
I owe a lot to the paper [San Bernardino Sun] for their little map and showing that it's only going to be a railroad track through [San Bernardino] Needles and not a highway because that made me look real closely at the document and ask questions.

And I -- I now believe that this document, just based on that fact that there is no road proposed for use through Needles, renders the document to be deficient. And it needs to be revised and recirculated again for the same review period that was circulated the first time.

Response
In response to public comments, DOE has added Section J.4 to the EIS to provide state-by-state maps of routes used in the analysis in the EIS. This is in addition to the route maps already included in the EIS (see Section 2.1.3.2 for national routes and Section 2.1.3.3 for Nevada maps). These maps contain tables that show the numbers of shipments originating in and passing through each state by mode and provides the impacts from the shipments in each state.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states and tribes may designate alternative preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

8.3 (11765)
Comment - EIS000512 / 0003
This is the first time I've ever visited Denver. And I am amazed, I'm amazed that with all of the work and energy and brilliant people involved that the solution for this waste is to truck it through on those high overpasses through this heavily populated area.

I've never been back east. I've never even seen overpasses like that, curves that go way up in the air.

Then the density of the population here. This is also one of the biggest cities I've ever seen. I stayed downtown last night, and I know the population of the downtown area is at least half minority, you know. And surely a place like the mousetrap, which I saw for the first time today, is much closer to those minority areas than they are to your all-white suburbs.

Response
Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states or tribes may designate alternate preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11 of the EIS). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

Fourteen states—Alabama, Arkansas, California, Colorado (where Denver is located), Delaware, Iowa, Kentucky, Nebraska, New Mexico, Ohio, Tennessee, Texas, Utah, and Virginia—have designated alternative or additional preferred routes (DIRS 104789-Rodgers 1998)

DOE has addressed environmental justice issues (minority or low-income populations) in Section 6.2.5 of the EIS for national transportation, and Sections 6.1.2.12 and 6.3.4 for Nevada. DOE has concluded that transportation impacts on the population are low and that there would be no disproportionate impacts on these populations. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. Should a rail corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

8.3 (12209)
Comment - EIS000478 / 0011
The greater latent cancer fatality risk of truck-based transportation suggests that the DOE use rail transportation as frequently as possible.

Response
DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. Should a rail corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

8.3 (12255)
Comment - EIS001157 / 0001
The DEIS addresses actions that the Department of Energy (DOE) proposes to take to develop a geologic repository at Yucca Mountain and to transport the material from 77 sites around the country to Yucca Mountain. The material to be stored at the proposed Yucca Mountain geologic repository will have to be shipped there. It is our belief that the transport of these materials cannot be separated from the site itself. Therefore, the DEIS should include the proposed routing.

The DEIS statement that the actual route would have to be addressed in a separate environmental impact statement (EIS) is not acceptable. Delaying such an important part of the environmental analysis is not reasonable, especially given the legislative exemptions to the National Environmental Policy Act (NEPA) that have already been accorded to the Yucca Mountain project.

Response
DOE believes that the EIS adequately analyzes environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

For the reasons discussed above, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

If the Yucca Mountain site was approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

8.3 (12596)
Comment - EIS001905 / 0003
Full release of all information to the public
On December 6th 1999, I and several of my colleagues in the House of Representatives sent a letter to the Secretary of Energy asking for important information regarding the routes of nuclear waste transport. From our reading of the DEIS, DOE had produced routes of transport to evaluate the impacts of nuclear waste transport, but had failed to release the routing. The DOE’s response to date has been mediocre. I am aware that you have released data files on your website that explain the routes. These files are not advertised and not readily understood by the general public, thus they do nothing to inform the general public. I also understand that you have released maps of likely nuclear waste transport for each state at www.gov/timeline/eis/routes/routemaps.htm. I applaud you for this. However, in the previous letter I and several colleagues also requested a 180 day extension and a second hearing opportunity for those communities that did not have the information necessary to be fully aware of DOE actions. The release of the maps occurred on January 21, 2000, only 19 days before the original end of the comment period on February 9, 2000. The extension to February 28, 2000, increased the time to comment on these routes to only 38 days. Thus, the ability for the American public to understand where the waste may travel and comment on these routes was severely curtailed. To correct this problem, the DOE must publish a Supplemental DEIS that focuses on the nuclear waste transportation routes. A 180-day review period should be required for the supplemental DEIS. It will not be sufficient to include the routes in the FEIS without the 180-day comment period.

Response
Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, state or tribes may designate alternate preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

In January 2000 (during the public comment process for the Draft EIS), DOE posted state maps of the representative highway and rail line routes analyzed in the Draft EIS at *http://www.ymp.gov/timeline/eis/routes/routemaps.htm*. In response to public comments, DOE has included these state maps of representative highway routes and rail lines in Appendix J of the EIS (see Section J.4). Section J.4 includes potential health and safety impact estimates associated with shipments for each state through which shipments could pass.

DOE distributed 3,400 copies of the Draft EIS to stakeholders and held 10 public hearings throughout Nevada and 11 public hearings elsewhere across the country during a 199-day comment period (August 13, 1999 through February 28, 2000). During the comment period, DOE encouraged stakeholders to offer comments on the document at the public hearings and by mail, facsimile, and the Internet. In May 2001, DOE issued the *Supplement to the Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and*

High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada, which it distributed to more than 4,000 stakeholders. The Department encouraged these stakeholders to submit comments during a 45-day comment period, which it later extended to 57 days (May 4 through July 6, 2001).

8.3 (12671)
Comment - EIS000648 / 0002
The need to pit rural people and urban people against each other, and to say we have to avoid Las Vegas, so the rurals need to take the impact. I think that it's an unfair, inequitable, and an unsafe proposition to do the roll of the dice. The risk analysis says that the rurals have to take the risk because it's to unsafe for urban areas. We're all citizens here. We're all in the same boat. The EIS, with is bounding analysis, says let's look at what we can do to the urban area, and that's the worst thing we could do. The rurals are the backup position.

Response
Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states or tribes may designate alternate preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. Should a rail corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

As described in the EIS, risks to people living in rural or urban areas as a result of a transportation campaign would be primarily associated with transportation accidents. The EIS contains a discussion of potential impacts from accidents in both the mostly legal-weight truck scenario and the mostly rail scenario (see Section 6.2.4.2). For mostly legal-weight truck transportation, Section 6.2.4.2.1 describes the maximum reasonably foreseeable accident, which could cause 0.55 latent cancer fatalities in an urban area. Severe accidents in less urban areas would have smaller consequences. Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low.

8.3 (12688)
Comment - EIS001887 / 0037
The Draft EIS fails to identify the specific transportation routes for spent fuel and HLW [high-level radioactive waste] shipments from specific reactor and generator locations to Yucca Mountain, despite the fact that these routes were identified as part of the analyses contained in the transportation appendix. DOE, in effect, has chosen to hide the routes and simply report the results of the analyses in a generic fashion. The half-hearted and inadequate attempt to publish a set of route maps three week[s] before the end of an extended comment period (and after 18 of 21 public hearings had already been conducted without any notice to the public about likely routes and potentially impacted communities) in no way mitigates this extraordinary and fundamental deficiency in the Draft EIS. The maps themselves fail to contain information about shipment numbers, modal mix, and specific communities impacted.

One can only conclude that the failure to disclose specific nuclear waste shipping routes in the Draft EIS is intentional and designed to serve a political objective of suppressing public interest in the project and participation in the public hearings, especially those in states other than Nevada. Nevada believes that DOE has violated the National Environmental Policy Act by concealing crucial information used in the Draft EIS. Absent this information, persons affected by the transportation impacts of the Proposed Action have no way of determining the substantive and legal sufficiency of DOE's analysis. Such concealment of information can only diminish public confidence in DOE's ability to safely transport these highly radioactive materials and, of itself, renders the Draft EIS fundamentally deficient.

Response

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states or tribes may designate alternate preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

In January 2000 (during the public comment process for the Draft EIS), DOE posted state maps of the representative highway and rail line routes analyzed in the DEIS at *http://www.ymp.gov/timeline/eis/routes/routemaps.htm*. In response to public comments, DOE has included these state maps of representative highway routes and rail lines in Appendix J of the EIS (see Section J.4). Section J.4 includes potential health and safety impact estimates associated with shipments for each state through which shipments could pass.

DOE believes, however, that the EIS adequately analyzes environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

For the reasons discussed above, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

If the Yucca Mountain site was approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

8.3 (12752)

Comment - EIS000990 / 0003

Under the DEIS mostly truck scenario, DOE's preferred Nevada route to Yucca Mountain is I-15, the Las Vegas Beltway (I-215), and US 95. Using the HIGHWAY model, DOE contractors generated national routes from the 77 shipping sites to connect with the Las Vegas Beltway. These national routes are not revealed in the DEIS, but they are disclosed in the DEIS references, which can be accessed on the worldwide web at www.ymp.gov/timeline/eis/trwl999udata.

The routes used for the mostly truck impact analysis in the DEIS correspond to actual cross Country routes to I-15 and the Las Vegas Beltway. These routes generally are I-80 for shipments from the Northeastern and North Central states, I-70 for shipments from Southeastern and Midwestern states, and I-10 and I-40 for shipments from South Central and Southwestern states. Shipments from the Pacific Northwest and Idaho use I-84 and I-15. Shipments from Arizona and California use I-5, I-10, and I-15. [See CRWMS M&O 1999, Chapter 4, file bt-map.prn. The origin-destination distances generated in miles in this file correspond to the origin-destination distances given in kilometers in DEIS Table J-11]. The DEIS compares the transportation impacts calculated for the preferred route with impacts for six potential alternative routes identified by the State of Nevada to minimize shipments through the Las Vegas Valley. [See Table J-48].

The routes used in the DEIS make Missouri one of the more heavily affected corridor state for truck shipments to Yucca Mountain, but the DEIS make no specific reference to transportation impacts in Missouri. One of the major truck routes to Yucca Mountain enters Missouri on I-270 from Illinois, travels through the St. Louis area to connect with I-70 at St. Charles, follows I-70 to I-435 in Kansas City, Missouri, and reconnects with I-70 through Kansas, Colorado, and Utah. According to the DEIS references, this route travels 250 miles in Missouri. Truck shipments using this route are presented in Table 1. Under the mostly truck scenario, proposed action, more than 18,000 truck shipments of SNF [spent nuclear fuel] and HLW [high-level radioactive waste] (about 37% of the total) traverse Missouri over 24 years. Under the mostly truck scenario, modules 1 & 2, 29,000 truckloads of SNF, HLW, and other radioactive wastes requiring geologic disposal (about 30% of the total) traverse Missouri over 39 years. Under either scenario, an average of two trucks per day would travel through St. Louis and Kansas City every day for decades. Additionally, Missouri would be traversed by up to 1,000 truckloads of greater-than Class C low level radioactive wastes from commercial reactors to Yucca Mountain during the same time period.

Response

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states or tribes may designate alternate preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

In response to public comments, DOE has included maps of the representative highway routes and rail lines for the 45 states it used for analysis in the EIS (see Figure J-47 of the EIS for the representative Missouri routes). It also included potential health and safety impacts associated with shipments for each state through which shipments could pass. Table J-87 lists the estimated number of legal-weight truck shipments of spent nuclear fuel and high-level radioactive waste that would enter Nevada after travelling through Missouri in the mostly legal-weight truck scenario. The table also lists the estimated number of rail shipment through California in the mostly rail scenario for each of the proposed Nevada rail corridors and heavy-haul truck routes.

If the Yucca Mountain site was approved, under the mostly legal-weight truck scenario, the estimated total number of truck shipments through Missouri would be 19,142 over 24 years, approximately 2 truck shipments per day. There would be an estimated 435 rail shipments, slightly more than 1 per month.

The estimated numbers of shipments entering Nevada after travelling through Missouri under the mostly rail scenario are less than the mostly legal-weight truck scenario. According to Table J-87, the number of rail shipments would range from 4,069 to 4,126 depending on the mode (rail or heavy-haul truck) and corresponding corridor/route selected in Nevada. This would be slightly more than 3 rail shipment per week over 24 years, at most. In addition, there would be approximately 71 legal-weight truck shipments through Missouri.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved and mostly rail was selected as the preferred mode (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. Should a rail corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews.

8.3 (12980)
Comment - EIS010303 / 0009
As it was pointed out in the House Energy and Water Development Appropriations Bill 2002 Report, Nuclear Waste Disposal, the DOE has an "exemplary safety record in the shipping of commercial and naval nuclear fuel" (p.3). The DOE has proven that it can safely transport spent nuclear fuel and high-level nuclear waste from plant sites across the nation. Yet, instead of moving forward with a more assertive approach in educating the public and working with state and local officials in the development of transportation routes to Nevada and other states, the DOE is deferring its transportation planning until the completion and final selection of the permanent repository.

Response
If the Yucca Mountain site was approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

8.3.1 STATE ROUTE 127, HOOVER DAM, NEVADA DEPARTMENT OF TRANSPORTATION ALTERNATIVES

8.3.1 (20)
Comment - 9 comments summarized
Commenters expressed concern about routing shipments of spent nuclear fuel and high-level waste over Hoover Dam, also referred to as Boulder Dam, and through Boulder City, Las Vegas, and the Spaghetti Bowl interchange of I-15/515 and U.S. 93/95 during peak travel times. One commenter stated that before any spent nuclear fuel and high-level radioactive waste should be allowed near Nevada, shipments must avoid contact (or proximity) with any waterways or populated areas and stated a highway needs to be built that circumvents the Dam and does not go through cities. Commenters expressed the hope that shipments would not be routed over the Dam and stated DOE should avoid the use of certain routes such as the Spaghetti Bowl.

Response
For truck transportation of spent nuclear fuel and high-level radioactive waste to Yucca Mountain, a motor carrier could use only routes that comply with the requirements contained in U.S. Department of Transportation regulations (49 CFR 397.101). The regulations require use of routes designated as preferred routes that reduce time in transit; these preferred routes are Interstate System highways, Interstate System beltways and bypasses, and state or tribal designated preferred routes. The only exceptions are for pickup and delivery routes used to travel to and from a nearest preferred route.

If there was a decision to proceed with the development of a repository at Yucca Mountain, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway routes or rail lines could be used. In the interim, states or tribes could designate alternative preferred highway routes, and highways and rail lines could be constructed or modified. Therefore, for purposes of analyses presented in Sections 6.2 and 6.3 of the EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations. DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for the shipment of radioactive materials.

Unless the States of Nevada and Arizona both designated U.S. 93 as a preferred route from Kingman, Arizona, to Las Vegas, Nevada, shipments of spent nuclear fuel and high-level radioactive waste would not cross Hoover Dam. Because DOE assumed that the Las Vegas Beltway would be available when shipments began in 2010, the analysis in Chapter 6 did not use highway routing that would pass through the Spaghetti Bowl interchange (Interstate-15/515 and U.S. 93/95) in Las Vegas. However, to evaluate the sensitivity of impacts to potential alternative routing of highway shipments in southern Nevada, DOE evaluated impacts that would occur if shipments traveled through the Spaghetti Bowl interchange (see Section J.3.1.3 of the EIS).

Federal regulations for highway routing of shipments do not include time-of-day travel restrictions or restrictions regarding travel on routes that cross waterways. However, DOE protocols do include consideration of time-of-day travel through urban areas. For additional information regarding DOE policies, procedures, and protocols for transportation, see Section M.3 of the EIS.

8.3.1 (195)

Comment - 12 comments summarized

Commenters stated that the Draft EIS was deficient because it did not analyze two routes identified by the Nevada Department of Transportation in 1989 (known as the A and B routes) for the transportation of spent nuclear fuel and high-level radioactive waste within Nevada. Others stated that alternative routing within Nevada could have higher impacts than those analyzed in the EIS. Alternative routing in the event of an accident or bad weather should also be addressed.

Response

As described in Section J.1.1.2, the analyses in the EIS used highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations require the shipments of radioactive material to be made on preferred routes to reduce time in transit. A preferred route is an Interstate System highway, bypass or beltway, or a route selected by a state or tribal routing agency. The regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F (A and B pass through White Pine County) as potential alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3). However, these are not yet formally designated alternative preferred routes.

For completeness, Section J.3.1.3 of the EIS evaluates all six of the Nevada Department of Transportation routes, including Nevada Department of Transportation routes A and B, as sensitivity analyses to provide comparisons with the currently allowed preferred routes. The data needed to characterize the Nevada Department of Transportation routes to support the impact calculations is equivalent to the data collected for the base Case routes. Tables J-47 and J-48 present the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario. The various impacts would generally be small for all cases, but for routes A and B they should be about a factor of 1.5 times greater than the route used for the EIS analysis. All direct environmental factors are addressed for Nevada transportation in the EIS (see Section 6.3.2).

Section M. 3.2.1.4 of the EIS includes information on the procedures to be used in the event of adverse weather or road conditions.

8.3.1 (608)
Comment - EIS000140 / 0002
DOE failed to address direct and indirect effects of legal-weight truck shipments through White Pine County, including implications for emergency first response and emergency medical services.

Response
As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transportation) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F (A and B pass through White Pine County) as potential alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada designate one of these other routes as an alternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states and local jurisdictions would be necessary. The affected routing authorities would consider public risk and other conditions along the other routes, including emergency response capability, highway design and condition, population density, traffic conditions, etc., during the process of selecting and designating alternative preferred routes.

For completeness, Section J.3.1.3 of the EIS evaluates all six of the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. The data needed to characterize the Nevada Department of Transportation routes to support the impact calculations is equivalent to the data collected for the base case routes. Tables J-47 and J-48 present the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario. The various impacts are generally small for all cases, but for routes A and B the impacts are about a factor of two larger than the route used for the EIS analysis.

With respect to emergency planning, Section M.6 of the EIS contain additional information on emergency response and the implementation of Section 180(c) of the NWPA. Section 180(c) requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using an up-front planning grant and based on availability of funds in annual Program budgets specified by Congress. The schedule in the proposed policy and procedures (63 *FR* 23753; April 30, 1998) for implementation of Section 180(c) of the NWPA is designed to provide adequate time for training of first responders in advance of the first shipments. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction.

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. In addition, DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty
- Much of the uncertainty is irreducible, and
- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

8.3.1 (641)
Comment - EIS000141 / 0005
The Draft EIS fails to consider unique local conditions along the NDOT [Nevada Department of Transportation] B Route which may increase the probability of severe accidents, and which could exacerbate the consequences of a severe accident or terrorist attack resulting in a release of radioactive materials. There are numerous mountain passes, such as White Horse Pass, Currant Summit, Black Rock Summit, Sandy Summit, and Warm Springs Pass. Near-route terrain frequently includes drop-offs into deep canyons or river valleys that would make response to an accident or attack, and recovery of the cask, damaged or not, quite difficult. Route proximity to surface water and groundwater resources is a major concern. DOE has failed to address the implications of route-specific conditions for accident prevention, emergency response, and the economic costs of cleanup and recovery.

Response
As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F as potential alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada designate one of these other routes as an alternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider public risk and other conditions along the other routes, including emergency response capability, highway design and condition, population density, traffic conditions, etc., during the process of selecting and designating alternative preferred routes.

For completeness, Section J.3.1.3 of the EIS evaluates all six of the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. The data needed to characterize the Nevada Department of Transportation routes to support the impact calculations is equivalent to the data collected for the base case routes. Tables J-47 and J-48 present the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario. The various impacts are generally small for all cases, but for route B the impacts are about a factor of two larger than the route used for the EIS analysis.

DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties, offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

With respect to emergency planning, Sections M.5 and M.6 of the EIS contain additional information on emergency response and the implementation of Section 180(c) of the NWPA. Section 180(c) requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using an up-front planning grant and based on availability of funds in annual Program budgets specified by Congress. The schedule in the proposed policy and procedures (63 *FR* 23753, April 30, 1998) for implementation of Section 180(c) of the NWPA is designed to provide adequate time for training of first responders in advance of the first shipments. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction.

In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments, and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $9.4 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 of the EIS included data compiled from case studies involving actual cleanup of radioactive materials contamination. The studies address consequences for releases of radioactive materials in communities.

8.3.1 (1006)
Comment - EIS000262 / 0002
Without detailed information on likely primary and secondary routes in California and the staging of shipments, it is impossible for Inyo County to evaluate the impacts of the shipping campaign on our area.

At present, State Route 127 is being utilized for shipment of low-level nuclear waste to the Nevada Test Site and may be used for shipment of transuranic waste from the Test Site to the Waste Isolation Pilot Plant. This makes State Route 127 a likely candidate for eventual shipments of high-level radioactive waste.

Section 180(c) of the NWPA calls for Federal action to provide improvements in emergency response training and capability along routes designated for the transport of high-level nuclear waste and spent fuel. The virtual absence of emergency response capability on Route 127 and the isolated character and the current configuration of this roadway promise to make compliance with this part of the Act an involved and expensive exercise on the part of the Federal Government.

Other necessary improvements will include complete reconstruction of some sections of the roadway and the construction, equipping and staffing of emergency response stations. The County and the State will be saddled with significant new costs to safeguard their residents. The EIS fails to address, in any manner, the significant fiscal and possibly significant environmental impacts of meeting these obligations. These impacts too, are inseparable from the issue of the repository itself and need to be quantified by the EIS.

Response

As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F (routes C and E include the use of California 127) as potential alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada or California designate one of these other routes as an alternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider public risk and other conditions along the other routes, including emergency response capability, highway design and condition, population density, traffic conditions, etc., during the process of selecting and designating alternative preferred routes.

Section J.3.1.3 of the EIS evaluates the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. Table J-46 includes descriptions of the other routes evaluated in the EIS, including Case 2, which uses State Route 127. The data needed to characterize these routes to support the impact calculations, including State Route 127, are equivalent to the data collected for the base case routes. Tables J-47 and J-48 present the results of the sensitivity evaluations, including the impacts nationally and in Nevada, based on the mostly legal-weight truck scenario.

Sections M.5 and M.6 of the EIS contain additional information on emergency response and the implementation of Section 180(c) of the NWPA. Section 180(c) requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using an up-front planning grant and based on availability of funds in annual Program budgets specified by Congress. The schedule in the proposed policy and procedures (63 *FR* 23753, April 30, 1998) for implementation of Section 180(c) of the NWPA is designed to provide adequate time for training of first responders in advance of the first shipments. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction.

The transportation analyses (with the exception of that for the Nevada branch rail line) consider shipments on existing highway infrastructure that would not require upgrading. Where upgrading is required for safe transport or maintenance to keep roads and railroads safe, the necessary funding would be made available to responsible jurisdictions.

8.3.1 (1014)
Comment - EIS000254 / 0004
Here are a few of the issues not even addressed in the DEIS on the Carlin route in regard to Crescent Valley:

- Lifestyle -- Social, economic, and quiet enjoyment of your property.
- Wildlife -- Wildlife corridors, range areas, viewing, rearing, grazing and hunting impacts.
- Ranchers -- Cattle ranging, rearing, feeding, security.
- Railroad crossings -- Locations? At grade? Safety? Security, noise.
- Water/Floodplains -- No mention of lake bed at Crescent Valley. Flash flooding, washouts, culverts, bridges, dam effect of railroad and impact of backup water to Crescent Valley town and valley landowners.
- Earthquake -- Is lakebed or valley soil subject to the liquefaction effect in case of earthquake? Note associated railroad impacts.
- Railroad Ownerships -- Who will own railroad? Who will own the land?
- Mitigation -- For all of the above must be stated.

Response
In its evaluation of potential impacts of constructing a branch rail line in each rail corridor in Nevada, DOE considered the potential impacts that could occur both to the natural environment and to communities, such as Crescent Valley, that would be nearby (see Section 6.3.2 of the EIS). For example, in the Carlin Corridor, DOE identified numerous springs within 5 kilometers (3 miles) of the alignment of a potential branch rail line. At the north end of this corridor, DOE biologists identified a hot spring approximately 0.5 kilometer (0.3 mile) east of Nevada Route 306 about 5 kilometers (3 miles) south of Interstate-80. DOE would locate the alignment of a branch rail line to minimize the potential to affect springs and wet areas. DOE would determine how to best avoid detrimental impacts, for example, in some areas, fences could be recommended to protect livestock and open culverts could allow access to both sides of the track.

In its assessment of potential land-use impacts, DOE considered the differences between land-use types, land disturbances, land ownership, and the creation of barriers. The assessment compared proposed uses of land for Yucca Mountain transportation purposes to existing or other proposed land uses to estimate the magnitude and context of potential conflicts. If an action would result in continuing a current land use either due to little or no impact or through mitigation, the effects were considered insignificant or small. For example as discussed in Chapter 6, the impacts to livestock and Bureau of Land Management grazing allotments could be mitigated through the use of fencing, overpasses, and underpasses, which could provide a water source to animals cut off from current sources. With these mitigating measures, the impacts would be lessened and considered small. If an action could result in departures from existing uses, and mitigation could not remedy the conflict, the effects could be more substantial. For example, as discussed in the Carlin Corridor sections of Chapter 6 (see Section 6.3.2.2.2), the Bonnie Claire Alternate passes directly through the portion of the newly estimated Timbisha Shoshone Homeland near Scottys Junction. Should this alternate be chosen, the construction of a branch rail line could limit or enhance economic development in the Timbisha Shoshone Trust Lands parcel and could limit the use for housing be restricting access. Factors considered included the uniqueness of a geographic area; presence of historic, scientific, and cultural resources; potential effects on endangered species; and compliance with Federal, State, or local law. Based on information available, potential land-use impacts associated with Yucca Mountain transportation activities could be minimized through judicious alignment of the branch rail line or through mitigation. Overall, the land-use impacts are not substantial because of the use of various optional and alternate routes in the corridor, mitigation measures, and the judicious routing of the branch rail line in the corridor.

Additional information about impact reduction features, procedures, and safeguards, and mitigation measures under consideration are included in Chapter 9 of the EIS. Chapter 9 identifies ongoing studies that could eventually influence mitigation measures related to the project plan and design. For example, Section 9.3 discusses mitigation measures intended to address impacts from the possible construction of a branch rail line.

If the Yucca Mountain site was approved, and rail was selected as the transportation mode, then decisions regarding ownership and shared use would be made. Line ownership, however, would not affect potential environmental impacts.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved, DOE would issue at some future date a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment in a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

8.3.1 (1155)
Comment - EIS000261 / 0003
The southeast [Inyo] County has recently seen several highway accidents involving non-nuclear hazardous waste. One incident with a leaking toxic waste truck resulted in the responders being exposed to toxic levels of waste, followed by hospitalization and ongoing medical treatment. The time delay in getting toxic waste expertise into the region was the reason for the severity of the incident. In another area, a hazardous waste truck failed to negotiate a turn near a rest stop, rolled over and crushed a picnic facility. Our confidence in truck transportation for dangerous materials on remote, narrow, two-lane roads is not high. The DEIS is silent on this issue.

State Highway 127 itself is not an engineered route; most of it originated as an historic wagon trail that was paved over a period of time. Inyo County's recent survey of the route from its junction in the south with Interstate 15 at Baker to its junction with U.S. Highway 95 in the north revealed many unbanked, unsigned high-speed turns, numerous blind rises where visibility is limited, sustained grades in excess of modern standards, and dozens of washes crossing both over and under the pavement. The route passes through four towns, two of which include sharp 90-degree turns in the middle of town.

In the event of an incident, there are few alternate routes useful to diverting commercial and passenger traffic around accident or cleanup sites. For long sections of 127, there is no alternate route whatsoever.

There are approximately 1,000 acres of land in the vicinity of Death Valley Junction that is proposed for release to the Timbisha-Shoshone Tribe for their use. If developed to mixed residential and commercial uses, this territory could host an unknown number of additional residents and contribute significantly to traffic on Route 127.
The status of this corridor with respect to Yucca Mountain shipments is not addressed in any meaningful fashion by the EIS. We don't see any mitigation in the EIS to compensate for the hazard which the waste would impose upon responders, travelers or residents of the region. Conditions on possible primary and secondary routes in California are not evaluated and no attempt is made to develop and weigh alternatives for getting nuclear waste originating in California into Yucca Mountain.

As it stands, the isolation and current configuration of southeast County roadways cannot reasonably and safely support the demands of a 25-year nuclear waste transport campaign. The EIS provides insufficient information to allow us to assess repository operations on County residents or determine our risk in the larger context of the entire national transportation effort.

Unless State Route 127 is officially dismissed from consideration for the transport of high-level waste and spent nuclear fuel, the DEIS at minimum needs to be amended to evaluate risks associated with the route, propose measures to offset those risks, and identify the expected source of funding of these measures.

Response
As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote

public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F (routes C and E include the use of California 127) as alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada or California designate one of these other routes as an alternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider the conditions of State Route 127 that were identified by the commenter, such as high accident rates in specific areas (for example, unbanked, unsigned high-speed turns; blind rises; limited visibility; and sustained grades in excess of modern standards), during the process of selecting and designating alternative preferred routes.

Section J.3.1.3 of the EIS evaluates the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. Table J-46 includes descriptions of the other routes evaluated in the EIS, including Case 2, which uses State Route 127. The data needed to characterize these routes to support the impact calculations, including State Route 127, are equivalent to the data collected for the base case routes. Tables J-47 and J-48 present the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario.

The transportation analyses (with the exception of that for the Nevada branch rail line) consider shipments on existing highway infrastructure that would not require upgrading. Where upgrading is required for safe transport or maintenance to keep roads and railroads safe, the necessary funding would be made available to responsible jurisdictions.

Section 9.3 of the EIS describes management actions to mitigate the potential for environmental impacts from transportation of spent nuclear fuel and high-level radioactive waste to the repository. California State Route 127 is currently not a preferred route so DOE has not determined how these risks would be mitigated. As mentioned above, DOE would not designate preferred highway routes based on the information in the EIS alone. Additional environmental and engineering studies would be conducted before such a decision was made. DOE anticipates that potential mitigation measures, which might include infrastructure upgrades, would be considered as a part of these additional studies.

8.3.1 (1172)
Comment - EIS000229 / 0005
The DEIS generally fails to identify and evaluate credible HHT [heavy-haul truck] routing options. Nevada acknowledges that DOE has accurately classified the Caliente Chalk River HHT route as a "non-preferred alternative" in response to national security issues raised by the Air Force. [p. 6-110] Since concurrence by the Secretary of the Air Force would be required, DOE should eliminate this route from further consideration. DOE's other HHT route options are unrealistic and unwise. The DEIS continues to consider HHT routes using I-15, the Las Vegas Beltway, and US 95 and through Las Vegas, in spite of repeated advice from Clark County and state agencies that these routes are not even acceptable for LWT [legal-weight truck] shipments. In 1994, NDOT [Nevada Department of Transportation] notified the California Highway Patrol that: "Because I-15 goes through the heart of Las Vegas, Nevada, is interested in selecting a preferred route... bypassing Las Vegas." Absent action by California to designate SR 127 or other routes avoiding I-15 into Las Vegas, NDOT stated its intention to "recommend to the State Transportation Board the designation of Nevada SR-160 as the preferred route and to undesignate I-15

between the Utah-Nevada Stateline and Las Vegas as a preferred route." DOE should eliminate HHT routes through Las Vegas from further consideration.

Response

DOE has reevaluated whether the Caliente-Chalk Mountain Corridor and the Caliente/Chalk Mountain heavy-haul truck route should be eliminated from further evaluation. DOE met with the Air Force (see Appendix C of the EIS), considered the information provided, and concluded that the Caliente-Chalk Mountain Corridor and the Caliente/Chalk Mountain heavy-haul truck route implementing alternatives should remain identified as "nonpreferred alternatives" in this Final EIS.

DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

As stated in Section 6.3 of the EIS, U.S. Department of Transportation regulations (49 CFR Part 397) govern highway shipments of spent nuclear fuel and high-level radioactive waste. This regulation describes the process that state or tribal routing authorities are to follow to designate alternative preferred routes. The State of Nevada has proposed alternative routes to DOE, which evaluated them in the EIS (see Section J.3.1.3). However, DOE is unaware of the State submitting alternate preferred routes to the Nuclear Regulatory Commission for approval. Until this happens, the Department would continue to consider alternatives through Las Vegas using the Interstate Highway System as required in Federal routing regulations for legal-weight and heavy-haul trucks.

For heavy-haul truck routes, DOE has chosen to analyze alternative routes in addition to the Interstate-15 and -215 (the partially complete Las Vegas Beltway) routing options. DOE will continue to consider the implementing alternatives (described in Section 6.3 of the EIS) that avoid the Las Vegas Valley. The Department is unaware that any State or Native American routing agency is in the process of, or has selected, a preferred route bypassing Las Vegas, such as State Route 160.

8.3.1 (1346)

Comment - EIS000382 / 0001

State Route 127 is about 50 miles long in Inyo County. It goes from the Inyo/San Bernardino County line all the way up to the Nevada border up by Longstreet. 127 is a poor highway for truck traffic. It's got flat-graded curves, sharp curves, and it's only a two-lane roadway. My opinion is that it's unsuitable for increased truck traffic.

I'm familiar with the hazardous material spills on that highway. I handled many of them, and I know what it takes to take care of a situation like that. Currently, in that part of the county there is no fire department, as was talked about. So there's not even the manpower to close the highway. We can't even put one person at each end of the truck spill to close the thing down. There's no trained manpower.

Shoshone only has one resident [police] officer. The next one would be Death Valley, and you're talking about 45 minutes away. Baker, California, on numerous occasions, has volunteered to come up and help, but you're talking about 57 miles from Shoshone to Baker. They are too busy with everything that happens on the 15. Pahrump has volunteered to come over on occasion. They have more than they can handle on State Route 160. So it's not reasonable to expect these people to help us out. Pretty much we're on our own, and there's no training, and the roadway is just not designed for this type of activity. So I would oppose any type of secondary use of State Route 127, all 50 miles of it in Inyo County, for any kind of HAZMAT [hazardous materials] transportation like this.

Response

As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F (routes C and E include the use of California 127) as alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

At present, State Route 127 is not a preferred highway, so DOE could not use it for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. If the State of Nevada or California designated this highway as an alternative preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. As noted above, the States of Nevada and California would have the opportunity to designate alternative preferred routes. The regulations require a state or tribe to select routes in accordance with the Federal guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states, local jurisdictions, and Native American tribes would be required. The affected routing authorities would consider the conditions of State Route 127 the commenter identified (that is, flat-graded curves, two lanes) and other conditions during the process of selecting and designating alternative preferred routes.

Section J.3.1.3 of the EIS evaluates the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. Table J-46 includes descriptions of the other routes evaluated in the EIS, including Case 2, which uses State Route 127. The data needed to characterize these routes to support the impact calculations, including State Route 127, are equivalent to the data collected for the base case routes. Tables J-47 and J-48 present the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario.

The comment mentions several potential highway upgrades necessary to improve the safety of transporting spent nuclear fuel and high-level radioactive waste on State Route 127. The transportation analyses (with the exception of a branch rail line) considered shipments on existing highways that would not require upgrading. Where upgrading would be required for safe transport or maintenance would be required to keep roads and railroads safe, the necessary funding would be made available to responsible jurisdictions.

At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. The Regional Servicing Contractor would be required to provide detailed written procedures for how it would respond to an incident and arrange for repair/replacement of equipment or recovery, as appropriate. In accordance with ANSI N14-27 (DIRS 156289-ANSI 1987), the carrier is expected to provide appropriate resources for dealing with the consequences of an accident, isolating and cleaning up contamination, and maintaining working contact with the responsible governmental authority until the latter has declared the incident to be satisfactorily resolved and closed. Section M.3 of the EIS contains more detail on the proposed role of the Regional Servicing Contractor.

Sections M.5 and M.6 of the EIS contain additional information on emergency response and the implementation of Section 180(c) of the NWPA. Section 180(c) requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions it would to transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using an up-front planning grant and based on availability of funds in annual Program budgets specified by Congress. The schedule in the proposed policy and procedures (63 *FR* 23753, April 30, 1998) for implementation of Section 180(c) of the NWPA is designed to provide adequate time for training of first responders in advance of the first shipments. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction.

8.3.1 (1440)

Comment - EIS000353 / 0003

Section 6.2.4, accident scenarios. Page 6-32. It identifies that approximately four traffic fatalities would occur during the course of transporting the spent nuclear fuel and high-level waste under the mostly legal-weight trucks scenario during the 24 years of operation nationwide.

Well, that seems like it's an extremely small number. And, in addition, it does not discuss the injuries due to accidents. White Pine County, with 105 miles of rural, two-lane roads, where automobiles and lightweight trucks travel at high speed, it is likely there will be a number of accidents related to the nuclear waste shipments. White Pine County needs more assurance and assistance from the DOE to be able to have communications equipment, medical facilities, emergency response personnel to provide the necessary care for any injured person.

Response

Section J.1.4.2.3 of the EIS provides the sources of data used in the transportation accident analysis, which included accident fatality rates developed by Saricks and Tompkins (DIRS 103455-1999) to perform the traffic fatality calculations on a state-by-state basis. DOE did not calculate nonradiological traffic injuries in the EIS. However, to provide some perspective, the route length provided by the commenter and the number of shipments, accident rates, and fatality rates in Nevada were used to estimate the nonradiological accident impacts in White Pine County. The accident and fatality rates used were 3.8×10^{-7} accidents per kilometer and 1.67×10^{-8} fatalities per kilometer, respectively (DIRS 103455-Saricks and Tompkins 1999). DOE assumed that 45,919 legal-weight truck shipments would travel along this route (from the EIS, Figure J-10). DOE also assumed that loaded and empty return truck shipments would use this highway. Using these data, a total of between 5 and 6 accidents would occur along this 170-kilometer (105-mile) stretch of highway over 24 years, or about one every 4 years. The probability of a traffic fatality occurring was calculated to be about one in four accidents over the 24-year period.

As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F (routes A and B are through White Pine County) as alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada designate one of these other routes as an alternative preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultations with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider public risk and other conditions along the other routes, including emergency response capability, highway design and condition, population density, traffic conditions, etc., during the process of selecting and designating alternative preferred routes.

For completeness, Section J.3.1.3 of the EIS evaluates all six of the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. The data needed to characterize the Nevada Department of Transportation routes to support the impact calculations is equivalent to the data collected for the base case routes. Tables J-47 and J-48 present the results of the sensitivity evaluations, including the impacts nationally and in Nevada, based on the mostly legal-weight truck scenario. The various impacts are generally small for all cases, but for routes A and B the impacts are about a factor of two larger than the route used for the EIS analysis.

Section M.6 of the EIS contains additional information on emergency response and the implementation of Section 180(c) of the NWPA. Section 180(c) requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions it would to transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using an up-front planning grant and based on availability of funds in annual Program budgets specified by Congress. The schedule in the proposed policy and procedures (63 *FR* 23753, April 30, 1998) for implementation of Section 180(c) of the NWPA is designed to provide adequate time for training of first responders in advance of the first shipments. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. Should the State of Nevada designate Nevada Alternative Routes A or B as a preferred highway, White Pine County would be eligible for technical assistance and funds provided by Section 180(c).

In addition, there is a Federal Radiological Program outlined in the Federal Radiological Emergency Response Plan and the Federal Radiological Monitoring and Assessment Plan. These plans outline the policies, procedures, roles, and responsibilities of Federal, tribal, state, and local agencies in planning for and responding to emergencies involving releases or suspected releases of radiological materials from government and commercial facilities or operations.

8.3.1 (1441)
Comment - EIS000353 / 0004
Section 6.3.1, impacts of Nevada mostly legal-weight transportation scenario. The EIS identifies there will be an average of 2,100 legal-weight truck shipments per year along with the accompanying escorts. The EIS only considers changes to the traffic level on I-15 and I-95. However, as I stated previously, it is felt that most likely these shipments will be routed around Clark County and Las Vegas. This means as most of the shipments will be coming from the East, they will be coming through Ely and White Pine. This will present a significant increase in the truck traffic in Ely and the County, and the impact of this increase in traffic needs to be addressed in the EIS.

During the EIS scoping meetings, it was stated regularly that the EIS will cover the extremities, extremes, and impacts of any variation in traffic will be less than that considered in the EIS. If the legal-weight shipments come on U.S. 93 from I-80, the EIS needs to address this. It needs to address it as far as Nevada. It needs to address it as far as Nevada's affected counties are concerned.

Response
As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F (routes A and B pass through White Pine County) as alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada or California designate one of these other routes as an alternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultations with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider public risk and other conditions along the other routes, including emergency response capability, highway design and condition, population density, traffic conditions, etc., during the process of selecting and designating alternative preferred routes.

Section J.3.1.3 of the EIS evaluates the Nevada Department of Transportation routes as sensitivity analyses, including transport through Ely and White Pine Counties. Tables J-47 and J-48 include descriptions of impacts of the other routes evaluated in the EIS. Because these other routes have not been formally designated by the State of Nevada as alternative preferred routes and because the routes follow existing highways and would require no additional land acquisition, the EIS focuses on quantifying the impacts to human health and safety and the potential for accidents along these other routes.

8.3.1 (1456)
Comment - EIS000142 / 0007
The contradictory nature of the omission of any substantive discussion of impacts in White Pine County is also apparent when one considers DOE's selection of transportation routes and related impacted corridor communities within the DEIS. The third paragraph on Page 6-35 of the DEIS includes the following statement: "Because the State of Nevada has not designated alternative preferred routes, only one combination of routes for legal-weight truck shipments would satisfy U.S. Department of Transportation routing regulations, (I-15 to U.S. Highway 95 to Yucca Mountain)." DOE elected not to consider the impacts or a region of influence along the State of Nevada identified candidate alternate routes. However, the first full paragraph of Page 2-44 contains the following statement: "The EIS analysis assumed that the proposed Interstate bypass around the urban core of Las Vegas, (the Las Vegas Beltway) would be operational before 2010." DOE could have just as easily assumed that the State of Nevada would designate one or both alternative routes it identified to keep waste shipments out of the Las Vegas urban core. The failure of DOE to include an assessment of the impacts of the State of Nevada identified alternative legal-weight routes as a serious deficiency of the DEIS.

The likelihood that the State of Nevada will designate alternative routes for legal-weight trucks that avoid the Las Vegas Valley is borne-out in the State's acquiescence to the use of routes through White Pine County to transport low-level radioactive waste (LLRW) across Nevada to the Nevada Test Site. As DOE is aware, the use of northern highway routes for LLRW has effectively shifted any transportation risks from the Las Vegas area to rural northern Nevada counties.

Failure of the DEIS to consider the impacts of legal-weight truck transportation through White Pine County is made worse by Tables J-47 and J-48 which demonstrates that risks of transporting spent fuel and high-level radioactive wastes through the County are significantly greater than the risks for the Base Case (routes allowed by current U.S. Department of Transportation regulations for Highway Route Controlled Quantities of Radioactive Materials). The fact that LLRW is also being transported on a route through White Pine County raises the specter of significant cumulative impacts.

The Final EIS must evaluate the direct, indirect, and cumulative impacts of transporting all forms of radioactive wastes through White Pine County.

The National Environmental Policy Act (NEPA) requires federal agencies to consider "connected actions". Construction and operation of a repository at Yucca Mountain will result in spent nuclear fuel and high-level radioactive waste being transported through Nevada (and in all likelihood by legal-weight truck in the short-term). The prospect of transportation of spent nuclear fuel and high-level radioactive waste through the Las Vegas Valley will trigger a decision by the Governor of Nevada to designate alternative routes. Therefore, the Final EIS must consider the impacts of State of Nevada identified alternative routes as a connected action pursuant to NEPA.

Response
As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote

public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F (routes A and B pass through White Pine County) as alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada designate one of these other routes as an alternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider public risk and other conditions along the other routes, including emergency response capability, highway design and condition, population density, traffic conditions, etc., during the process of selecting and designating alternative preferred routes.

Use of the northern Las Vegas Beltway, currently under construction, would be consistent with the definition of a preferred route given above, whereas the Nevada Department of Transportation alternative routes, which use non-Interstate System highways for a large fraction of the travel distance in Nevada, would not automatically meet the definition of a preferred route.

In any event, alternative routing options within Nevada were analyzed in the EIS in Section J.3.1.3. The data needed to characterize the Nevada Department of Transportation routes to support the impact calculations are equivalent to the data collected for the base case routes (that is, routes currently allowed by DOE regulations). The environmental impacts of the base case and six Nevada Department of Transportation routes are presented in Table J-48. Thus, DOE did not exclude the Nevada Department of Transportation routes from consideration in the EIS. Therefore, all direct environmental factors are addressed for Nevada transportation in the EIS (see Section 6.3.2).

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. In addition, DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty
- Much of the uncertainty is irreducible, and
- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

Section 8.1.1 of the EIS discusses the cumulative past and present actions occurring in Nevada that would be additive to actions related to the proposed repository and its associated transportation of spent nuclear fuel and high-level radioactive waste. These actions include activities of the Nevada Test Site, Nellis Air Force Base, management of low-level radioactive waste, Native American activities, other DOE waste management, and regional mining activities and enterprises, among others. Impacts of all of these activities on the environment are assessed and accumulated in accordance with National Environmental Policy Act regulations.

8.3.1 (1543)
Comment - EIS000357 / 0002
Increased motor vehicle traffic. It is very difficult to evaluate impact on communities in the major zone of influence. I was unable to find any quantification of how many actual legal-weight truck haul loads could be expected through Ely on U.S. 93 or State Route 318 scenario. The table on J-7 might indicate around 1,500 shipments from the Idaho National Engineering and Environmental Laboratory, 800 shipments from Hanford that might use a route through Ely as an alternate to interstate routes spread over a 20-year period. And these are shown on Table J-4.

It would be useful if there was analysis of some key points like Ely, apparently a relatively low-impact area with about 350 shipments of high-level radioactive waste a year, Table J-4, as opposed to, perhaps, high-impact Mesquite with, perhaps, an average of 1,700 shipments a year of commercial spent nuclear fuel. Figure J-10.

Response
Section 6.3.1.3 of the EIS presents the human health and safety impacts of transporting spent nuclear fuel and high-level radioactive waste on current preferred highways and six other routes based on a 1989 Nevada Department of Transportation study. These other routes include two that involve transport through Ely and White Pine County (see Table J-46, Cases 5 and 6). However, because these other routes have not been formally designated by the State of Nevada as alternative preferred routes and because the routes follow existing highways and would require no additional land acquisition, the EIS focuses on quantifying the impacts to human health and safety and the potential for accidents along these other routes.

Should the State of Nevada designate the highway route through Ely on U.S. 93 or State Route 318 as an alternate preferred routes and not be preempted, Ely and White Pine County could expect to see a majority of the legal-weight truck shipments of spent nuclear fuel from nuclear powerplant sites in the eastern, midwestern, and northwestern United States. This constitutes a vast majority of the spent nuclear fuel shipments. Figure J-10 shows that approximately 45,919 shipments per year would enter Nevada at Mesquite over 24 years or about 1,900 shipments per year. Approximately this number of shipments could be diverted from entering Nevada at Mesquite to entering Nevada at Wendover and traveling through Ely on U.S. 93 or State Route 318, assuming no shipments would enter Nevada on Interstate-15 at Mesquite.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began through a jurisdiction. At this time many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway routes or rail lines could be used. In the interim, states and tribes may designate alternate preferred highway routes, and highways and rail lines could be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

8.3.1 (2399)
Comment - EIS000674 / 0003
The bottom line is NDOT [Nevada Department of Transportation] has already said when shipments start big time, they're not going to allow shipments on I-15 between the Utah border and the west side of Las Vegas. They just haven't had to take that decision yet.

Similarly all these routes are going to have problems with the NRC [Nuclear Regulatory Commission]. In my statement, and I won't read this, the NRC has identified five criteria that they advise their staff to avoid.

When people want to ship spent fuel, they got to go to the NRC first and get a route approval for routes that will make it difficult for terrorists and saboteurs to take down a shipment. None of the routes in the EIS comply with those criteria.

Specifically we need to say a few things about the Caliente/Chalk Mountain route. Forgive me if I say Chalk River because Chalk River's a famous nuclear facility in Canada and those of us who work in that field, it's just hard sometimes. I've made the mistake about three times in the last week.

First of all, the most difficult part of this route that we're talking about is between here [Lincoln County] and Rachel. You go out here to mile post 93, drive through Oak Springs Summit to mile post 77 and you'll see sixteen miles where a whole lot of road improvement--probably double-landing, guard rails, everything. The same thing at Hancock Summit for fifteen miles, and there's another ten miles in there and some of it goes through fragile environment like around Crystal Springs.

So, (A) it's going to be difficult and expensive to upgrade; (B) there will be environmental impacts.

Response

As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F as alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada or California designate one of these other routes as an alternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultations with affected states, tribes, and local jurisdictions would be necessary.

Section J.3.1.3 of the EIS evaluates the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. Table J-46 includes descriptions of the other routes evaluated in the EIS. The data needed to characterize these routes to support the impact calculations are equivalent to the data collected for the base case routes. Tables J-47 and J-48 present the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario.

The Nuclear Regulatory Commission would review routes proposed by DOE after the selection process identified in Section M.3.2.1.2 of the EIS and would involve Regional Servicing Contractors and Federal, state, tribal, and local responsible authorities.

DOE recognizes that use of the highways in Nevada could require upgrades, particularly if heavy-haul trucks were used (see Section J.3.1.2 of the EIS). However, as stated in Section 6.2, the Department believes that the use of existing roads for legal-weight truck transportation would not cause additional environmental impacts because there would be no changes in the rights-of-way for those roads.

8.3.1 (4191)
Comment - EIS001160 / 0009
Failure of the DEIS to consider the impacts of legal-weight truck transportation through White Pine County is made worse by Table J-48 which demonstrates that risks of transporting spent fuel and high-level radioactive wastes through the County are significantly greater than the risks for the Base Case (routes allowed by current Department of Transportation regulations for Highway Route Controlled Quantities of Radioactive Materials). The fact that LLRW is also being transported on a route through White Pine County raises the specter of significant cumulative impacts.

Response
As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F (A and B pass through White Pine County) as alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada or California designate one of these other routes as an alternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider public risk and other conditions along the other routes, including emergency response capability, highway design and condition, population density, traffic conditions, etc., during the process of selecting and designating alternative preferred routes.

For completeness, Section J.3.1.3 of the EIS evaluates all six of the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. The data needed to characterize the Nevada Department of Transportation routes to support the impact calculations is equivalent to the data collected for the base case routes. Tables J-47 and J-48 present the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario. The various impacts are generally small for all cases, but for routes A and B the impacts are about a factor of two larger than the route used for the EIS analysis.

The low-level waste shipments through White Pine referred to by the commenter did not begin until the summer of 1999, after the Draft EIS was published. Prior to that time, the low-level waste shipments traveled over Hoover Dam and through the Las Vegas Valley on the way to the Nevada Test Site low-level waste disposal areas. Routing low-level waste shipments around Las Vegas and Hoover Dam was a voluntary action by the carrier, although DOE and stakeholders influenced it. This action does not necessarily set precedence for spent nuclear fuel and high-level radioactive waste shipments to Yucca Mountain, which must follow much more stringent routing requirements than low-level waste shipments.

Section 8.4 of the EIS provides the results of cumulative impact analyses conducted to ensure that the environmental impacts of the Proposed Action and other potential actions that involve the same regions or resources are provided to decisionmakers. The information is used to minimize or avoid adverse consequences and to develop an appropriate mitigation strategy and enable DOE to monitor its effectiveness. The health and safety impacts of low-level waste shipments to Nevada Test Site disposal areas are included in Table 8-58 of the EIS, which lists cumulative impacts (see "Nevada Test Site expanded use" in the table). The table does not identify impacts to specific populations (that is, for specific routes) for any of the categories listed in the table. However, the collective incident-free radiation doses to the public and workers from transporting low-level waste to Test Site disposal areas (150 person-rem in Table 8-58 for entire trips, including inside and outside Nevada) are small in relation to the cumulative radiation doses in Nevada for transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain (approximately 2,000 to 4,000 person-rem in Table J-48). Therefore, the cumulative incident-free radiation dose impacts in Nevada of transporting low-level waste, spent nuclear fuel, and high-level radioactive waste are not significantly different than the impacts of shipping spent nuclear fuel and high-level radioactive waste alone. It is unlikely that any additional mitigation or monitoring would be required beyond that for spent nuclear fuel and high-level radioactive waste transportation.

For nonradiological traffic fatalities, the fatality rates for shipments of all three materials are approximately the same because they are all shipped on heavy combination trucks, from which the accident rates were derived. The cumulative impacts of the increased legal-weight truck traffic on the existing highway infrastructure would be evaluated in detail during the route identification and selection process to be implemented in the next several years.

8.3.1 (4200)
Comment - EIS001160 / 0017
The DEIS should estimate the number of expected transportation incidents/ accidents which might be expected to occur within White Pine County over the 24 year shipping campaign. This information could be easily derived from U.S. Department of Transportation incident/accident reports prepared for other shipments of spent nuclear fuel and high-level radioactive wastes. There have been incidents and accidents in the past. There will be such occurrences in the future. White Pine County is concerned that any single transportation incident or accident, even assuming no release of radioisotopes to the accessible environment, could be widely covered by the media, with perceived risks amplified and area stigma a result.

Response
To provide some perspective, the route length [170 kilometers (105 miles)] and the number of shipments, accident rates, and fatality rates in Nevada were used to estimate the nonradiological accident impacts in White Pine County. The accident and fatality rates used were 3.8×10^{-7} accidents per kilometer and 1.67×10^{-8} fatalities per kilometer, respectively (DIRS 103455-Saricks and Tompkins 1999). DOE assumed that 45,919 legal-weight truck shipments would travel along this route (from the EIS, Figure J-10). DOE also assumed that loaded and empty return truck shipments would use this highway. Using these data, a total of between 5 and 6 accidents would occur along this 170-kilometer stretch of highway over 24 years, or about one every 4 years. The probability of a traffic fatality occurring was calculated to be about one in four of the accidents over the 24-year period.

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. In addition, DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty
- Much of the uncertainty is irreducible, and
- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents,

which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

8.3.1 (4211)
Comment - EIS001160 / 0025
The DEIS does not adequately address issues raised and substantiated by White Pine County during the scoping process. For example:

Alternatives to be considered should include construction and use of a hazardous cargo route around the City of Ely. The DEIS does not consider the benefit, feasibility or cost of this alternative.

The risks associated with use of U.S. Highways 93 and 6 and State Highway 318 through the County should be compared against the risks of using other routes (i.e. I-15 to U.S. 95). Although Table J-48 provides a summary of risks for each route, there is no analysis of the data in this table. In fact, Table J-48 reveals that the risks of transporting waste through White Pine County are significantly greater than through the Las Vegas Valley. The detailed analysis of routes through the Las Vegas Valley then do not bound the range of expected impacts the text in Chapter 6 implies. Table J-48 makes clear that specific impacts of transportation through White Pine County should have been included within the DEIS.

Response
The commenter mentions a potential highway upgrade as an alternative that could improve the safety of transporting spent nuclear fuel and high-level radioactive waste through White Pine County; that is, a hazardous cargo bypass around the City of Ely. The transportation analyses (with the exception of that for the branch rail line) considered shipments on existing highway infrastructure that would not require upgrading. Where upgrading was required for safe transport or maintenance to keep roads and railroads safe, the necessary funding would be made available to responsible jurisdictions.

As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F (A and B pass through White Pine County) as potential alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada designate one of these other routes as an alternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider public risk and other conditions along the other routes, including emergency response capability, highway design and condition, population density, traffic conditions, etc., during the process of selecting and designating alternative preferred routes.

For completeness, Section J.3.1.3 of the EIS evaluates all six of the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. The data needed to characterize the Nevada Department of Transportation routes to support the impact calculations is equivalent to the data collected for the base case routes. Tables J-47 and J-48 present the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario. The various impacts are generally small for all cases, but for routes A and B the impacts are about a factor of two larger than the route used for the EIS analysis.

8.3.1 (4219)
Comment - EIS001160 / 0036
The DEIS does not adequately address issues raised and substantiated by White Pine County during the scoping process. For example:

It is imperative that the repository EIS includes an exhaustive evaluation of the environmental consequences of waste transport through White Pine County. Because of the unique attributes of the County and its communities, the analysis must be specific to these geographic areas. A generic assessment of transportation risks will not facilitate identification of specific impacts and will preclude consideration of mitigation options necessary to alleviate such effects. The DEIS includes only a cursory assessment of transportation impacts in White Pine County. Socioeconomic, environmental, land use, etc. is not assessed. Measures to mitigate impacts of transportation through White Pine County are not included within the document.

The repository EIS must consider these significant differences in risk (estimated by UNLV-TRC[(6)] as being significantly greater in White Pine County) and address appropriate methods for managing risks in the County to a level commensurate with other areas of the Nation. Table J-48 of the DEIS confirms that risks of transporting waste through White Pine County are significantly greater than other routes involving Interstate highways. The DEIS does not address methods for managing transportation risks in White Pine County.

[(6)] Highway Routes, Parentela, Emelinda, et. al., Risk Analysis for Spent Nuclear Fuel Transportation Through White Pine County: University of Nevada-Las Vegas, Transportation Research Center, prepared for White Pine County Nuclear Waste Project Office, UNLV/TRC/RR-95/9, November 1995.

Response
As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F (A and B pass through White Pine County) as potential alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada designate one of these other routes as an alternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider public risk and other conditions along the other routes, including emergency response capability, highway design and condition, population density, traffic conditions, etc., during the process of selecting and designating alternative preferred routes.

For completeness, Section J.3.1.3 of the EIS evaluates all six of the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. The data needed to characterize the Nevada Department of Transportation routes to support the impact calculations is equivalent to the data collected for the base case routes. Tables J-47 and J-48 present the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario. The various impacts are generally small for all cases, but for routes A and B the impacts are about a factor of two larger than the route used for the EIS analysis.

The comment expressed concern about proposed measures to offset or mitigate the risks associated with transporting radioactive waste to Yucca Mountain. As stated in Section 3.2.2 of the EIS, legal-weight truck shipments would use existing highways that would require no new land acquisition and no new construction. Thus, the EIS focused on potential impacts to human health and safety along existing highways.

8.3.1 (4232)
Comment - EIS001160 / 0047
A variety of discrepancies within the DEIS text and tables and inconsistencies in data presented in the document exist. Several of the risk computations use assumptions that do not appear to be consistent with known references, and reasonable expectations. Examples of these problems with the DEIS are included within the specific comments which follow. Several of the "worst case scenarios" do not appear to be "worst case" for White Pine County. Using known intersections, traffic conditions, established weather patterns and road usage, County reviewers were able to develop several worst case scenarios that meet or easily exceed the ones listed in the DEIS. Examples of possible "worst case" scenarios which should be considered within the FEIS as a means to bound impact assessment and to identify reasonable mitigation measures include:

Accident Scenarios

1. Legal weight truck loaded with spent fuel collides with double-trailer on U.S. 6 immediately south of the City of Ely water supply at Murry Springs. Both vehicles engulfed in flames. Fire of sufficient heat and duration to destroy cask seals resulting in breach of containment. Direct impacts include environmental contamination, closure of U.S. 6 and enhanced public perception of risk and related area stigmatization.

2. Legal weight or heavy-haul truck loaded with spent fuel collides with double-trailer gasoline tanker at intersection of U.S. 93 and State Route 375 near Crystal Springs in Lincoln County. Both vehicles engulfed in flames. Fire of sufficient heat and duration to destroy cask seals resulting in breach of containment. Indirect impacts in White Pine County include reduction of vehicular traffic along U.S. 6 and U.S. 93 through the County and related reductions in visitation to Great Basin National Park and other destination locations within the County.

3. Legal weight truck loaded with spent fuel collides with double-trailer tanker on U.S. 93 thirty miles north of Ely. Both vehicles engulfed in flames. Fire of sufficient heat and duration to destroy cask seals resulting in breach of containment. Direct impacts include environmental contamination, closure of U.S. 93 and enhanced public perception of risk and related area stigmatization. Economic and fiscal consequences of road closure.

DOE is also encouraged to give serious consideration to the scenario presented by Ms. Elizabeth Risden, a White Pine County resident, at the October 19, 1999 DEIS hearing in Ely.

Response
As discussed in Section 6.2.4.2 of the EIS, the National Environmental Policy Act requires assessment of reasonably foreseeable impacts from proposed agency actions. In its various EISs, DOE has defined a reasonably foreseeable accident as one that has a frequency of occurrence of at least once in 10 million years (1×10^{-7} per year). The concept of a maximum reasonable foreseeable accident is sometimes misinterpreted as being a "worst-case" accident.

"Real-life conditions" such as those raised by the commenters would involve various types of collisions (such as airplanes and military trucks with explosives), various natural disasters, specific locations (such as mountain passes), or various infrastructure accidents (such as track failure) in effect constitute a combination of cask failure mechanisms, impact velocities, and temperature ranges, which the EIS does evaluate. DOE has revised the EIS to describe the maximum reasonably foreseeable accident in terms of cask failure mechanisms, range of impact velocities, and temperature range.

In the Draft EIS, DOE considered six categories of increasingly severe and unlikely accident scenarios. The analyses hypothesized one accident scenario to represent each category, along with a corresponding projection of the amount of radioactive material a transportation cask could release. The analyses estimated impacts of postulated releases in three population zones – urban, suburban, and rural – and under two weather conditions – slowly dispersing conditions and moving air conditions. The analyses also estimated impacts from an unlikely but severe accident scenario called a maximum reasonably foreseeable accident.

DOE has revised the transportation accident analyses in the EIS to reflect new information. For example, since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). DOE has concluded that the models used for analysis in the Draft EIS relied on assumptions about spent nuclear fuel and cask response to accident conditions that caused an overestimation of the resulting impacts.

Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low.

In evaluating the potential impacts of transportation accidents in the EIS, DOE conservatively assumed that no emergency response would occur and evaluated the full impacts of the accident on the surrounding population. The analysis of impacts of transportation accidents in the EIS (Section J.1.4.2.1) does not take credit for emergency response efforts to reduce exposures to individuals. Therefore, the impacts consider the range of what might happen regardless of the emergency response capabilities of jurisdictions along transportation routes. If responders followed standard emergency response procedures, such as avoiding the downwind smoke of a major fire, exposures would be low. However, because DOE could not predict what type of emergency response would be available, it could not factor any mitigation of impacts as a result of such measures into the EIS analysis.

8.3.1 (4240)
Comment - EIS001160 / 0055
Although White Pine County is a remote rural area, the topography, climate, population concentration, existing transportation systems and economic condition are unique and must be considered in any decision on transportation routing for hazardous materials. The absence of any data in the DEIS concerning this is particularly disconcerting for the County's emergency first responders. Besides transportation issues, it is a fact that White Pine County is downwind of Yucca Mountain and its residents have had health problems from testing conducted at the NTS [Nevada Test Site]. County residents would probably prefer the no action alternative where wastes are stored at their current locations. The DEIS should consider baseline health and public perceptions of risk.

Response
As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and Highway 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F (routes A and B are through White Pine County) as potential alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to

Yucca Mountain. Should the State of Nevada designate one of these other routes as an alternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider public risk and other conditions along the other routes, including emergency response capability, highway design and condition, population density, traffic conditions, etc., during the process of selecting and designating alternative preferred routes.

For completeness, Section J.3.1.3 of the EIS evaluates all six of the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. The data needed to characterize the Nevada Department of Transportation routes to support the impact calculations is equivalent to the data collected for the base case routes. Tables J-43 and J-44 presents the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario. The various impacts are generally small for all cases, but for routes A and B the impacts are about a factor of two larger than the route used for the EIS analysis.

Sections M.5 and M.6 of the EIS contain additional information on emergency response and the implementation of Section 180(c) of the NWPA. Section 180(c) requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using an up-front planning grant and based on availability of funds in annual Program budgets specified by Congress. The schedule in the proposed policy and procedures (63 *FR* 23753, April 30, 1998) for implementation of Section 180(c) of the NWPA is designed to provide adequate time for training of first responders in advance of the first shipments. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. Should the State of Nevada designate Nevada Alternative Route A or B as a preferred highway, White Pine County would be eligible for technical assistance and funds provided by Section 180(c).

As stated in Section 3.2.2 of the EIS, legal-weight truck shipments would use existing highways that would require no new land acquisition and no new construction. Thus, the EIS focused on potential impacts to human health and safety along existing highways.

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Section 2.5.4 and Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. In addition, DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty

- Much of the uncertainty is irreducible, and

- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents,

which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

8.3.1 (4298)
Comment - EIS001160 / 0107
Page 6-31, Section 6.2.4.2.1, Paragraph 2 states "The accident risk for legal-weight truck shipments dominates the total risk. . . " If this is the case and shipments through White Pine County are even a remote possibility, then detailed analysis of such shipments through White Pine County should be addressed in the DEIS.

Response
As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F (routes A and B are through White Pine County) as potential alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada designate one of these other routes as an alternative preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultations with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider public risk and other conditions along the other routes, including emergency response capability, highway design and condition, population density, traffic conditions, etc., during the process of selecting and designating alternative preferred routes.

For completeness, Section J.3.1.3 of the EIS evaluates all six of the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. The data needed to characterize the Nevada Department of Transportation routes to support the impact calculations is equivalent to the data collected for the base case routes. Tables J-47 and J-48 presents the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario. The various impacts are generally small for all cases, but for routes A and B the impacts are about a factor of two larger than the route used for the EIS analysis.

DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties, offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

8.3.1 (5193)
Comment - EIS001443 / 0018
Communities along State Route 127 constitute the most isolated populations in Inyo County. Assistance with roadway incidents must come from the Inyo County Sheriff Unit at Shoshone, Park Service Rangers dispatched out of Cow Creek near Furnace Creek, or California Highway Patrol also coming out of Death Valley or out of Pahrump, Nevada. Most of the route lies one to three hours from any public assistance. To deal with major

roadway incidents, County Sheriff units are sent from Lone Pine, which is three hours away from the closest segment of SR127.

Currently, the State Route 127 towns of Tecopa, Shoshone, and Death Valley Junction are served by a single Volunteer Fire Protection District that is without adequate funding. In case of a serious toxic or radiological release in Inyo County, specialist response teams must be brought in from either San Bernardino or Bakersfield, a process which takes a minimum of three to four hours, assuming that the response team is not occupied elsewhere. The closest medical facility of any note is in Pahrump, which is a minimum of thirty minutes from the closest segments of the road and several hours away from the furthest. The closest fully equipped hospital is in Las Vegas, which is at least two hours away from the closest sections of SR127.

Response
As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F (routes C and E include the use of California State Route 127) as potential alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada or California designate one of these other routes as an alternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider public risk and other conditions along the other routes, including emergency response capability, highway design and condition, population density, traffic conditions, etc., during the process of selecting and designating alternate preferred routes.

Section J.3.1.3 of the EIS evaluates the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. Table J-46 includes descriptions of the other routes evaluated in the EIS, including Case 2, which uses State Route 127. The data needed to characterize these routes to support the impact calculations, including State Route 127, are equivalent to the data collected for the base case routes. Tables J-47 and J-48 presents the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario.

At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. The Regional Servicing Contractor would be required to provide detailed written procedures for how it would respond to an incident and arrange for repair/replacement of equipment or recovery, as appropriate. In accordance with ANSI N14-27 (DIRS 156289-ANSI 1987), the carrier is expected to provide appropriate resources for dealing with the consequences of an accident, isolating and cleaning up contamination, and maintaining working contact with the responsible governmental authority until the latter has declared the incident to be satisfactorily resolved and closed. Section M.3 of the EIS contains more detail on the proposed role of the Regional Servicing Contractor.

Sections M.5 and M.6 of the EIS contain additional information on emergency response and the implementation of Section 180(c) of the NWPA. Section 180(c) requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using an up-front planning grant and based on availability of funds in annual Program budgets specified by Congress. The schedule in the proposed policy and procedures (63 *FR* 23753, April 30, 1998) for implementation of Section 180(c) of the NWPA is designed to provide adequate time for training of first responders in advance of the first shipments. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. Under Section 180(c), DOE will fund eligible jurisdiction planning activities to determine current capabilities and needs and fund training for emergency response activities. Should spent nuclear fuel and high-level radioactive waste be transported on SR 127, Inyo County and the communities along the route would be eligible for technical assistance and funds provided by Section 180(c).

In addition, there is a Federal Radiological Program outlined in the Federal Radiological Emergency Response Plan and the Federal Radiological Monitoring and Assessment Plan. These plans outline the policies, procedures, roles, and responsibilities of Federal, tribal, state, and local agencies in planning for and responding to emergencies involving releases or suspected releases of radiological materials from government and commercial facilities or operations. Under Section 180(c), DOE will fund eligible jurisdiction planning activities to determine current capabilities and needs and fund training for emergency response activities.

8.3.1 (5194)
Comment - EIS001443 / 0019
State Route 127 serves much of the tourist traffic flowing into Death Valley National Park from Las Vegas and Southern California, with recent estimates showing park usage on the order of 1.4 million visitors/year. Considerable increases in traffic volume are expected to accompany the growth of California and of both Pahrump and Las Vegas, Nevada (the Nation’s fastest-growing medium-size and large cities, respectively). Also, there are approximately 1000 acres of land in the vicinity of the town of Death Valley Junction (intersection of SR127 and SR190) that may be released to the Timbisha-Shoshone tribe for their use. If developed to mixed residential and commercial uses, this territory could host an unknown number of additional residents and contribute significantly to traffic on Route 127. Per information received from Caltrans, the route is not scheduled for major improvements through 2015.

Response
As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation’s identification of Routes A through F (routes C and E include the use of California 127) as potential alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada or California designate one of these other routes as an alternate preferred routes, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation’s *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider public risk and other conditions along the other routes, including emergency response capability, highway design and condition, population density, traffic conditions, etc., during the process of selecting and designating alternate preferred routes.

Section J.3.1.3 of the EIS evaluates the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. Table J-43 includes descriptions of the other routes evaluated in the EIS, including Case 2, which uses State Route 127. The data needed to characterize these routes to support the impact calculations, including State Route 127, are equivalent to the data collected for the base case routes. Tables J-43 and J-44 presents the results of the sensitivity evaluations, including the impacts nationally and in Nevada, based on the mostly legal-weight truck scenario.

The commenter mentions that State funding for upgrades to California State Route 127 are not anticipated until 2015. The transportation analyses (with the exception of that for the branch rail line) consider shipments on existing highway infrastructure that would not require upgrading. Where upgrading was required for safe transport or maintenance to keep roads and railroads safe, the necessary funding would be made available to responsible jurisdictions.

8.3.1 (5393)
Comment - EIS001887 / 0101
Page 2-47; Section 2.1.3.3.1 - Nevada Legal-Weight Truck Scenario

The Draft EIS completely ignores the costs and impacts associated with the type of vehicle inspection and escort operations that would be required upon entry into Nevada. Prior to transporting waste through Nevada, safety compliance of vehicles, loads, and drivers must be assured by appropriate State agencies. Legal-weight trucks would need to be inspected at port of entry facilities where vehicle and driver compliance verification with state and federal laws and regulations would be performed, shipping papers reviewed, and escorts assigned to accompany trucks. To capture commercial vehicles entering the state on I-15, ports of entry need to be constructed at or near Mesquite and Jean/Sloan.[20]

Costs to build ports of entry include land acquisition, construction, equipment and training, personnel, utilities, and other on-going or related expenses. Details of these costs are contained in the Nevada Highway Patrol study Base Case Scenario-High Level Transportation (see Attachment R). Other activities could also be conducted at the port of entry. These activities could include vehicle inspection, issuing NDOT [Nevada Department of Transportation] oversize load permits, and other related permit activities.

The ports of entry should have one inspection bay and pit that is segregated and protected from the other bays to provide maximum protection to employees and others using the facility during an inspection of vehicles transporting radioactive shipments.

The Nevada Highway Patrol estimates initial (start-up) costs for required ports of entry for inspection of legal-weight truck shipments at over $43 million, with subsequent annual costs for operating the ports of entry at over $6 million (see Attachment R).

[20] Should NDOT designate alternative routes, port of entry locations would need to be reviewed.

Response
Section 6.2.3 of the EIS provides the impacts of national transportation of spent nuclear fuel and high-level radioactive waste including impacts to workers, including inspectors. The EIS does not address costs of operations normally the responsibilities of shippers, carriers, or states. States would normally require fees of shippers or carriers to cover state-required operations specifically for spent nuclear fuel and high-level radioactive waste.

Sections M.5 and M.6 of the EIS contain additional information on emergency response and the implementation of Section 180(c) of the NWPA. Section 180(c) requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using an up-front planning grant and based on availability of funds in annual Program budgets specified by Congress. The schedule in the proposed policy and procedures (63 *FR* 23753, April 30, 1998) for implementation of Section 180(c) of the NWPA is designed to provide adequate time for training of first responders in advance of the first shipments. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction.

In response to comments on the Draft EIS, DOE added Appendix M to the EIS to provide additional information on transportation regulations and the operational aspects of spent nuclear fuel and high-level radioactive waste transportation (see Sections M.2 and M.3). This information includes more details on Inspections (Section M.3.2.2.2), shipping papers (Section M.2.3), and driver training (Section M.2.6).

8.3.1 (5719)
Comment - EIS001887 / 0332
Page 6-39 to 6-40; Section 6.3.1.2.1 - Impacts from Incident-Free Transportation

The Draft EIS fails to consider unique local conditions along potential highway routes in Nevada which could result in significantly higher collective doses and significantly higher doses to maximally exposed individuals. The Draft EIS analyses using the RADTRAN and RISKIND models do not reflect unique local conditions.

Individuals in Nevada who reside, work, or are institutionally confined at certain locations within 6 to 40 meters (20 to 130 feet) of a nuclear waste highway route, or within 6 to 50 meters (20 to 160 feet) of a nuclear waste rail route, could potentially receive yearly radiation doses equal to a significant percentage of, or even in excess of, average annual background doses (360 millirem/year). Such exposures could occur under circumstances where: (1) residences, workplaces, or certain institutions (especially schools, prisons, or long-term health care or retirement facilities) are located near route features or segments which would require nuclear waste trucks or trains to stop and start again, or travel at very slow speed; (2) the number of shipments is high enough (one to several casks per day) that opportunities for exposures occur frequently at the same locations, and (3) the individuals residing, working, or confined at near-route locations are regularly present to be exposed to a significant portion (if not all) of the shipments which occur annually.

All three circumstances exist along some of the truck routes identified in the Draft EIS. Route segments of special concern include US 95 from Las Vegas to Lathrop Wells; the so called NDOT [Nevada Department of Transportation] B Route, US 93A, US 93, US 6, and US 95 from West Wendover to Lathrop Wells (especially where vehicle stops and/ or left turns are required in West Wendover, McGill, Ely, Tonopah, Goldfield, and Beatty); and SR160 from I-15 to US95 (especially where vehicle stops are required in Arden and Pahrump).

For example, there are locations along the NDOT B Route in West Wendover, Ely, Tonopah, Beatty and Goldfield where exposure times at a distance of 6 – 10 meters could average 2 minutes per LWT [legal-weight truck] shipment. Under the proposed action, mostly truck scenario, the maximally exposed individual at these locations in Nevada could potentially receive annual doses ranging from 150 mrem to 260 mrem, equivalent to 42% to 62% of the average annual background radiation dose.

The Draft EIS fails to fully evaluate the impacts of routine exposures to individuals stuck in traffic jams (also referred to as gridlock incidents). The Draft EIS assumption that this would be a one time occurrence for the affected individual is an undocumented speculation. Given the regularity of commuting patterns, the opposite assumption may be more likely. Gridlock is likely to occur on a regular basis on I-15, I-215, and US95 in Las Vegas. Gridlock involving a large number of vehicles could also occur frequently in a rural area, for example, as a result of highway construction.

The Draft EIS fails to address the types of questions frequently asked by members of the public. How many people could be exposed to 40 mrem in a worst case gridlock incident (e.g., cask jammed up against school bus, city bus, tour bus, etc.)? Would the same 40 mrem exposure over 4 hours pose greater health risks to pregnant woman and unborn children, young children, or persons already exposed to higher than average levels of radiation? Should a health effects analysis address possible psychological consequences, or trauma-related illnesses, which might result from a gridlock incident?

Response

As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F as potential alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada or California designate one of these other routes as an alternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider public risk and other conditions along the other routes, including emergency response capability, highway design and condition, population density, traffic conditions, etc., during the process of selecting and designating alternate preferred routes.

For completeness, Section J.3.1.3 of the EIS evaluates all six of the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. The data needed to characterize the Nevada Department of Transportation routes to support the impact calculations is equivalent to the data collected for the base case routes. Tables J-47 and J-48 presents the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario. The various impacts are generally small for all cases, but for routes A and B the impacts are about a factor of two larger than the route used for the EIS analysis.

The U.S. Department of Transportation routing requirements, along with regulatory requirements to limit radiation dose external to a shipping cask, help to ensure that radiation dose to persons who live along routes would be low. The analysis in Chapter 6 of the EIS for the mostly legal-weight truck scenario estimates the dose to persons who would drive alongside the trucks as they travel on the highways, who would be stopped in locales where truck shipments stop, and who live along the routes that would be used. In response to public comments, DOE forecasted growth in populations along routes in order to improve its estimates of potential impacts that could occur in the future when shipments would occur. However, the estimated dose to an individual living along a route would not change with changes in population - only the integrated dose to the whole population would change. The dose for an individual who lived along a route would be an average of about 0.008 millirem per year. This is more than 30,000 times less than average annual background radiation in the United States and less than one-one thousandth of the dose from a chest X-ray.

DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties, offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

Nonetheless, based on public comments, the Final EIS includes representative impacts in communities along transportation routes. This analysis accounts for factors such as the locations of intersections, commercial establishments and residences, and traffic signals. Impacts to individual communities could be different if the actual routes from generator sites to Yucca Mountain were different from those analyzed, but the impacts of incident-free transportation would be so low for individuals who live and work along the routes that these individual impacts would not be discernible even if the corresponding doses could be measured. The total impacts of transportation would be similar for different routes that might be used.

DOE used information contained in a report prepared for the City of North Las Vegas (DIRS 155112- Berger Group 2000). The information in this report provided DOE with an estimate of the cost of advancing completion of the Las Vegas Beltway for use by heavy-haul trucks, an estimate of the populations that might live along the Beltway, and a basis for estimating the dose to a maximally exposed individual in a Nevada community from transportation of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. DOE also used information in *The Statewide Radioactive Materials Transportation Plan*, Phase II, to identify potential alternative highway routes for shipments of spent nuclear fuel and high-level radioactive waste that the State of Nevada has considered in the past (DIRS 103072-Ardila Coulson 1989).

To alleviate potential gridlock situations for the transportation of spent nuclear fuel and high-level radioactive waste, DOE would have contingencies in place to address inclement weather, local or regional disturbances, and construction-related activities. In addition, as with transuranic waste shipments to the Waste Isolation Pilot Project site in New Mexico, DOE would use a satellite communications and tracking system. This system can provide drivers with advance warning of poor weather, congested traffic, construction zones, and other potential hazards.

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. In addition, DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty
- Much of the uncertainty is irreducible, and
- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

8.3.1 (5799)
Comment - EIS001622 / 0012
Routing and Emergency Response Concerns in California

California transportation agencies have expressed concern over the possibility that DOE may decide to route through California a major portion of the Yucca Mountain shipments using roads not designed for heavy truck traffic. This concern was heightened recently when DOE decided to reroute through southern California, including California State Route 127 (SR-127), thousands of low-level radioactive waste shipments from eastern states to the Nevada Test Site in order to avoid nuclear waste shipments through Las Vegas and over Hoover Dam.

California is concerned about the inherent risk and potential detrimental impact to highway and local roads and the surrounding areas as result of this additional heavy truck traffic. Alternative routing, such as the proposed for low-level wastes shipments to the Nevada Test Site, will take shipments off the interstate highway system and place them instead on state routes and local roads that are not designed or maintained to the same standards as the interstate highway system. As an example, although SR-127 is not approved for Highway Route Controlled Quantity (HRCQ) shipments, such as spent fuel shipments, SR-127 is mentioned on page 2-73 of the DEIS as part of a potential high route within California that includes I-40 from Needles to Barstow, I-15 from Barstow to Baker, and SR-127 from Baker to the Nevada State line.

SR-127 is a two-lane, asphalt highway, approximately 85 miles long, located in relatively isolated portions of eastern San Bernardino and Inyo Countries, California. The highway is subjected to intense desert heat, as Death Valley often reaches the highest temperature in the U.S. with long periods of no rainfall. Both conditions make the roadway susceptible to disrepair. Additional heavy traffic, such as from the transport of thousands of low-level radioactive waste shipments to Nevada as well as the transport of a major portion of 70,000 tons of Yucca Mountain spent fuel shipments, would hasten the deterioration process. Excessive numbers of shipments by heavy trucks on SR-127 would require complete reconstruction of some sections of the roadway.

Further, SR-127 is not an engineered route. Most of SR 127 originated as a wagon trail that was paved over a period of time to accommodate tourists to Death Valley resulting in large sections of roadway that are not built on proper base materials. During certain times of the year, this route is the primary access road for thousands of tourists to the Death Valley National Park. It has tight horizontal and vertical curves where visibility is limited, sustained grades, and dozens of washes crossing both under and over the pavement. The road does not include turnouts or wide shoulders and is subject to periodic flash flooding.

Response
As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state routing or tribal agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F (routes C and E include the use of California 127) as potential alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada or California designate one of these other routes as an alternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider the conditions of State Route 127 that were identified by the commenter, such as high accident rates in specific areas (for example, unbanked, unsigned high-speed turns; blind rises; limited visibility; and sustained grades in excess of modern standards), during the process of selecting and designating alternate preferred routes.

Section J.3.1.3 of the EIS evaluates the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. Table J-46 includes descriptions of the other routes evaluated in the EIS, including Case 2, which uses State Route 127. The data needed to characterize these routes to support the impact calculations, including State Route 127, are equivalent to the data collected for the base case routes. Tables J-47 and J-48 presents the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario.

The low-level waste shipments through California referred to by the commenter did not begin until the summer of 1999, after the EIS was published. Prior to that time, the low-level waste shipments traveled over Hoover Dam and through the Las Vegas Valley on the way to the Nevada Test Site low-level waste disposal areas. Routing low-level waste shipments around Las Vegas and Hoover Dam was a voluntary action by the carrier, although DOE and stakeholders influenced it. This action does not necessarily set precedence for spent nuclear fuel and high-level radioactive waste shipments to Yucca Mountain, which must follow much more stringent routing requirements than low-level waste shipments.

The commenter mentions that major improvements to State Route 127 could be necessary to upgrade and maintain the highway. As discussed in Sections 2.3.3.2 and J.3.1.2 of the EIS, the transportation analyses (with the exception of the branch rail line) considered shipments on existing highways that would not require upgrading (with the exception of heavy-haul truck routes). Where upgrading is required for safe transport or maintenance to keep roads and railroads safe, funding would be available to responsible jurisdictions.

8.3.1 (6026)
Comment - EIS001273 / 0001
As a Trustee of the Death Valley Unified School District, I am concerned about 2 aspects of the transportation of nuclear wastes (high & low-level) to the proposed Yucca Mtn. Repository:

1.) In Southeastern Inyo County the highway to be used is Calif. #127. It is winding and full of curves, is classed as a Class #3 roadway by Cal. Trans, and federal funding for improvements are not scheduled til 2012. In essence, 127 is a dangerous route for nuclear transport.

2.) As of this spring there will be no emergency response infrastructure in Southeastern Inyo County through which #127 passes. Haz-mat teams are 85 & 100 miles distant. Should a school bus collide with a transport, no rescue of children could be made immediately. In fact the Calif. Highway Patrol would have to close down #127 at both ends in case of a spill.

Response
As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F (routes C and E include the use of California 127) as potential alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada or California designate one of these other routes as an alternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider the conditions of State Route 127 that were identified by the commenter, such as high accident rates in specific areas (for example, unbanked, unsigned high-speed turns; blind rises; limited visibility; and sustained grades in excess of modern standards), during the process of selecting and designating alternate preferred routes.

Section J.3.1.3 of the EIS evaluates the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. Table J-46 includes descriptions of the other routes evaluated in the EIS, including Case 2, which uses State Route 127. The data needed to characterize these routes to support the impact calculations, including State Route 127, are equivalent to the data collected for the base case routes. Tables J-47 and J-48 presents the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario.

The comment mentions potential highway conditions that could be detrimental to the safety of transporting spent nuclear fuel and high-level radioactive waste on State Route 127. The transportation analyses (with the exception of a branch rail line) considered shipments on existing highways that would not require upgrading. If upgrading was required for safe transport or maintenance was required to keep roads and railroads safe, the necessary funding would be made available to responsible jurisdictions.

At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. The Regional Servicing Contractor would be required to provide detailed written procedures for how it would respond to an incident and arrange for repair/replacement of equipment or recovery, as appropriate. In accordance with ANSI N14-27 (DIRS 156289-ANSI 1987), the carrier is expected to provide appropriate resources for dealing with the consequences of an accident, isolating and cleaning up contamination, and maintaining working contact with the responsible governmental authority until the latter has declared the incident to be satisfactorily resolved and closed. Section M.3 of the EIS contains more detail on the proposed role of the Regional Servicing Contractor.

Sections M.5 and M.6 of the EIS contain additional information on emergency response and the implementation of Section 180(c) of the NWPA. Section 180(c) requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using an up-front planning grant and based on availability of funds in annual Program budgets specified by Congress. The schedule in the proposed policy and procedures (63 *FR* 23753, April 30, 1998) for implementation of Section 180(c) of the NWPA is designed to provide adequate time for training of first responders in advance of the first shipments. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction.

8.3.1 (7063)
Comment - EIS001337 / 0021
Because of the potential for U.S. Highway 6 and State Route 318 to be unavailable due to inclement weather, accidents, or construction, Lincoln County and the City of Caliente noted during scoping that the DEIS must consider impacts of transporting radioactive waste along U.S. Highway 93 through Lincoln County. The DEIS does not consider transportation along U.S. Highway 93 in Lincoln County.

Response
The analysis in Section 6.2.1 of the EIS used highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of Highway Route Controlled Quantities of Radioactive Materials, require the shipments of radioactive material to be made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway or a route selected by a state or tribal routing agency. The regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation identification of the Routes A through F as potential alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3). None of these routes, including the preferred highways and other routes identified by the Nevada Department of Transportation, includes transportation on U.S. Highway 93 in Lincoln County or through the City of Caliente. As a consequence, the potential impacts of transporting spent nuclear fuel and high-level radioactive waste through Lincoln County and Caliente are not evaluated in the EIS.

Section M.3.2.1.4 of the EIS discusses the protocols and procedures to be followed under adverse weather or road conditions and describes how safe parking areas are to be determined. The procedures are in two parts. One part relates to pretrip planning that would use available data relating to expected conditions. Shipments would not be dispatched on a route where expected conditions would not comply with the requirements in the procedures. For en route problems, it is expected that those with the shipment are best able to discuss and report expected and encountered conditions. The transportation contractors are to develop detailed procedures for use by the drivers and crews in making determinations regarding adverse weather and road conditions. The procedure states that DOE would coordinate diversion to a safe area if delay was required. On this basis, it can be concluded that, only under extremely unlikely conditions, allowed pursuant to 49 CFR 397.101(c) when, "…emergency conditions make continued use of the preferred route unsafe or impossible," would a shipment travel on U.S. 93 through Lincoln County and Caliente.

8.3.1 (8911)
Comment - EIS001961 / 0001
I am concerned about [an aspect] of the transportation of nuclear wastes (high and low-level) to the proposed Yucca Mountain Repository: 1) In Southeastern Inyo County the highway to be used is California Route 127. It is winding and full of curves, is classed as a class 3 roadway by CalTrans, and federal funding for improvements [is] not scheduled until 2012. In essence, 127 is a dangerous route for nuclear transport.

Response
As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

Route 127 is currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada or California designate one of these other routes as an alternative preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider the conditions of State Route 127 that were identified by the commenter, such as high accident rates in specific areas (for example, unbanked, unsigned high-speed turns; blind rises; limited visibility; and sustained grades in excess of modern standards), during the process of selecting and designating alternate preferred routes.

Section J.3.1.3 of the EIS evaluates the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. Table J-46 includes descriptions of the other routes evaluated in the EIS, including Case 2, which uses State Route 127. The data needed to characterize these routes to support the impact calculations, including State Route 127, are equivalent to the data collected for the base case routes. Tables J-47 and J-48 presents the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario.

Sections M.5 and M.6 of the EIS contain additional information on emergency response and the implementation of Section 180(c) of the NWPA. Section 180(c) requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using an up-front planning grant and based on availability of funds in annual Program budgets specified by Congress. The schedule in the proposed policy and procedures (63 *FR* 23753, April 30, 1998) for implementation of Section 180(c) of the NWPA is designed to provide adequate time for training of first responders in advance of the first shipments. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction.

The commenter mentions that State Route 127 is a winding highway, full of curves, and a dangerous route for nuclear transport. The legal-weight truck shipments postulated in the EIS would require no special highway design considerations, alignment, curvature, or other infrastructure requirements that are not already provided for the safe transportation of any cargo using 18-wheel tractor-trailer combination trucks. The transportation analyses (with the exception of that for the branch rail line) consider shipments on existing highway infrastructure that would not require upgrading. Where upgrading was required to keep roads and railroads safe for this type of transportation, the necessary funding would be made available to responsible jurisdictions.

8.3.1 (9611)
Comment - EIS001888 / 0283
Analysis of State Routes

In 1986, the State of Nevada began a process to analyze and identify potential SNF [spent nuclear fuel] the routes through the state.

Clark County agrees with some of the findings in the State report. However, Clark County's economic growth in the past decade has rendered some of the State of Nevada routes outdated. The recently approved Enterprise Land use plan charts a course for rapid and extensive economic growth in the southwestern part of urban Clark County. Due to this expansion, the State of Nevada routes C through F now pass through urban Clark County and should be regarded as non-preferred routes by Clark County. Among the routes considered by the State of Nevada, only the B route is acceptable to Clark County.

Response
As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribeto designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F as potential alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada designate one of these other routes as analternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider public risk and other conditions along the other routes, including emergency response capability, highway design and condition, population density, traffic conditions, etc., during the process of selecting and designating alternate preferred routes.

For completeness, Section J.3.1.3 of the EIS evaluates all six of the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. The data needed to characterize the Nevada Department of Transportation routes to support the impact calculations is equivalent to the data collected for the base case routes. Tables J-47 and J-48 presents the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario.

8.3.1 (10139)
Comment - EIS001865 / 0014
Section 2.3.3.2, "Potential Highway Routes for Heavy-Haul Trucks and Associated Intermodal Transfer Station Locations Considered but Eliminated from Further Detailed Study": The County concurs that federal highway U.S. 127 should not be considered for heavy-haul trucks. The County also believes that regular truck haul under the "mostly legal-weight truck shipping" should not be considered for this narrow, winding highway that has poor

alignment and steep grades that make the road generally unsuitable for commercial hauling of high-level radioactive material. Considerable recreational travel occurs on this road due to its providing primary access to Death Valley National Park from the south. Slow moving recreational vehicles are well-known locally as a traffic hazard on this route. This section of highway is remote and emergency response units are limited in number and sufficiently distant from some road portions adding to the complexity of spill containment and cleanup should an accident occur. Furthermore, the County suggests that U.S. 95 is a route of major concern due to some of the same characteristics as U.S. 127. The use of U.S. 95 will require additional assessment on the part of the County of San Bernardino and Caltrans (California Department of Transportation).

Response

As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F (routes C and E include the use of California 127) as potential alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

Neither State Route 127 nor U.S. 95 is currently designated as preferred highways and thus could not be used for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. However, should the State of Nevada or California designate one of these highways as an alternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider the conditions of State Route 127 and U.S. 95, including emergency response capability, highway design and condition, population density, traffic conditions, etc., during the process of selecting and designating alternate preferred routes.

Section J.3.1.3 of the EIS evaluates the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. Table J-46 includes descriptions of the other routes evaluated in the EIS, including Case 2, which uses State Route 127. The data needed to characterize these routes to support the impact calculations, including State Route 127, are equivalent to the data collected for the base case routes. Tables J-47 and J-48 presents the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario.

The commenter mentions that State Highway 127 is a narrow, winding highway that has poor alignment and steep grades that make the road generally unsuitable for commercial hauling of high-level radioactive material. The legal-weight truck shipments postulated in the EIS would require no special infrastructure that is not already provided for the safe transportation of any cargo using 18-wheel tractor-trailer combination trucks. The transportation analyses (with the exception of that for the branch rail line) consider shipments on existing highway infrastructure that would not require upgrading. Where upgrading was required for safe transport or maintenance or for heavy-haul truck transportation to keep roads and railroads safe, the necessary funding would be made available to responsible jurisdictions.

DOE does not intend to designate routes based solely on the EIS. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and would be conducted in accordance with U.S. Department of Transportation routing guidelines. The preferred routes would be submitted to the Nuclear Regulatory Commission for approval.

8.3.1 (10906)
Comment - EIS000353 / 0006
Irregardless of what routes are chosen, you'll be coming through that populated section of White Pine and Lincoln counties.

Now, you know, there's a lot of talk about alternate routes. It only takes a quick look at a Nevada map to realize there's not many alternative routes. Our mountains run north and south, and there's a road down in the valley. So when you say, haven't designated an alternative route, they're going to be hard-pressed to come up with too many alternate routes.

Some meetings we attend, NRC [Nuclear Regulatory Commission], or the Department of Transportation, because Yucca Mountain is yet to be a repository, yet there's thousands of shipments of low-level wastes. And they're using the same roads that they're going to utilize on the high-level.

The major source of concern to the people living in White Pine County, and particularly in the Ely vicinity, is the transportation of this material. With the apparent objections of the gaming industry, as expressed by the politicians, and as that gentlemen stated earlier, it is very unlikely any of the identified routes, rail or highway, will go through Clark County.

Response
As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F (A and B pass through White Pine County) as potential alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada or California designate one of these other routes as an alternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider public risk and other conditions along the other routes, including emergency response capability, highway design and condition, population density, traffic conditions, etc., during the process of selecting and designating alternate preferred routes.

For completeness, Section J.3.1.3 of the EIS evaluates all six of the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. The data needed to characterize the Nevada Department of Transportation routes to support the impact calculations is equivalent to the data collected for the base case routes. Tables J-47 and J-48 presents the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario. The various impacts are generally small for all cases, but for routes A and B the impacts are about a factor of two larger than the route used for the EIS analysis.

The low-level waste shipments through White Pine referred to by the commenter did not begin until the summer of 1999, after the Draft EIS was published. Prior to that time, the low-level waste shipments traveled over Hoover Dam and through the Las Vegas Valley on the way to the Nevada Test Site low-level waste disposal areas. Routing low-level waste shipments around Las Vegas and Hoover Dam was a voluntary action by the carrier, although DOE and stakeholders influenced it. This action does not necessarily set precedence for spent nuclear fuel and high-level radioactive waste shipments to Yucca Mountain, which must follow much more stringent routing requirements than low-level waste shipments.

Section 8.4 of the EIS provides the results of cumulative impact analyses conducted to ensure that the environmental impacts of the Proposed Action and other potential actions that involve the same regions or resources are provided to decisionmakers. The information is used to minimize or avoid adverse consequences and to develop an appropriate mitigation strategy and enable DOE to monitor its effectiveness. The health and safety impacts of low-level waste shipments to Nevada Test Site disposal areas are included in Table 8-60 of the EIS where cumulative impacts are tabulated (see "Nevada Test Site expanded use" entry in the table). Note that the table does not identify impacts to specific populations (that is, for specific routes) for any of the categories listed in the table. However, the collective incident-free radiation doses to the public and workers from transporting low-level waste to Test Site disposal areas (150 person-rem in Table 8-58 for entire trips, including inside and outside Nevada) are small in relation to the cumulative radiation doses in Nevada for transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain (approximately 2,000 to 4,000 person-rem in Table J-48). Therefore, the cumulative incident-free radiation dose impacts in Nevada of transporting low-level waste, spent nuclear fuel, and high-level radioactive waste are not significantly different than the impacts of shipping spent nuclear fuel and high-level radioactive waste alone. It is unlikely that any additional mitigation or monitoring would be required beyond that for spent nuclear fuel and high-level radioactive waste transportation.

8.3.1 (11092)
Comment - EIS000374 / 0003
The southeast County has recently seen several highway accidents involving non-nuclear hazardous waste. One leaking incident with a leaking toxic waste truck resulted in the responders being exposed to toxic levels of waste, followed by hospitalization and ongoing medical treatment. The time delay in getting toxic waste into the region was the reason for the severity of the incident.

In another area, a hazardous waste truck failed to negotiate a turn near a rest stop, rolled over, and crushed a picnic facility. Our confidence in truck transportation for dangerous materials on remote, narrow, two-lane roads is not high. Unfortunately, the DEIS is silent on this issue.

Road conditions. State Highway 127 itself not an engineered route. Most of it originated as a historic wagon trail that was paved over a period of time. Inyo County's recent survey of this route, from its junction in the south with Interstate 15 in Baker to its junction with US Highway 95 in the north, revealed many unbanked, unsigned, high-speed turns, numerous blind rises where visibility is limited, sustained grades in excess of modern standards, and dozens of washes that cross both under and over the pavement. The route passes through four towns, two of which include sharp 90° turns in the middle of town.

In the event of an incident, there are few alternative routes useful to diverting commercial and passenger traffic around accident or cleanup sites. For long sections of Highway 127, there's no alternative route whatsoever.

There are approximately 1,000 acres of land in the vicinity of Death Valley Junction that are proposed for release to the Timbisha-Shoshone tribe for their use. If developed to mixed residential and commercial uses, this territory could host an unknown number of additional residents and contribute significantly to traffic on Route 127.

During the period of emplacement, it is reasonably foreseeable for development densities on private lands located in Inyo County to approach those of the Pahrump Valley. This also will result in an unknown number of additional residents and contribute significantly to route traffic on 127.

The EIS's treatment of the State Route 127 corridor is also of concern. The status of the corridor with respect to Yucca Mountain shipments is not addressed in any meaningful fashion by the EIS. We don't see any mitigation in the EIS to compensate for the hazard which the waste would impose upon responders, travelers, and residents of this region. Conditions on possible primary and secondary routes in California are not evaluated, and no attempt is made to develop and weigh alternatives for getting nuclear waste originating in California into Yucca Mountain.

As it stands, the isolation and current configuration of the southeast county's roadways cannot reasonably and safely support the demands of the 25-year nuclear waste transport campaign. The EIS provides insufficient information to allow us to assess repository operations on county residents or determine our risk in the larger context of the national transportation effort.

Unless State Route 127 is officially dismissed from consideration for transport of high-level waste and spent nuclear fuel, the Draft Environmental Impact Statement, at a minimum, needs to be amended to evaluate the risks associated with the route, proposed measures to offset those risks, and identify the expected source of funding for those mitigation measures.

Response

As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

These same regulations allow a state or tribe to designate alternate routes in accordance with U.S. Department of Transportation guidelines. This is the basis for the Nevada Department of Transportation's identification of Routes A through F (routes C and E include the use of California 127) as potential alternative highway routes for legal-weight truck shipments to Yucca Mountain (see Section J.3.1.3 of the EIS).

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada or California designate one of these other routes as an alternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the U.S. Department of Transportation's Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider the conditions of State Route 127 that were identified by the commenter, such as high accident rates in specific areas (for example, unbanked, unsigned high-speed turns; blind rises; limited visibility; and sustained grades in excess of modern standards), during the process of selecting and designating alternate preferred routes.

Section J.3.1.3 of the EIS evaluates the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. Table J-46 includes descriptions of the other routes evaluated in the EIS, including Case 2, which uses State Route 127. The data needed to characterize these routes to support the impact calculations, including State Route 127, are equivalent to the data collected for the base case routes. Tables J-47 and J-48 presents the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario.

The transportation analyses (with the exception of that for the Nevada branch rail line) considered shipments on existing highway infrastructure that would not require upgrading. Where upgrading was required for safe transport or maintenance to keep roads and railroads safe, the necessary funding would be made available to responsible jurisdictions.

Section 9.3 of the EIS describes management actions to mitigate the potential for environmental impacts from transportation of spent nuclear fuel and high-level radioactive waste to the repository. California State Route 127 is currently not a preferred route so DOE has not determined how these risks would be mitigated. As mentioned above, DOE would not designate preferred highway routes based on the information in the EIS alone. Additional environmental and engineering studies would be conducted before such a decision was made. DOE anticipates that potential mitigation measures, which might include infrastructure upgrades, would be considered as a part of these additional studies.

8.3.1 (11168)
Comment - EIS000370 / 0001
The [Inyo] county's primary concern with the EIS is the superficial analysis of the transportation campaign necessary to move some 70,000 or more tons of radioactive waste into Yucca Mountain. In terms of short-term risks to humans, the hazards associated with transportation pose the greatest threat to populations across the nation. The transportation campaign is an integral part of the Yucca Mountain project. It is inseparable from the operation of the proposed repository. Consideration, in detail, of transportation impacts cannot reasonably be deferred to future analysis any more than other off-site impacts. Without detailed information on likely primary and secondary routes in California and the staging of shipments, it is impossible for Inyo County to evaluate the impacts of the shipping campaign on our area.

At present, State Route 127 is being utilized for shipment of low-level nuclear waste to the Nevada Test Site, and may be used for shipment of transuranic waste from the test site to the Waste Isolation Pilot Plant in Carlsbad, New Mexico. This makes State Route 127 a likely candidate for eventual shipments of high-level waste.

Response
DOE believes that the EIS adequately analyzes transportation-related impacts that could result from, and that would be associated with, the Proposed Action. DOE also believes that the EIS provides the information necessary to make certain decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site was approved. See the introduction to Chapter 8 of this Comment-Response Document for additional information.

DOE used state-specific accident data in the analyses, which included consideration of specific conditions and hazards along representative highway and rail routes. However, DOE does not believe it necessary to consider population and other route characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties, offer the most appropriate means to arrive at conservative estimates of transportation-related public health impacts.

In response to comments, additional information on the potential state-specific routes and local and regional impacts is provided in Section J.4 of the EIS. In addition, Section J.3.1.3 presents a sensitivity analysis that compares estimated impacts for national transportation and transportation in Nevada over highway routes identified by the State as potential alternate preferred routes. One of the potential alternate routes would use California Route 127. It would be necessary for the State of Nevada to coordinate with the State of California before this route could be designated as an alternate preferred route. The Final EIS includes impacts representative of those to individuals who live in small communities along transportation routes. This analysis accounts for factors such as the locations of commercial establishments and residences.

Sections 6.2 and 6.3 of the EIS address the potential impacts of transporting spent nuclear fuel and high-level radioactive waste from facilities where it is generated to the proposed repository. Appendix J discusses the methods and data DOE used for these analyses. Based on the results of the impact analyses presented in Chapter 6 and Appendix J, as well as the results published in other studies and environmental impact analyses cited in the EIS, DOE is confident spent nuclear fuel and high-level radioactive waste it could transport spent nuclear fuel and high-level radioactive waste safely to Yucca Mountain. DOE also believes, as the EIS reports, that the potential impacts of this transportation would be so low for individuals who lived and worked along the routes that these individual impacts would not be discernible even if the corresponding doses could be measured. The analysis presented in the EIS factored in the characteristics of spent nuclear fuel and high-level radioactive waste, the integrity of shipping casks that would be used in transport, and the regulatory and programmatic controls that would be imposed on shipping operations (see Appendix M). The EIS analytical results are supported by technical and scientific studies that have been compiled through decades of research and development by DOE and other Federal agencies, including the Nuclear Regulatory Commission and the U.S. Department of Transportation, as well as by the international community, including the International Atomic Energy Agency.

At this point in time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway routes or rail lines could be used. In the interim, states and tribes could designate

alternate preferred highway routes, and highways and rail lines could be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highways, beltways, or bypasses, and state or tribal designated alternates) that reduce time in transit. DOE identified rail lines based on current rail practices, since there are no comparable Federal regulations applicable to the selection of rail lines for the shipment of radioactive materials. Analyses in the EIS (Sections J.2 and J.3) demonstrate that the total transportation impacts would be essentially the same regardless of the routes used. These analyses indicate that because all shipments would comply with regulatory limits, the impacts would be proportional principally to the number of shipment miles. Hypothetical accidents that would result in releases of radioactive materials from the casks would be extremely unlikely regardless of the routes because applicable transportation requirements prescribe that the casks must be able to withstand virtually all types of accidents without releasing their contents.
Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes DOE would use would be identified approximately 5 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction.

8.3.1 (11538)
Comment - EIS010022 / 0001
We have heard the horror stories about spills in the horrendous traffic of Las Vegas. I have noticed a clear avenue of escape from this traffic.

At or near milepost CL 100 on US 95 a nearly empty stretch of land extends east and a bit south toward I-15. A road across this area would bypass Las Vegas.

Much of the waste will come from the east. CA-127 and NV-373 will bypass Las Vegas and is about empty space.

So build a bit of road and save a bunch of hassle from Las Vegas. I could also use such a road on the way to Mesquite and Utah.

Response
In this Final EIS, DOE has identified rail as its preferred mode for transporting spent nuclear fuel and high-level radioactive waste to the proposed repository at Yucca Mountain, both nationally and within Nevada for shipments that arrive in Nevada by rail. At this time DOE has not identified a preference for a specific rail corridor within Nevada. DOE would identify a preferred corridor only if the Yucca Mountain site was approved, and then only after consultation with affected stakeholders, particularly the State of Nevada.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway routes or rail lines could be used. In the interim, states and tribes could designate alternate preferred highway routes, and highways and rail lines could be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit.

8.3.1 (11748)
Comment - EIS002299 / 0005
There will be significant transportation impacts in California from the proposed Yucca Mountain repository. California has four operating commercial nuclear power plants, three commercial plants being decommissioned, and is a major generator of spent nuclear fuel. Spent fuel is now being temporarily stored at these reactor sites and at five research reactor locations throughout the State. Under DOE's plans, spent nuclear fuel from two of California reactors is scheduled for transport during the first year that shipments occur.

In addition, DOE could route through California a major portion of the Yucca Mountain shipments. Nevada officials estimate that 74,000 truck shipments (three-fourths of the total shipments to the repository) of spent fuel and high-level waste could be transported through California to Yucca Mountain under DOE's "mostly truck" scenario, an average of five truck shipments daily for 39 years. Under a mixed truck/rail scenario, an estimated 26,000 truck shipments and 9,800 rail shipments could be transported through California to the Yucca Mountain site. Our concern about DOE's possibly routing through California a major portion of these shipments was heightened recently when DOE announced their decision to reroute through Southern California, including SR-127, thousands of low-level radioactive waste shipments from eastern states to the Nevada Test Site, in response to Nevada and Arizona's requests to avoid shipments through Las Vegas and over Hoover Dam.

California's Concerns: The Draft EIS failed to identify shipments routes, modes, number and characteristics of shipments, and only superficially discussed transportation impacts. The logistics and risks associated with these shipments should be addressed in the Draft EIS. Transportation is the single area of the repository project, which will impact the most people and should be discussed thoroughly in the EIS.

DOE's possible routing through California, especially along SR-127, of a large portion of these shipments to Yucca Mountain is a major concern. SR-127 road conditions, flash flooding, seasonal peaks in tourism, scarcity and long response time for emergency response to a shipment accident, and impacts on the road infrastructure from increased heavy truck traffic are of serious concern.

Response

In response to public comments, DOE has included maps of the representative highway routes and rail lines for the 45 states it used for analysis in the EIS (see Figure J-34 of the EIS for the representative California routes). It also included potential health and safety impacts associated with shipments for each state through which shipments could pass. Table J-74 lists the estimated number of legal-weight truck shipments of spent nuclear fuel and high-level radioactive waste that would enter Nevada from California on Interstate-15 in the mostly legal-weight truck scenario. The table also lists the estimated number of rail shipment through California in the mostly rail scenario for each of the candidate Nevada rail corridors and heavy-haul truck routes.

If the Yucca Mountain site was approved, under the mostly legal-weight truck scenario, the total number of truck shipments through California was estimated to be 6,867 over 24 years, which is less than 1truck shipment per day. There would be no rail shipments.

The estimated numbers of shipments entering Nevada from California under the mostly rail scenario are less than the mostly legal-weight truck scenario. According to Table J-74, the number of rail shipments would range from 512 to 1,464 depending on the mode (rail or heavy-haul truck) and corresponding corridor/route selected in Nevada. This is slightly more than 1 rail shipment per week over 24 years. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

As described in Section J.1.1.2, the analysis in the EIS used representative highway routes that conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, which were developed to promote public safety and reduce radiological risk for transport of highway route controlled quantities of radioactive materials, require that shipments of radioactive material are made on preferred routes to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or a route selected by a state or tribal routing agency. As a consequence, when choosing representative routes in Nevada, DOE was limited to Interstate-15, the bypasses around Las Vegas (assumed complete at the time of transport) and U.S. 95 to the Yucca Mountain site.

The Nevada Department of Transportation-identified routes are currently not designated as preferred highways and thus could not be used at the present time for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Should the State of Nevada or California designate one of these other routes as an alternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultations with affected states, tribes, and local jurisdictions would be necessary. The affected routing authorities would consider public risk and other conditions along the other routes, including emergency response capability, highway design and condition, population density, traffic conditions, etc., during the process of selecting and designating alternate preferred routes.

Section J.3.1.3 of the EIS evaluates the Nevada Department of Transportation routes as sensitivity analyses to provide comparisons with the currently allowed preferred routes. Table J-46 includes descriptions of the other routes evaluated in the EIS, including Case 2, which uses State Route 127. The data needed to characterize these routes to support the impact calculations, including State Route 127, are equivalent to the data collected for the base case routes. Tables J-47 and J-48 presents the results of the sensitivity evaluations, including the impacts nationally and within Nevada, based on the mostly legal-weight truck scenario.

Sections M.5 and M.6 of the EIS contain additional information on emergency response and the implementation of Section 180(c) of the NWPA. Section 180(c) requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using an up-front planning grant and based on availability of funds in annual Program budgets specified by Congress. The schedule in the proposed policy and procedures (63 *FR* 23753, April 30, 1998) for implementation of Section 180(c) of the NWPA is designed to provide adequate time for training of first responders in advance of the first shipments. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction.

8.3.1 (12376)
Comment - EIS000142 / 0008
As noted in White Pine County's comments on the scope of the EIS, the Final EIS must consider the extent to which local emergency first response capabilities serve to mitigate or exacerbate risks. The extent to which environmental conditions in the County (i.e., climate and wildlife) bear upon transportation risks should be considered. Measures to mitigate transportation risks, at least to a level commensurate with the Base Case, should be identified and evaluated within the Final EIS.

Response
In addition to the routes that meet the current definition of a preferred route in accordance with U.S. Department of Transportation regulations (see 49 CFR 397.101), six other highway routing options within Nevada were analyzed in the EIS in Section J.3.1.3. The six other routes were based on those identified by the Nevada Department of Transportation and were evaluated as sensitivity cases to the base case routes (that is, routes that are consistent with current U.S. Department of Transportation regulations for highway route controlled quantities of radioactive material). The data needed to characterize the Nevada Department of Transportation alternative routes to support the impact calculations is equivalent to the data collected for the base case routes. It should be noted that only if the State of Nevada designates an alternative preferred route, such as Nevada Department of Transportation Alternatives A or B, would spent nuclear fuel or high-level radioactive waste be transported through White Pine County and that would only be by legal-weight truck.

Section 9.3 of the EIS addresses management actions to mitigate potential adverse environmental impacts of the transportation of spent nuclear fuel and high-level radioactive waste to the site from 77 locations around the nation. The section describes actions that could be taken based on the description of the affected environment given in Chapter 3 and the potential impacts described in Chapter 6. Section 116(c) of the NWPA states that "the Secretary shall provide financial and technical assistance to [an affected unit of local government or the State of Nevada] to mitigate the impact on such [an affected unit of local government or the State of Nevada] of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Any decision to provide assistance under Section 116 would be based in part on an evaluation of a report submitted by an affected unit of local government or the State of Nevada to document likely economic, social, public health or safety, and environmental impacts. If the proposed repository were to become operational, DOE would enter into discussions with potentially affected units of local government and consider appropriate support and mitigation measures.

If the Yucca Mountain site was approved and after a decision was made regarding transportation modes and routes, local jurisdictions would be better able to identify the likely economic, social, public health and safety, and environmental impacts that would be the basis for a request for economic assistance under Section 116(c) of the

NWPA. Because several years would elapse between approval of the repository and start of a transportation campaign, affected units of local government and tribal governments would have sufficient time to request and receive funding.

8.3.1 (12467)
Comment - EIS001887 / 0095
Page 2-44; Section 2.1.3.3 - Nevada Transportation

The State of Nevada finds the analysis of Nevada transportation impacts associated with the Proposed Action contained in the Draft EIS to be legally and substantively deficient. The Draft EIS fails to address the interconnectedness of national and Nevada transportation issues and impacts. Instead, the Draft EIS treats Nevada transportation as if it were entirely isolated from the national transportation system and the characteristics, decisions, and other factors that condition and drive the national spent fuel and HLW [high-level radioactive waste] shipping campaign. For example, the issue of rail access to Yucca Mountain will have a major impact on the type and number of shipments that occur across the country. Likewise, the viability of, and decision to go forward with, an intermodal transfer facility in Nevada will be a major determinant of modal mix for shipments nationwide. Conversely, decisions made by utilities and contract shippers regarding transportation casks, routing considerations, weather, and many other factors will determine routes that are impacted within Nevada. Acknowledgment of such interconnectedness is not addressed in the Draft EIS.

The Draft EIS contains an inadequate and superficial treatment of Nevada transportation issues and impacts. The Draft EIS fails to evaluate alternative highway routes in a manner that permits the identification of preferred alternatives, and the level of information and analysis is different for various routes. The Draft EIS completely ignores at least one of the most likely highway shipping routes through the State (the NDOT [Nevada Department of Transportation] 'B' route). Moreover, the analysis of potential rail spur alternatives is uneven, exclusive of potentially attractive alternatives, lacks specificity, and insufficient for selecting preferred alternatives. Also, the analysis of rail construction impacts and the impacts/necessities of operating a rail line within Nevada are grossly understated. The evaluation of potential intermodal transfer facility locations is based on inadequate, extraordinarily incomplete and uneven information and fails to identify a preferred location, which is essential for adequately assessing impacts of other aspects of the transportation system, both in Nevada and nationally. The assessment of the costs and impacts of heavy-haul transportation on Nevada highways is incomplete and understates the difficulties inherent in an unprecedented activity of such scale and duration, difficulties and costs that will likely make intermodal transport within Nevada infeasible. Finally, the assessment of potential socioeconomic impacts associated with spent fuel and HLW transportation in Nevada is incomplete, inadequate, and fails to address the range of significant impacts to communities along the identified rail spur and to the State as a whole.

Response
The routing presented in Sections 6.2.3 and 6.2.4 of the EIS for truck and rail transportation is representative of the routing that could be used to transport spent nuclear fuel and high-level radioactive waste to Yucca Mountain. The impacts are not expected to vary significantly due to differences in rail or truck routes used. In addition, Section J.3.1.3 presents an analysis of the sensitivity of impacts to changes in Nevada routing. Specifically, the Nevada Department of Transportation 'B' route is presented as Case 5 in Table J-46. With regard to the insufficient presentation of impacts for the rail corridors, Section J.3.1 discusses the selection of the five candidate rail corridors and presents a list of studies that illustrate the process for screening potential rail alignments. Specifically, the *Nevada Potential Repository Preliminary Transportation Strategy Study 1* (DIRS 104795-CRWMS M&O 1995) and the *Nevada Potential Repository Preliminary Transportation Strategy Study 2* (DIRS 101214-CRWMS M&O 1996) are listed, among others, and provide information on the rail corridor alignments including detailed maps.

Section J.2 of the EIS discusses implementing alternatives for heavy-haul truck transportation routes and facilities. The interactions and dependencies between Intermodal modes and protocols are assessed and included in the impact analysis. The level of information acquired and assessed was as even as possible since the assessments were based on existing information. Potential heavy-haul truck route upgrades are addressed in Section J.3.1.2 and detailed cost estimates are given in *Cost Estimate for the Heavy-Haul Truck Transport Design* (DIRS 154675-Ahmer 1998). Total estimate for Nevada transportation is listed in Table 2-5; it would be about $800 million for a new branch rail line. Highway upgrades would be less depending on the condition and local of the roads.

DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties, offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

DOE does believe, however, that the EIS adequately analyzes the potential environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

For the reasons discussed above, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

If the Yucca Mountain site was approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

8.3.1 (13181)
Comment - EIS010243 / 0028
Clark County is within the region of influence of Yucca Mountain Program (YMP) for transportation because Congress identified the interstate highway system as the default route for the transportation of HLW [high-level radioactive waste]. The most direct route from power generating sites to Yucca Mountain is the interstate highway system through Clark County. Therefore most of the truck trips from shipping sites will pass through Clark County.

The shortest routes from the waste generating sites to Yucca Mountain pass through Clark County en route to Yucca Mountain. Congress anticipated efforts to avoid transportation of waste through particular areas. That is why they designated the Interstate highway system as the default transportation route for the movement of HLW to a repository in the NWPAA. Therefore, any effort to avoid shipping any of these waste streams through Clark County will be met with requests from other similarly affected areas. The result of these requests will be an uneconomical routing process that will be both circuitous and expensive. Clark County assumes that the interstate highway system through Clark County will be the primary route used to transport waste to Yucca Mountain.

Because the majority of the truck-transported HLW will pass through the county en route to Yucca Mountain, the transportation impacts will be concentrated in Clark County. The Nuclear Regulatory Commission identified Clark County as part of the maximally affected region in the nation in an Environmental Impact Statement.

The DEIS assumed that DOE would be able to ship HLW using Clark County's planned northern and western beltways. However, these "beltways" are unlike beltways in other communities in several important respects. First, Clark County's beltway system is entirely paid for with local tax dollars and is not part of the Federal Highway System. As a result, Clark County's beltway is ineligible as a HLW route under Appendix A of HM 164. Another concern is that the beltway is being constructed as a frontage road rather than as a typical beltway facility. This is another reason Clark County's beltway system is ineligible as a transportation route. This means the primary route used for the truck transportation of HLW is likely to be Interstate 15 and US Highway 95 through Las Vegas. The SDEIS did not consider our comments in this area. However, the assumption that DOE cannot use the Clark County beltway system was used in this assessment.

Response
DOE has identified rail as its preferred mode of transportation both nationally and within Nevada to transport spent nuclear fuel and high-level radioactive waste to the Yucca Mountain site that arrive in Nevada by rail (see the introduction to Chapter 2 of the EIS). Nevertheless, DOE continues to analyze the impacts of legal-weight truck shipments. The U.S. Department of Transportation requires highway shipments to use routes that would be the safest, would reduce time in transit, and would avoid populated areas as far as is possible, consistent with the other requirements. The U.S. Department of Transportation provides procedures for states and tribes to designate routes that could be used. These procedures require a state to consider overall public safety in designating routes that would be alternates to routes specified by Department of Transportation regulations.

The U.S. Department of Transportation requirements and the planned completion of the Las Vegas Beltway led DOE to assume, for purposes of analysis in the EIS, that legal-weight truck shipments would not enter the Spaghetti Bowl interchange of Interstate-15 and U.S. 95. Nevertheless, to assess how impacts would be different from those of using the Las Vegas Beltway, DOE analyzed the impacts for legal-weight trucks to travel through the Spaghetti Bowl interchange (see Section J.3.1.3 of the EIS for an analysis of the impacts of using different routes in Nevada).

8.3.2 CALIENTE/CHALK MOUNTAIN

8.3.2 (136)
Comment - 25 comments summarized
Commenters objected to DOE's position that the Caliente Chalk Mountain Corridor and the Caliente/Chalk Mountain heavy-haul truck route are nonpreferred alternatives based simply on U.S. Air Force opposition to routes passing through the Nellis Air Force Range because they would compromise critical and sensitive national security activities. Commenters said that the Air Force's position was not adequately explained in the EIS; that the specific reasons for Air Force opposition should be described; and that mitigation measures should then be developed and identified in the EIS. Commenters said that the Chalk Mountain routes are environmentally preferable because military security at Nellis would protect spent nuclear fuel and high-level radioactive waste shipments from terrorist attacks. Others said that environmental impacts associated with the Chalk Mountain routes would be less than other alternatives because the lengths of these routes are the shortest of all alternatives under consideration, and they would avoid many communities in Nevada. Moreover, some said that shipping the spent nuclear fuel and high-level radioactive waste through Nellis would force the Federal Government to bear some of the risks associated with such transport; if the people of Nevada are being asked to have spent nuclear fuel and high-level radioactive waste shipped through their communities, the Federal Government should show leadership by routing through the extensive less-populated Federal and military lands in Nevada. Others commenters objected to the deference given to the Air Force's position but not to other entities that have special status under the NWPA and who also strongly oppose certain routes (for example, routes through Lincoln and Nye Counties and through the Las Vegas Valley). These commenters wanted to know why the Air Force was given special status, whether the Air Force was a Cooperating Agency in the preparation of the EIS, and whether the Department of Defense has refused to allow DOE access to lands under the control of the Air Force.

Others, however, supported the Air Force's position. Some said that if these routes are not preferred by DOE, and not acceptable to the Air Force, then they should be eliminated from the EIS as viable alternatives, and included as considered but eliminated from further detailed studies.

Response
Public comments during the EIS scoping period requested that DOE evaluate routes through the Nellis Air Force Range (now called the Nevada Test and Training Range) to Yucca Mountain. In response, DOE added an implementing alternative for the transportation of spent nuclear fuel and high-level radioactive waste by rail or by heavy-haul truck to the Yucca Mountain site across the Nellis Air Force Range (the Caliente-Chalk Mountain Corridor and Caliente/Chalk Mountain heavy-haul truck route analyzed in the Draft EIS).

During preparation of the Draft EIS, DOE consulted with various organizations and agencies, including the Air Force (see Appendix C of the EIS). In a letter dated March 1999, F. Whitten Peters, Acting Secretary of the Air Force, commented that the Air Force believes that there is no route through the Nellis Air Force Range that could avoid adversely affecting classified national security activities, leading to the imposition of flight restrictions and affecting the ability for testing and training. As a consequence, DOE listed the Caliente-Chalk Mountain Corridor and Caliente/Chalk Mountain heavy-haul truck route in the Draft EIS as "nonpreferred alternatives."

In comments on the Draft EIS, the Air Force restated its position that routes across the Nevada Test and Training Range would not be consistent with its national security uses. The Air Force concluded that use of such a corridor or route could adversely affect critical and sensitive national security activities. The U.S. Air Force has stated that it knows of no route across the Nevada Test and Training Range that would avoid militarily sensitive areas and thus not affect the heavy volume of testing and training that occurs daily. The Nevada Test and Training Range is the nation's premier range for training of operational flying units and development and operational testing of weapons systems. The transportation of spent nuclear fuel and high-level radioactive waste would lead to the imposition of flight restrictions that would severely degrade the ability to test existing and evolving weapons systems, as well as train U.S. and allied aircrews. Therefore, the Air Force believes that such a route would be inconsistent with the national security uses of the Range.

In response, DOE reevaluated whether it should eliminate the Caliente-Chalk Mountain Corridor and the Caliente/Chalk Mountain heavy-haul truck route from further evaluation. DOE met with the Air Force (see Appendix C of the EIS), considered the information the Air Force provided, and concluded that the Caliente-Chalk Mountain Corridor and the Caliente/Chalk Mountain heavy-haul truck route implementing alternatives should remain identified as "nonpreferred alternatives" in this Final EIS.

The Air Force was not a cooperating agency in the preparation of the EIS and was not afforded "special status" as suggested by some commenters. Rather, DOE, in designating the corridor/route as "nonpreferred alternatives," recognized the implications of this corridor/route on national security uses of the Nevada Test and Training Range. At this time, DOE is not aware of any modifications to the corridor or route that would mitigate the concerns of the Air Force. DOE has been able to obtain sufficient information on the corridor and route to estimate environmental impacts that could occur from the construction and operation of a branch rail line or heavy-haul truck route.

DOE has not identified a particular rail corridor or heavy-haul truck route as "environmentally preferable." If the Yucca Mountain site was recommended and approved and a mode of transportation (rail or heavy-haul truck in Nevada) was selected in a Record of Decision, DOE would then identify an environmentally preferable corridor or route in a subsequent Record of Decision. In making such a determination, the Department would consider a variety of environmental factors, including many raised by the commenters. The potential environmental impacts from the construction and operation of the Caliente-Chalk Mountain Corridor or the Caliente/Chalk Mountain heavy-haul truck route are discussed in Sections 6.3.2.2.3 and 6.3.3.2.2 of the EIS, respectively.

8.3.2 (5044)
Comment - EIS001520 / 0012
The draft EIS identifies the Caliente/Chalk Mountain route (possible rail or heavy-haul route) as a non-preferred alternative. However, the draft EIS presents no environmental logic for this designation. Instead, the draft EIS states that the designation is based on opposition from the U.S. Air Force, which is concerned about potential interference with Nellis Air Force Range testing and training activities. Since this route is about half the overall distance of the more circuitous Caliente route and therefore should be less harmful to the environment, and since this route avoids the population centers surrounding Las Vegas, it would seem to be a candidate for designation as a preferred alternative from an environmental perspective. The Board recommends that the final EIS provide a more thorough explanation of the basis for deciding whether to exclude the Caliente/Chalk Mountain route from consideration.

Response
Public comments during the EIS scoping period requested that DOE evaluate routes through the Nellis Air Force Range to Yucca Mountain. In response, DOE added an implementing alternative for the transportation of spent nuclear fuel and high-level radioactive waste by rail or by heavy-haul truck to the Yucca Mountain site across the

Nellis Air Force Range (the Caliente-Chalk Mountain Corridor and Caliente/Chalk Mountain heavy-haul truck route analyzed in the Draft EIS).

During preparation of the Draft EIS, DOE consulted with various organizations and agencies, including the Air Force (see Appendix C of the EIS). In a letter dated March 1999, F. Whitten Peters, Acting Secretary of the Air Force, commented that the Air Force believes that there is no route through the Nellis Air Force Range that could avoid adversely affecting classified national security activities, leading to the imposition of flight restrictions and affecting the ability for testing and training. As a consequence, DOE listed the Caliente-Chalk Mountain Corridor and Caliente/Chalk Mountain heavy-haul truck route in the Draft EIS as “nonpreferred alternatives.”

In comments on the Draft EIS, the Air Force restated its position that routes across the Nevada Test and Training Range would not be consistent with its national security uses. The Air Force concluded that use of such a corridor or route could adversely affect critical and sensitive national security activities.

In response, DOE reevaluated whether the Caliente-Chalk Mountain Corridor and Caliente/Chalk Mountain heavy-haul truck route should be eliminated from further evaluation. DOE met with the Air Force (see Appendix C of the EIS), considered the information they provided, and concluded that the Caliente-Chalk Mountain Corridor and the Caliente/Chalk Mountain heavy-haul truck route implementing alternatives should remain identified as “nonpreferred alternatives” in this Final EIS.

The Air Force was not a cooperating agency in the preparation of the EIS and was not afforded “special status” as suggested by some commenters. Rather, DOE in designating the corridor/route as “nonpreferred alternatives,” recognized the implications of this corridor/route on national security uses of the Nevada Test and Training Range. At this time, DOE is not aware of any modifications to the corridor/route that would mitigate the concerns of the Air Force. DOE has been able to obtain sufficient information regarding the corridor/route to estimate the potential environmental impacts that could occur from the construction and operation of a branch rail line or heavy-haul truck route.

DOE has not identified a particular rail corridor or heavy-haul truck route as “environmentally preferable.” If the site was approved and a mode of transportation (rail or heavy-haul truck in Nevada) was selected in a Record of Decision, DOE would then identify an environmentally preferable corridor/route in a subsequent Record of Decision to select a rail corridor or heavy-haul truck route. In making such a determination, a variety of environmental factors, including many raised by the commenters, would be considered. The potential environmental impacts from the construction and operation of the Caliente-Chalk Mountain Corridor and Caliente/Chalk Mountain heavy-haul truck route are included in Sections 6.3.2.2.3 and 6.3.3.2.2 of the EIS.

8.3.3 ALTERNATIVE ROUTES AND MODES

8.3.3 (23)
Comment - 20 comments summarized
Commenters suggested alternatives not considered in the EIS for using different mixes (for example, 50:50, 60:40) and special rail, highway, monorail, and air transportation modes to ship spent nuclear fuel and high-level radioactive waste.

Commenters suggesting the use of air transportation stated that impacts of transporting spent nuclear fuel and high-level radioactive waste using aircraft would be less than for rail or truck shipments. A commenter suggested that DOE should build a new national high-speed rail transportation system to ship spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Commenters also suggested that trucks should not be used and that rail lines and highways for shipping spent nuclear fuel and high-level radioactive waste should be constructed to circumvent towns and cities; another recommended a monorail system should be constructed to transport the materials. One commenter suggested DOE should evaluate the impacts of using dedicated trains for rail shipments. A commenter suggested the EIS should consider additional regional transportation corridors through the Nellis Air Force Range and in the vicinity of Goldfield, Nevada.

A commenter suggested the EIS should evaluate a third transportation scenario based on the current capabilities of waste generator sites. The suggested scenario would assume all generator sites not served by railroads would ship by legal-weight trucks.

Response

DOE evaluated the potential environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste from 72 commercial and 5 DOE sites to the proposed repository at Yucca Mountain. If there was a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. However, at this time, many years before shipments to a repository could begin, it is impossible to predict with a reasonable degree of accuracy the exact number of shipments that would be made by either truck or rail. Indeed, the commenters' suggestions about the possibility of mixing modes and routes demonstrated the wide range of possible transportation options. For this reason, in the EIS, DOE evaluated two scenarios for moving the materials to Nevada: (1) transport using mostly legal-weight trucks and (2) transport using mostly rail. DOE analyzed these scenarios to ensure that it considered the range of potential environmental impacts associated with the transportation of spent nuclear fuel and high-level radioactive waste.

DOE believes that the mostly rail case, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. In reaching this conclusion, DOE considered the capabilities of the sites to handle larger (rail) casks, the distances to suitable railheads, and historic experience in actual shipments of nuclear fuel, waste, or other large reactor-related components. DOE also considered relevant information published by sources such as the Nuclear Energy Institute and the State of Nevada.

Nevertheless, in response to comments, DOE has analyzed the effects of different mixes of rail and truck shipments. The results of this analysis confirm DOE's estimate that the mostly rail and mostly legal-weight truck scenarios represent a reasonable range (lower and upper bound) of potential environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste.

As stated in Section 6.2 of the EIS, DOE analyzed two feasible scenarios – mostly rail and mostly legal-weight truck – for potential impacts of transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Prior transportation analyses provide substantial evidence that truck, rail, and barge modes of transportation that could be used would result in small environmental impacts (see DOE environmental impact statements listed in Table 1-1). Different mixes of modes from the two analyzed in the EIS (for example, a 50:50 or 60:40 truck-to-rail mix or a mix in which shipments from 32 commercial sites would use legal-weight trucks and shipments from 45 commercial and DOE sites would use rail) would result in impacts that would be somewhere between those for the mostly legal-weight truck scenario and the mostly rail scenario (Section J.1.2.1.4 discusses how impacts would change for variations in the mix of transportation modes for shipments to Yucca Mountain). Thus, as mentioned above, DOE chose to analyze the mostly rail and mostly legal-weight truck scenarios as a means of displaying the range of impacts that could result from different mixes of modes.

The weight of spent nuclear fuel and heavily shielded shipping casks would make transportation by air very expensive. In addition, use of air transportation would not eliminate use of land transportation. Shipments would still have to travel from generator sites to nearby airports and from an airport in Nevada to Yucca Mountain by a land transportation mode. Finally, regulatory requirements in 10 CFR Part 71 regarding air transportation of plutonium in excess of 20 curies could preclude air transportation of spent nuclear fuel that could contain as much as 20,000 curies of plutonium per MTHM or 40,000 curies of plutonium per truck cask. Regulations in 10 CFR Part 71 address requirements prescribed by Congress regarding air transportation of plutonium.

Section J.2.3 of the EIS presents an assessment of impacts of using dedicated trains to transport spent nuclear fuel and high-level radioactive waste. Based on current information from the U.S. Department of Transportation and the Association of American Railroads, it is DOE's opinion that there is no clear advantage for using either dedicated trains or general freight service.

Section J.3.1.2 of the EIS lists studies of potential rail alignments from which DOE identified the five candidate rail corridors. In addition, that section discusses the screening approach for the five corridors and why DOE chose to analyze them. DOE assumed transportation of spent nuclear fuel and high-level radioactive waste would use existing highways and railroads except in Nevada, where a branch rail line would be needed for trains to travel from an existing railroad to a Yucca Mountain Repository. Other routes and corridors through Nevada, including Nellis Air Force Range, were considered in the selection of the routes analyzed (see Section J.3.1 and cited references of the EIS). Section J.3.1 provides the results of impact sensitivity studies performed for the various routes.

DOE did not consider alternatives such as those discussed in the comments, including special rail lines to circumvent cities, a new national rail line dedicated for shipment of spent nuclear fuel and high-level radioactive waste, or a monorail, because the potential impacts identified from rail and truck transportation using existing infrastructure would be small, cost of the suggested alternatives would be high, and new construction for these alternatives would increase impacts.

DOE could decide to use a dedicated train that carried only the material to be shipped to Yucca Mountain, or could elect to move the spent nuclear fuel and high-level radioactive waste in general freight. If the material was shipped as general freight, the position of the spent nuclear fuel or high-level radioactive waste car in the train would be regulated by 49 CFR 174.85. This regulation requires that railcars placarded "radioactive" must be separated from a locomotive, occupied caboose, or carload of undeveloped film by at least one nonplacarded car, and it may not be placed next to other placarded railcars of other hazard classes. Section J.2.3 of the EIS presents an assessment of impacts of using dedicated trains to transport spent nuclear fuel and high-level radioactive waste. Based on current information from the U.S. Department of Transportation and the Association of American Railroads, it is DOE's opinion that there is no clear advantage for using either dedicated trains or general freight service.

8.3.3 (24)
Comment - 9 comments summarized
DOE received both positive and negative comments on the potential for using barges to transport spent nuclear fuel and high-level radioactive waste. Included was a comment that argued large-scale use of barges would, or might, be preferred by states to land-only, cross-country transportation from generator sites to Yucca Mountain using railroads or trucks. This comment stated that barge transportation would reduce the risk of accidents and ground spillage of radioactive materials. The comment further stated that if barge transportation is the lowest risk mode of transport, it should be considered a feasible transport alternative. One commenter suggested that DOE should consider a shipping scenario in which barge transportation is maximized. Commenters addressed use of barges to transport spent nuclear fuel from nuclear powerplants along the East Coast (Atlantic Ocean) and Gulf of Mexico through the Panama Canal to a West Coast port such as San Diego, California. These commenters suggested shipments arriving in San Diego would be transferred to trucks or rail cars for delivery to Yucca Mountain.

Response
Transportation modes and scenarios analyzed in the EIS are based on DOE's assessment of what would be feasible and practical for delivering spent nuclear fuel from generator sites in the continental United States to a repository at Yucca Mountain, which is in the Nevada desert approximately 640 kilometers (400 miles) from the nearest seaport. In addition, prior analyses of transportation modes (rail, truck, and barge) provide substantial evidence that all modes of transportation that could be used would result in low impacts. These analyses include those presented in this EIS, the *Final Environmental Impact Statement on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel* (DIRS 101812-DOE 1996, all), and a report issued by the Nuclear Regulatory Commission (DIRS 152476-Sprung et al. 2000, all).

Nevertheless, in response to public comments and as discussed in Section 2.3.3 of the EIS, DOE evaluated the potential for including a large-scale barge scenario. The purported advantage of large-scale use of barges was that it would reduce the amount of cross-country overland travel. However, DOE eliminated this barge scenario from further consideration in the EIS because it would be overly complex, requiring greater logistical complexity than either rail or legal-weight truck transportation; a much greater number of large rail casks than rail transportation; much greater cost than either rail or legal-weight truck transportation; long transportation distances potentially requiring the transit of the Panama Canal outside U.S. territorial waters; transportation on intercoastal and coastal waterways of the coastal states and on major rivers through and bordering states; extended transportation times;

intermodal transfer operations at ports and land transportation from a western port to Yucca Mountain. Section J.2.2 discusses the large-scale barge scenario.

Even though the large-scale barge scenario was eliminated from further consideration, the EIS does address the use of barges to transport spent nuclear fuel to nearby railheads from 17 commercial generator sites not served by a railroad. DOE considers this use of barge the maximum that would be operationally feasible and practical.

The shipping casks used to transport spent nuclear fuel and high-level radioactive waste would be massive and tough, with design features that complied with strict regulatory requirements that ensure the casks perform their safety functions even when damaged. Numerous tests and extensive analyses have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents. In addition, since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000, all). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

In addition, because spent nuclear fuel and high-level radioactive waste is in solid form, casks do not “leak” radioactive material as that term is commonly used, and this material cannot be “spilled.” Instead, a release of radioactive material would involve a release of spent nuclear fuel particles, gasses, volatile elements, and crud into the air.

DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties, offer the most appropriate means to arrive at conservative estimates of transportation-related impacts. In this EIS, DOE has used computer models it has used in previous EISs and other studies. These models are widely accepted by the national and international scientific and regulatory communities. To ensure that the EIS analyses reflect the latest reasonably available information, DOE has either incorporated information that has become available since the publication of the Draft EIS or modified existing information to accommodate conditions likely to be encountered over the life of the Proposed Action. For example, the analysis in the Draft EIS relied on population information from the 1990 Census. In this Final EIS, DOE has scaled impacts upward to reflect the relative state-by-state population growth to 2035, using 2000 Census data.

8.3.3 (178)
Comment - 4 comments summarized
Commenters stated that even if DOE is unable to construct a branch rail line or use heavy-haul trucks to transport spent nuclear fuel and high-level radioactive waste in Nevada, it might still prefer to get casks to Nevada by rail. For this reason, commenters suggested the EIS should analyze transporting legal-weight truck casks from generator sites by rail to an intermodal transfer station in Nevada and then loading the casks onto legal-weight trucks for transport to Yucca Mountain.

Response
In response to public comments, DOE considered a truck cask-on-railcar scenario in which legal-weight truck casks would be shipped by rail from generator sites to Nevada and then loaded onto legal-weight trucks for transport to Yucca Mountain. The purported advantage of this scenario is that DOE could use rail transportation nationally but would not have to construct and operate a branch rail line or use heavy-haul trucks in Nevada. As discussed in Section 2.3.3 of the EIS, DOE determined that while this scenario would be feasible, it would not be practical and the scenario was eliminated from further consideration. The number of shipping casks and railcar shipments would be greater by a factor of 5 than for the mostly rail scenario and the additional cost would be more than $1 billion. In addition, the truck casks-on-railcar scenario would lead to the highest estimates of occupational health and public health and safety impacts (mostly coming from rail-traffic related fatalities.

Nevertheless, DOE assessed the sensitivity of transportation impacts to assumptions related to transportation scenarios (see Section J.2.1 of the EIS). Under this scenario, because all shipments (except shipments of naval spent nuclear fuel) would use legal-weight truck casks, which would house less fuel assemblies that rail casks, the number of railcar shipments would be about 53,000 over the 24 years of the Proposed Action. This is the same as the number of legal-weight truck plus naval spent nuclear fuel shipments in the mostly legal-weight truck scenario.

DOE estimated impacts of this variation of the mostly rail transportation scenario by scaling from the impacts estimated for the mostly rail scenario. The analysis used the ratio of the number of railcars that would be shipped to the number of railcar shipments estimated for the mostly rail scenario and assumed each shipment would include an escort car and five railcars carrying legal-weight truck casks. Compared to the mostly rail scenario, radiological impacts from truck casks on railcars would increase by approximately a factor of 5 and the nonradiological impacts would increase by approximately a factor of 3. The estimated number of public incident-free latent cancer fatalities would be approximately 3, and the estimated number of traffic fatalities would be 8. The total of these estimates, 11, is about 1.5 times the DOE revised estimate of 7 fatalities (2.5 latent cancer fatalities plus 4.5 traffic fatalities) for the legal-weight truck scenario.

8.3.3 (5690)
Comment - EIS001887 / 0303
Also in the Summary document (p. S-53) and later in Section 6, DOE fails to address the potential shipping alternative of repackaging spent fuel and HLW [high-level radioactive waste] at a potential inter-modal transfer site. Under the DOE heavy-haul scenario, HLW and SNF [spent nuclear fuel] coming to an intermodal facility by rail must be shipped to the repository via heavy-haul trucks and cannot be repackaged or reconfigured for legal-weight truck transport. It is possible that, given the length, geography, and impacts associated with heavy-haul transportation on the scale required to implement the Proposed Action, such shipments may prove to be impossible. In such an event, intermodal alternatives to heavy-haul should be evaluated.

Response
In response to public comments, DOE considered a truck Cask-on-railcar scenario in which legal-weight truck casts would be shipped by rail from generator sites to Nevada and then loaded onto legal-weight trucks for transportation to Yucca Mountain. The purported advantage of this scenario is that DOE could use rail transportation nationally but would not have to construct and operate a branch rail line or use heavy-haul trucks in Nevada. As discussed in Section 2.3.3 of the EIS, DOE determined that while this scenario would be feasible, it would not be practical and the scenario was eliminated from further consideration. The number of shipping casks and railcar shipments would be greater by a factor of 5 than for the mostly rail scenario and the additional cost to the Program would be more than $1 billion. In addition, the truck Casks-on-railcar scenario would lead to the highest estimates of occupational health and public health and safety impacts (mostly coming from rail-traffic related fatalities).

Nonetheless, DOE assessed the sensitivity of transportation impacts to assumptions related to transportation scenarios (see Section J.2.1 of the EIS). Under this scenario, because all shipments (except shipments of naval spent nuclear fuel) would use legal-weight truck casks, which would house less fuel assemblies that rail casks, the number of railcar shipments would be about 53,000 over the 24 years of the Proposed Action. This is the same as the number of legal-weight truck plus naval spent nuclear fuel shipments in the mostly legal-weight truck scenario.

8.3.3 (7822)
Comment - EIS001653 / 0019
Pg. 2-43 1st Par. Can the Navy ship by truck? If not, why not?

Response
Section 2.1.3.2.2 of the EIS states that "The Navy prepared an EIS (USN 1996, all) and issued two Records of Decision (62 *FR* 1095, January 8, 1997; 62 *FR* 23770, May 1, 1997) on its spent nuclear fuel." This EIS, *Final Environmental Impact Statement for a Container System for the Management of Naval Spent Nuclear Fuel* (DIRS 101941-USN 1996), evaluated a range of alternatives that would provide a system of containers for management of naval spent nuclear fuel following examination at the Idaho National Engineering and Environmental Laboratory. Section 3.0 of the Navy EIS describes and compares the alternatives evaluated, which includes most types of spent nuclear fuel container systems either in use or proposed for use.

Section 3.7 of the Navy EIS, Alternatives Eliminated from Detailed Analysis, contains the results of the evaluation performed for alternate methods of transporting naval spent nuclear fuel. Section 3.7 states:

"The use of trucks as the principal means for transporting naval spent nuclear fuel was also eliminated from detailed analysis in this EIS for other reasons. Rail transport permits the shipment of a greater number of spent fuel assemblies in each shipment than truck transport, resulting in fewer shipments. Those container systems which can be physically accommodated by truck would require many more shipments, with resultant increased environmental impacts. Preliminary estimates show that at least five times the number of shipments would be required for transport by truck as compared to rail. Since each container must be designed to the same regulatory requirements (10 CFR Part 71), each container would be expected to produce about the same radiological dose rate on the exterior surface of the container. However, considering the population distribution and proximity of people along and on the truck route, each truck shipment results in about five times greater radiation exposure than a rail shipment. Thus the five times greater number of shipments required for truck rather than rail transportation would be expected to result in about twenty-five times greater radiological dose to the public and workers. Transportation accident rates in general commerce are higher per truck mile than per rail mile (DIRS 101920-Saricks and Kvitek 1994). While the accident rate is not large for either rail or truck, the number of accidents could be about five times larger for truck shipments than for rail due to the greater number of shipments.

"In view of the above, the Naval Nuclear Propulsion Program has eliminated from consideration a shift to legal-weight truck transportation as a reasonable alternative to be evaluated in detail in this EIS for naval spent nuclear fuel. The ultimate decision on transportation options (legal-weight truck, some combination of legal-weight truck and rail or rail/heavy-haul truck) would be made by DOE on the basis of analyses to be performed in the repository EIS" (DIRS 101941-USN 1996).

The Navy has experience in the use of heavy-haul truck transportation for shipments of spent nuclear fuel in containers of similar or greater height and weight compared to those intended for use in the shipments to the repository. Although naval spent nuclear fuel is transported to the Idaho National Engineering and Environmental Laboratory by rail, naval spent nuclear fuel in shipping containers is moved for short distances at the point of origin at two naval prototype sites (Windsor and West Milton) by heavy-haul truck to a nearby rail terminal, where the containers are loaded onto railcars for the remainder of the journey to the Idaho National Engineering and Environmental Laboratory.

Heavy-haul truck movement of the naval spent nuclear fuel canisters inside transportation casks over local roadways in Nevada is feasible because the loaded containers, with an intermodal skid, would weigh about 140 metric tons (150 tons) and measure less than 3 meters (10 feet) in diameter and 7.6 meters (25 feet) in length. The length and width do not present unusual difficulties, but the weight would require a trailer with 13 to 15 axles and would require attention to bridge weight limits. Heavy-haul trucks with the capacity to handle such loads are typically capable of sustained highway speeds of 40 to 56 kilometers (25 to 35 miles) per hour.

8.3.3 (11299)
Comment - EIS001814 / 0028
DEIS Page 2-72
DOE eliminated the development of a new road for heavy-haul trucks from further detailed evaluation because the construction of a new branch rail line would be only slightly more expensive and transportation by rail would be safer (no intermodal transfers) and more efficient (TRW 1996, page 6-7).

The analysis cited is based on the constraints for grade and curvature used for heavy-haul vehicles designed for highway use. DOE did not consider the feasibility of adapting trucks designed for heavy-haul in mining activities to the transport of spent fuel casks. These vehicles have the advantage of being able to handle extremely heavy loads (up to 400,000 tons) without the constraints on grade and degree of curvature required for vehicles designed for highway transport. Allowing significantly increased grades, sharper curves, and different surfacing materials (e.g. gravel) could significantly reduce the cost of constructing dedicated heavy-haul roads.

Response
While the use of off-road heavy-haul transporters would allow a new road alignment within the proposed rail corridors to be designed at steeper road grades and tighter curvatures, the cost savings associated with the reduction

in earthwork is more than offset by the costs associated with constructing intermodal transfer stations and purchasing, operating, and maintaining a fleet of one-of-a-kind trucks.

The heavy-haul truck cost estimate in *Nevada Transportation Engineering File Table of Contents/Summary* (DIRS 154675-Ahmer 1998), which includes the "Cost Estimate for Heavy Haul Truck Transport Design" (5/98), shows, for example, that the estimated annual cost of operating and maintaining a truck fleet is $12 million on average for the Caliente heavy-haul truck route. The annual rail operating and maintenance costs for the Caliente Corridor are approximately $3 million on average, by comparison. Use of off-road trucks over a newly constructed road combines the high initial construction costs associated with rail with the high operating and maintenance costs associated with heavy-haul truck transportation.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

8.3.3 (11810)
Comment - EIS001622 / 0066
The massive scale of radioactive waste shipments to the proposed repository will be unprecedented. Total annual shipments of these wastes are projected to increase within the next decade from the current 15 to 25 rail shipments per year to between 400 to 600 rail shipments per year (Federal Railroad Administration, June 1998). The State of Nevada's preliminary estimates of potential legal-weight truck shipments to Yucca Mountain through California and Nevada show that an estimated 74,000 truck shipments, about three-fourths of the total, could traverse southern California under DOE's mostly truck scenario. This could be an average of five truck shipments through California every day for 39 years. Under a mixed truck and rail scenario, California could receive an average of two truck shipments per day and 4-5 rail shipments per week for 39 years. The State of Nevada estimates that under a "best case" scenario that assumes the use of larger rail shipping containers, there would be more than 26,000 truck shipments and 9,800 rail shipments through California. This represents a large increase in both scale and complexity of operations compared to past shipments.

Likely routes in California would impact Sacramento, the Los Angeles area, San Luis Obispo, Santa Barbara, San Bernardino, Fresno, Bakersfield, Barstow, and smaller cities and communities. Under a consolidated southern routing strategy, Nevada has stated that the likely east-west highway corridors would be I-44 from Missouri to Oklahoma, I-40 from Tennessee to California, and I-15 from California to Nevada. The most likely east-west rail corridor would be the Santa Fe-Burlington Northern line from Kansas City to San Bernardino, connecting with the Union Pacific from San Bernardino to Nevada.

Response
In response to public comments, DOE has included maps of the representative highway routes and rail lines for the 45 states it used for analysis in the EIS (see Figure J-32 of the EIS for the representative California routes). It also included potential health and safety impacts associated with shipments for each state through which shipments could pass. Table J-74 lists the estimated number of legal-weight truck shipments of spent nuclear fuel and high-level radioactive waste that would enter Nevada through southern California on Interstate-15 in the mostly legal-weight truck scenario. The table also lists the estimated number of rail shipment through California in the mostly rail scenario for each of the candidate Nevada rail corridors and heavy-haul truck routes. The shipment numbers are for the proposed action, which has a total emplacement of 70,000 MTHM, and does not include the values for the Inventory Modules 1 and 2, which address increased inventories, currently not allowed by the NWPA. The shipment numbers included by the commenter are for the currently unallowable Module 2 inventory. See Table J-1 for estimated numbers of shipments for the various inventory and national transportation analysis combinations.

If the Yucca Mountain site was approved, the total number of truck shipments through California was estimated to be 6,867 over 24 years, which amounts to less than one truck shipment per day. For Inventory Modules 1 and 2, if it were assumed that the number of shipments through California increases in proportion to the increase in the total number of shipments, the number of shipments though California would be about 14,000 shipments over 38 years, which is approximately 1 shipment per day.

The estimated numbers of shipments entering Nevada from California under the mostly rail scenario are less than the mostly legal-weight truck scenario. According to Table J-74, there would be no truck shipments through

California and, the number of rail shipments would range from 512 to 1,464, depending on the mode (rail or heavy-haul truck) and corresponding corridor/route selected in Nevada. At most, 1,464 rail shipments would be made on the Jean heavy-haul truck route over 24 years. This equates to about 1 rail shipment every 6 days. However, DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began. At this time, many years before shipments could begin, it is impossible to predict accurately which highway routes or rail lines DOE could use. Before such shipments began, states and tribes could designate alternate preferred highway shipping routes, and highways and rail lines could be built or modified.

Nonetheless, the representative highway routes identified for the EIS analysis conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, developed for transportation of Highway Route Controlled Quantities of Radioactive Materials, require such shipments to be on preferred routes selected to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or an alternate route designated by a state or tribal routing agency. Alternate routes could be designated by states or tribes under Department of Transportation regulations (49 CFR 397.103) that require consideration of the overall risk to the public and prior consultation with local jurisdictions and other states and tribes. Federal regulations do not restrict the routing of rail shipments. However, for the analysis, as discussed in Section J.1.1.3 of the EIS, DOE assumed routes for rail shipments that would provide expeditious travel and the minimum number of interchanges between railroads.

It is not possible at this time to determine the validity of the so-called “consolidated southern routing strategy.” At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. Section M.3 of the EIS contains more detail on the proposed role of the Regional Servicing Contractor. As discussed in Section M.3.2.1.2, the Regional Servicing Contractors would submit route plans to DOE for approval prior to their submittal to the Nuclear Regulatory Commission for approval. The route plans would most likely include more than one potential routing option for shipments from each waste generator site. These plans would be developed based on consultations with shippers, Federal, state, tribal, and local authorities, and application of U.S. Department of Transportation and Nuclear Regulatory Commission regulations. Among these, there could be southern and northern highway options. However, the actual route taken by a specific shipment would consider additional criteria as part of the shipment dispatching process, such as potential adverse weather conditions and construction delays. Therefore, it is not possible to predict whether the Regional Servicing Contractors would dispatch a higher volume of shipments to the southern east-west routes than more northerly east-west routes. Although one would expect the southern highway corridors to be less susceptible to adverse weather conditions than a more northern corridor, especially in winter months, the southern corridor would involve longer distances and longer transit times from the waste generator sites in the north-central and northeastern United States. The Regional Servicing Contractors would be tasked to develop procedures for dispatching the shipments as well as procedures for use by drivers and crews in making determinations on adverse weather and road condition operations. Section M.3.2.1.4 provides a discussion of the protocols and procedures that would be implemented by a Regional Servicing Contractor and its subcontractors under adverse weather or road conditions.

8.4 Transportation Casks

8.4 (25)
Comment - 53 comments summarized
Many commenters stated that full-scale field testing of shipping casks should be required and undertaken by the Department. Full-scale tests should reflect expected conditions during transport and not conditions limited by regulations of the Nuclear Regulatory Commission. Examples of conditions of transport include testing with spent nuclear fuel rods, diesel and gasoline fires in excess of 30 minutes and high temperatures, high-speed traffic accidents, train accidents and derailments, accidents in mountainous terrain, immersion in water, and sabotage with penetrating weapons. Some commenters stated that computer simulations should not be relied on, particularly since such modeling is inadequate for testing of nuclear weapons. If computer modeling is used, commenters said that modeling in excess of that required by the regulations should be conducted to determine failure thresholds.

Commenters questioned the reliability of testing on existing casks (use of quarter-scale models or only computer modeling), noting that only a very few casks are in use in the United States and that the recently licensed GA4/9 cask has not yet been manufactured. The EIS should clarify whether new or existing casks or preliminary cask designs were considered in the analysis.

Response
The NWPA requires that DOE use casks certified by the Nuclear Regulatory Commission when transporting spent nuclear fuel and high-level radioactive waste to a repository. The Commission certifies that a cask meets the requirements of 10 CFR Part 71, which prescribes radiological performance standards for casks subjected to specific test conditions. These test conditions represent the kinds of forces that a cask would encounter in a severe transportation accident. A cask's ability to survive the tests prescribed by 10 CFR Part 71 can be demonstrated in several ways. These options include component, scale-model, and full-scale tests to demonstrate or confirm the performance of the casks. As part of its detailed technical review, the Commission decides what level of physical testing or analysis is appropriate and necessary for each cask design. If the applicant for a certificate fails to demonstrate compliance with the regulations, the Nuclear Regulatory Commission would not issue a certificate. Therefore, if full-scale testing was necessary, it would be done before the Commission issued a certificate of compliance. For a more complete discussion of cask testing, see Section M.4, of the EIS. DOE has the option of evaluating the need for a full-scale cask test demonstration in the future.

At this time, the Nuclear Regulatory Commission does not require that shipping casks demonstrate their ability to withstand sabotage events as part of the certification process. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection and safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the physical protection and safeguards regulation are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons. The cask safety features that provide containment, shielding, and thermal protection also provide protection against sabotage. The casks would be massive. The spent nuclear fuel in a cask would typically be only about 10 percent of the gross weight; the remaining 90 percent would be shielding and structure.

It is not possible to predict whether sabotage events would occur, and if they did the nature of such events, nevertheless, DOE examined various accidents, including an aircraft crash into a transportation cask. The consequences of both the maximum reasonably foreseeable accident and the aircraft crash are presented in the EIS for the mostly truck and mostly rail transportation scenarios and can provide an approximation of the types of consequences that could occur from a sabotage event. In addition, DOE analyzed the potential consequences of sabotage against a truck or rail cask (see Section 6.2.4.2.3 of the EIS). The results of this analysis indicate that the risk of the maximally exposed individual incurring a fatal cancer would increase from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the terrorist attack of September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

For the EIS, the analysis assumed that the radiation emitted from casks would be within regulatory limits. To determine the number of shipments to be used in the analyses, DOE used the CALVIN computer program. The CALVIN program estimated the number of shipments by using a collection of different kinds of rail and truck shipping casks, including currently existing or designed casks, and matching these to the characteristics of the fuel to be shipped by each generator and the cask handling capabilities of the generator's site. (See Table J-3 of the EIS.)

8.4 (115)
Comment - 37 comments summarized
Commenters expressed concerns that the shipping casks analyzed in the EIS were not yet designed, tested or fabricated, and therefore the environmental analyses were incomplete or erroneous. Design criteria and materials requirements are unknown, and manufacturing equipment is unavailable or has not been developed. Other commenters addressed the inability to preclude human error in the manufacturing process, and the lack of known

and experienced cask manufacturers and experienced workers. Others questioned whether it would be possible to manufacture casks that would be “flawless” (not leak) and could withstand extreme temperature changes. The elimination of the multi-purpose Canister program would expose workers to radiation during the transfer at the reactors, during shipping, and at the repository. Still others said that all manufacturing standards and requirements must be met; that manufacturing oversight is required; and that DOE should make a financial commitment for further research. Commenters provided examples of the problems with existing storage/transportation casks, and casks that have not been certified, requesting that DOE test and publish data on any proposed casks and seek public comment. Some commenters believe that shipping casks can safely transport spent nuclear fuel given the past safety record of the industry.

Response

The shipping casks DOE would use to transport these spent nuclear fuel and high-level radioactive waste would be massive and tough, with design features that complied with strict regulatory requirements that ensure the casks would perform their safety functions even when damaged. Numerous tests and extensive analyses have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents. In addition, since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

Because shipping casks are passive devices, human actions are not necessary to maintain the safety functions of a cask once it has been properly loaded and prepared for shipment. Human factors could affect cask safety in the design, fabrication, maintenance, and preparation for use. Effective practices promoted by a safety culture, strong regulatory oversight, quality assurance, and industry and regulatory standards provide a high degree of assurance that shipping casks meet the performance requirements of the regulations of the Nuclear Regulatory Commission and U.S. Department of Transportation. In addition, through continued commitment of resources to research and development, and development of consensus codes and standards, the Federal Government and private industry have contributed to ongoing improvement of cask safety.

At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which shipping casks would be used. However, many casks are currently being built in the United States for the dual purposes of storage and transportation. As a consequence, fabricators are experienced in cask construction; other fabricators are familiar with construction of nuclear systems and components. DOE is confident that skilled workers and their companies are capable of doing the quality work expected for construction of these casks. As part of the certification of a cask design, the Nuclear Regulatory Commission requires a quality assurance plan that covers all processes and procedures for manufacturing the casks. This quality assurance plan is made part of the contract for the manufacture of casks. The cask owner and the Nuclear Regulatory Commission conduct inspections and audits of the manufacturer’s operations and implementation of their quality assurance plan and procedures to ensure that casks are built to meet certification requirements.

Transportation activities conducted by DOE would use casks certified by the Nuclear Regulatory Commission. The regulations, which must be met prior to certification, include radiological performance standards that ensure public health and safety. These standards are established and well known. Although DOE would use casks designed by others, the designs and applicable quality assurance activities would have to be certified by the Nuclear Regulatory Commission.

Although human error cannot be totally avoided, modern cask design practices, design certification, and compliance with approved quality assurance programs for all aspects of DOE’s transportation activities would limit the occurrence of human factor-based errors and mitigate their effects, should they occur. For example, in cask manufacturing the Nuclear Regulatory Commission regulations require a comprehensive quality assurance program in which measures must be established to ensure that special processes, including welding, heat treating, and nondestructive testing, are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements (see 10 CFR Part 71 Subparts D and H).

Transportation accident data (truck and train accident rates) provided by states and other government agencies for use in the analyses incorporates human error. These rates include human error as causes of the accidents as well as equipment failures that could be caused by human errors in manufacturing. Hence, human error was incorporated into the estimates of impacts of transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Additional detail on human error and accident rates is provided in Section J.1.4.2.2 of the EIS.

DOE believes that the EIS adequately analyzes transportation-related impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site was recommended and approved. See the introduction to Chapter 8 of this Comment Response Document for more information.

8.4 (159)
Comment - 3 comments summarized
Several commenters expressed concerns about gas generation and pressure buildup in spent fuel casks and the potential for venting and hydrogen explosion. One commenter expressed concern about undetected defects in shipping casks.

Response
As discussed in Section 2.1.3.4 of the EIS, the casks that DOE would use to ship spent nuclear fuel and high-level radioactive waste would be certified by the Nuclear Regulatory Commission. Commission regulations at 10 CFR 71.43 do not allow casks to be vented during transportation. In addition, during transportation the containment cavities of the casks, which would hold the spent nuclear fuel, would not contain significant quantities of water or any other material that could be a significant source of explosive or pressurizing gas from radiolytic decomposition or chemical reaction. Nuclear Regulatory Commission and U.S. Department of Transportation regulations, and DOE Orders, as appropriate, would be in effect for all shipments. These regulations and Orders, which include quality assurance programs, would provide the level of safety oversight and monitoring necessary to ensure every cask was properly prepared for shipment.

Casks are robust structures composed of well Characterized materials that are assembled to form relatively simple and massive structures that are within the scope of current technology. Manufacture of the cask is accomplished using many standardized processes and the resulting cask's quality is ensured through application of the Nuclear Regulatory Commission's comprehensive quality assurance program, which covers fabrication of casks and requires that measures be established to ensure that special processes, including welding, heat treating, and nondestructive testing, are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements (see 10 CFR Part 71, Subparts D and H). The quality assurance program picks up systematic errors in the product and shuts down production and use of the casks if a problem is found. The Commission's oversight is independent of DOE's schedule and funding and can be expected to ensure that quality casks would be produced.

8.4 (199)
Comment - 6 comments summarized
Commenters said that the EIS should address additional variations in shipping casks, packaging options, materials and designs for waste packages, and multipurpose canisters. The EIS should also address the various shipping casks to be used and the spent nuclear fuel and high-level radioactive waste contents that will be shipped in each. Commenters suggested the EIS should assume that transport-only casks would be used and that only 68-metric-ton (75-ton), and not 113-metric-ton (125-ton) multipurpose casks, would be used. One commenter wanted the description of the packaging options to indicate that as-low-as-reasonably-achievable principles would allow some radiation to be emitted from packages.

Response
Because all casks must meet the same Nuclear Regulatory Commission and U.S. Department of Transportation safety performance standards for routine radiological exposures and behavior in severe accidents, the principal differences in casks for purposes of risk assessment are their weight, heat load capacity, and carrying capacity. These cask characteristics directly affect the number of shipments and type of transport vehicle.

Section 2.1.1.1 of the EIS discusses the range of packaging scenarios DOE is currently considering for packaging spent nuclear fuel and high-level radioactive waste for shipment and disposal. Section 5.2.2 discusses the design of disposal containers and waste packages being considered. Table J-3 lists and briefly describes 24 different types of shipping casks, including dual-purpose casks, and their projected contents assumed for the purpose of analyzing the potential impacts of shipping commercial spent nuclear fuel. Although other assumptions regarding cask sizes and contents are possible, DOE concluded that the assumptions used in the EIS are appropriate for estimating impacts of transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Section J.1.2.1.2 discusses the assumptions used in the EIS analysis for numbers of canisters of DOE spent nuclear fuel and high-level radioactive waste that would be transported in shipping casks.

Because the design and performance of shipping casks are strictly regulated and must be certified before use, DOE believes that the design details of casks that would not be used for many years are not needed to provide a reasonable estimate of the potential impacts in transporting spent nuclear fuel and high-level radioactive waste. Section 2.1.1.1 of the EIS explains the basis for DOE's selection of three packaging options.

DOE did not include a multipurpose canister option for legal-weight truck shipments because the quantity of spent nuclear fuel transported in a legal-weight truck cask is much less than the quantity that would be loaded into a disposal container. In addition, commercial storage casks that use multipurpose canisters for storage and transportation have capacities much greater than legal-weight truck casks. Designs of disposal containers, waste packages, dual-purpose and multipurpose canisters, other components, and operations of a geologic repository would implement the principle of reducing exposure to workers to levels that are as low as reasonably achievable.

8.4 (226)
Comment - 13 comments summarized
Commenters had general concerns about the shipment of spent nuclear fuel and high-level radioactive waste in casks. Commenters stated that casks are not safe and examples were cited of casks that had been broken in transit and of casks that had leaked. Others stated the casks had been inadequately tested and that every foreseeable risk should be eliminated so that there would be no danger of exposure to radioactive materials. Another commenter stated that spent nuclear fuel and high-level radioactive waste shipments are strictly regulated by the U.S. Department of Transportation and the Nuclear Regulatory Commission. This commenter noted that there have been nearly 3,000 shipments of spent nuclear fuel over the past 30 years, over which time there has never been a release of nuclear material due to a transportation accident. Another commenter believed that just because a cask had Nuclear Regulatory Commission certification, that was not a guarantee of good quality and cited examples from the nuclear powerplant located in the commenter's community. One commenter stated that the assumptions made in the Draft EIS related to cask permeability and potential for breach were very conservative and might have not been well thought through.

Response
In response to public comments, DOE has added Appendix M to the EIS, which presents information on cask safety (see Section M.4). DOE would be required to follow Nuclear Regulatory Commission and U.S. Department of Transportation regulations and use Commission Certified casks when transporting spent nuclear fuel and high-level radioactive waste to a repository. DOE is confident that by implementing these regulations and using Commission Certified casks, transportation would be carried out in a safe manner. Of the thousands of shipments completed over the last 30 years, none has resulted in an injury through release of radioactive material.

Shipping casks are robust structures composed of well-characterized materials that are assembled to form relatively simple and massive structures that are within the scope of current technology. Manufacture of the cask would be accomplished using many standardized processes and the resulting cask's quality would be assured through application of the Nuclear Regulatory Commission comprehensive quality assurance program. The program covers fabrication of casks and requires that measures be established to ensure that special processes, including welding, heat treating, and nondestructive testing, are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements (see 10 CFR Part 71, Subparts D and H).

Numerous tests and extensive analyses have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents. In addition, since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel and high-level radioactive wastefully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

In addition, because spent nuclear fuel and high-level radioactive waste is in solid form, casks do not "leak" radioactive material as that term is commonly used. Instead, a release of radioactive material would involve a release of spent nuclear fuel particles, volatile elements, crud, and fission product gasses into the air.

8.4 (640)
Comment - EIS000141 / 0004
The DEIS also fails to consider unique local conditions along the potential truck route that could cause unacceptable safety and security risks for truck shipments using General Atomics GA-4/9 casks. Primarily a rural two-land highway with numerous steep grades and sharp curves, the route traverses high mountain passes subject to severe winter storms. Long segments (up to 60 miles) have no safe parking areas, few refueling facilities, and limited local emergency response capabilities. The Draft report assumes that almost all truck shipments will be made in the new GA-4/9 casks. The weight of the loaded GA-4/9 cask requires that it be used in conjunction with a specially designed trailer, a lower weight, cab-over-engine tractor, and a single fuel tank. DOE has failed to demonstrate that the GA-4/9 system is appropriately designed for a decades-long, nationwide shipping campaign to Yucca Mountain.

Response
The casks that DOE would use would be designed, manufactured, and operated in accordance with Nuclear Regulatory Commission requirements. These requirements apply to any cask and for any road or rail conditions, including those described in the comment. DOE is not limited to the GA4/9 casks for truck shipments. It could use any Commission-certified cask. The GA4/9 is attractive because of its advanced design and high capacity. The tractor-trailer designed for use with the cask was tested on a specially designed track. The transporter performed adequately in the test, which simulated about 400,000 kilometers (250,000 miles) of highway travel. Planning for shipments would consider route hazards, weather, logistics, and emergency response. For more information see Appendix M of the EIS.

8.4 (840)
Comment - EIS000173 / 0006
There is a problem of preventing criticality in a shipping cask, such as occurred in Japan last month due to an error made at a nuclear powerplant that injured many people, some critically.

Response
Preventing criticality in a shipping cask, as well as in any other system, structure, or component that handles spent nuclear fuel is a fundamental objective. The recent criticality accident that occurred in Japan did not involve spent nuclear fuel handling. The accident occurred at a processing facility. It was studied in depth by the Japanese government and international experts. The causes of the accident were multiple, but stemmed from inadequate training of operators and failure to follow approved procedures. DOE would ensure adequate training of its Federal and contractor staff. The Department would monitor all spent nuclear fuel handling activities at its facilities and ensure compliance with all safety requirements. The Nuclear Regulatory Commission standards for radioactive material shipping casks are found in 10 CFR Part 71. This ruling places limits on the amount of fissile material that can be loaded in a cask and stipulates that loaded casks remain subcritical even under conditions most favorable to

criticality. The criticality control systems for the cask are designed to maintain subcriticality for the most reactive contents permitted in a cask.

8.4 (1061)
Comment - EIS000289 / 0007
I can tell you that Radioactive Waste Management Associates in New York have presented me with facts about your casks that you have not. They are only built to withstand impact speeds of up to 30 miles per hour; and you admit to the fact they can only withstand temperatures of 1,400°, but diesel fuel burns at around 1,800°. And there was a famous fire that resulted from a truck accident in a tunnel that attained this temperature.

Response
The U.S. Nuclear Regulatory Commission requirements for transportation casks are described in 10 CFR Part 71. The requirements establish radiological performance standards for containment, shielding, and subcriticality that must be satisfied for cask designs when subjected to certain tests that represent the forces expected from normal and accident conditions of transportation. Included in the accident tests are a 9-meter (30-foot) free fall onto an essentially unyielding surface and exposure to a fully engulfing hydrocarbon fuel/air fire with an average temperature of 870°C (1,475°F). The 9-meter freefall does result in about a 48-kilometer (30-mile)-per-hour terminal velocity. However, hitting an unyielding target is significantly more severe than a 48-kilometer-per-hour traffic accident between vehicles, or between a vehicle and an ordinary stationary object. Similarly, an average temperature specification for a fire test adequately describes the range temperatures of visible flames of a hydrocarbon-air fire, which may range from 316°C to 1,112°C (600°F to 2,200°F). Although these accident conditions are called tests, analysis of the cask design is often sufficient to demonstrate compliance with regulatory performance requirements. Appendix M of the EIS provides additional information on cask testing and safety.

8.4 (1144)
Comment - EIS000087 / 0001
The truck drivers that transport this stuff have a limited amount of time they can be in front of these containers. Why? Because the containers leak. They do not provide containment.

If they were perfect, the truck driver would be able to be with his truck an unlimited amount of time each day. Therefore, we have a leaky container.

Response
Although the casks emit low-level radiation, they do not leak or release radioactive material, as implied in the comment. Spent nuclear fuel does emit gamma radiation and neutrons, which are largely absorbed by the massive cask. The shielding provided by the cask and distance reduces radiation levels near the cask to levels permitted by the Nuclear Regulatory Commission and the U.S. Department of Transportation. In accordance with those agency regulations, the dose rate around the cask can be no higher than 10 millirem per hour at 2 meters (6.6 feet) from the edge of the transport vehicle. The total dose received by all persons near the cask including crew and members of the public were estimated and are shown in Chapter 6 and Appendix J of the EIS. The maximum dose rate in the crew area permitted by regulation is 2 millirem per hour. Total annual radiation exposure to truck crews are limited by regulation.

8.4 (1575)
Comment - EIS000516 / 0003
Many activities were taken into account such as fire, puncture, accidents. But my question is, how hot of a fire? What kinds of lengths of heat burning would cause the casks to puncture? What will happen when the cask is immersed when combined with other possible factors such as falling off of a highway area into a river? What will happen when that's combined with high speeds with possibility of a fire?

Response
The Nuclear Regulatory Commission requirements establish radiological performance standards for containment, shielding, and sub Criticality that must be satisfied for cask designs when subjected to certain tests that represent the forces expected from normal and accident conditions of transportation (10 CFR Part 71). The regulatory tests for accident conditions are conducted sequentially. The sequence of tests is intended to represent the events expected in an accident (for example, impact, puncture, and fire). Although these accident conditions are called tests, analysis

of the cask design is often sufficient to demonstrate compliance with regulatory performance requirements. Appendix M of the EIS provides additional information on cask testing and safety.

8.4 (2458)

Comment - EIS000679 / 0004

Point number three: We suggested in the past they develop a variety of rail casks instead of the original. DOE was to make every reactor in the country use one big cask that half of them couldn't handle, this kind of the papa bear, mama bear, baby bear approach to cask design. Again they actually seemed to have listened to what they said, but there's so little detail in the Draft EIS that we can't tell what their small, medium, and large rail casks are all about.

Response

Because the specific casks that would be used for truck and rail shipments of spent nuclear fuel and high-level radioactive waste have not been designated, the EIS addresses the performance of generic cask designs in estimating transportation impacts. The important factors needed for this impact assessment are cask performance under normal and accident transportation conditions and cask capacity. Any cask DOE used would have to be certified by the Nuclear Regulatory Commission.

8.4 (2757)

Comment - EIS000859 / 0002

What if the canisters holding this material begin to leak? I know that an environmental impact study is being conducted; however, this study is assuming that these canisters are 100% safe. How can we know they are safe since we've never really used these casks for centuries at a time? I also know that the study is sponsored or directed by the same Department of Energy that is making the proposal. A study cannot prove that they are safe for a long period of time.

In the canister study, the tests conducted for a thirty foot free-fall seem hardly adequate. Trains and trucks often travel on bridges and overpasses, hills and mountains that are hundreds of feet high. What then? This nuclear waste will be coming from everywhere in the country, in some cases over 3000 miles. The risk is by far too great.

Response

Section 2.1.3.4 of the EIS discusses shipping cask manufacturing, maintenance, and disposal. For transportation, the reusable cask, not the spent nuclear fuel canister, provides containment. These casks are designed for service lives of 25 years or longer. During their service lives casks are continually monitored and maintained to ensure their performance level is adequate to protect public health and safety. Although the likelihood and consequences of releases of radioactive material from spent nuclear fuel casks are small, such risks and impacts are addressed in Section 6.2.4.2. The 9.1-meter (30-foot) freefall might seem inadequate when compared to the heights of some bridges and overpasses that a cask could encounter. However, hitting an unyielding surface is significantly more severe than hitting water, sand, hard soil, and even rock surfaces that could be encountered by a cask if such a drop occurred. Events were addressed in the EIS in determining that the risk of transporting spent nuclear fuel is low. Additional information about cask testing and safety is provided in Appendix M of the EIS.

8.4 (2787)

Comment - EIS000880 / 0004

How will DOE bound the number of shipments required to move waste from reactors to Yucca Mountain? Does the EIS assume that new, large rail and truck casks will be available and are these new casks realistic given the costs involved and the fact that DOE is now prohibited from engaging in cask design and production activities?

Response

As discussed in Sections 6.2.1 and 6.2.3 of the EIS, DOE considered a mostly truck and mostly rail scenario for the EIS. DOE factored casks now under development by private sector vendors into its analyses. As discussed in Section J.1.2.1, combining these modal assumptions with the amount of spent nuclear fuel to be shipped and the capacities of the truck and rail casks provides a good estimate of the numbers of shipments expected for the two scenarios. DOE believes that the mostly rail case, in which more than 95 percent of the spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. Although DOE is no longer developing spent nuclear fuel casks, the private sector is. DOE plans to use these vendor developed, Nuclear Regulatory Commission Certified casks for its transportation activities.

8.4 (5205)

Comment - EIS001443 / 0029

It is recognized that the Nuclear Regulatory Commission has recently initiated a new program of cask testing which proposes to subject transportation cask prototypes to an expanded range of physical tests. Since the nature and, of course, results these tests are at present unknown and cask options cannot be evaluated via the NEPA [National Environmental Policy Act] process at this time, the current Yucca Mountain DEIS cannot be used as a base document from which to tier off a NEPA evaluation of possible cask designs. Further discussion of cask designs at this time is therefore unwarranted.

Response

DOE believes that the comment refers to the Package Performance Study (PPS), which the Nuclear Regulatory Commission (NRC) began at the end of 1999. This study will be similar to the Modal Study conducted for the NRC by Lawrence Livermore National Laboratory. Both studies address the performance of NRC-approved casks for severe "real-world" accidents. Accident events and situations considered in the PPS might result in tests and analyses of tests that are different from regulatory test conditions. This would be consistent with the scope of the PPS and would not suggest major changes to the current NRC transportation regulations in 10 CFR Part 71. Information on these studies is on the Sandia National Laboratories Internet site (*http://www.ttd.sandia.gov/nrc/modal.htm*).

The Nuclear Regulatory Commission revises its regulations periodically. The most recent revision in 1996 reflected changes in the international transportation regulations developed by the International Atomic Energy Agency that serve as a model for most national regulations. However, the changes to the Commission regulations are not of the magnitude suggested in the comment and will not affect the applicability of the EIS to meet National Environmental Policy Act requirements.

Information on cask safety and testing is provided in Section M.4 of the EIS. It is DOE's opinion that sufficient information on cask safety and testing is provided in the EIS to support current decisionmaking.

8.4 (5478)

Comment - EIS001660 / 0016

The DOE will change the design of the casks which would transport the HLW [high-level radioactive waste] and SNF [spent nuclear fuel] to the proposed repository at Yucca Mountain. The DEIS does not address whether the new design of the casks has been tested and analyzed. What is the integrity of die valves, seals, and shielding of the new designed cask? (Referenced information is at Attachment A - "Radiological Waste Management Associates" report.) Full scale cask testing is needed rather than computer simulations. [Following is text of reference.]

Use of "reference cask" containing a water jacket neutron shield

The Modal Study used as its reference cask one using a water neutron shield. This shield was assumed to evaporate in event of fire. The resulting dead air space was modeled to cut the heat transfer rate into the cask by over 70% (Modal 6-36). Given a 1475°F fire transferring heat at a rate of 17,000 BTU/hr-ft2, this had the effect of reducing the heat actually absorbed by the cask to 5,000 BTU/hr-ft2. This reduction was assumed when the melting times were calculated. However, newer casks no longer use water jackets, and the thermal insulation device assumed in the Modal Study is no longer present. Therefore, the heat transfer rate absorbed by the cask is expected to be much closer to the thermal output from the fire itself, since it cannot be assumed without testing that the polypropylene shield will behave like a water jacket. Since the time to reach lead melt is proportional to the rate of thermal input, the absence of the dead air insulator would have the effect of reducing the time required to melt the lead shielding from 1.09 hours to about 20 minutes. (Audin, 18) For the uranium and/or stainless steel shield, this means quicker increases in temperature than those postulated by the Modal Study, resulting in a reduction in the fire severity needed to cause a given accident condition.

"Lead cask bias" used to select most appropriate measurement parameter

The decision to use strain on the inner cask wall as the primary measure of cask response is based on lead's tendency to "slump" when subjected to high loading, resulting in high strains on inner cask wall. However, uranium and/or stainless steel are strong and rigid and thus will not slump. Rather, the force from impacts will be transferred to the joints and welds of the cask, likely resulting in a greater force being applied to them than those in a lead cask. The choice of strain as the sole measurement parameter for physical duress will likely lead to an underestimation of the damage caused to newer casks through rupture of welds and seals in the event of an accident. Therefore, new experiments must be performed to model this behavior.

Response
Section 6.2.4.2 of the EIS addresses transportation accident scenarios and the radiological impacts from accidents. DOE has revised the transportation analysis in the EIS to reflect new information. For example, since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates*. Based on the analysis in the report, DOE has concluded that the models used for analysis in the Draft EIS relied on assumptions that caused an overestimation of accident impacts. The radiological performance standards require that a design, in order to be certified, must provide radiological protection according to specified criteria for normal and accident conditions. The performance criteria are applied to containment, shielding, and sub Criticality. The performance standards are the same for any cask design.

8.4 (5825)
Comment - EIS001728 / 0003
Safe shipment containers [are] necessary. We believe that the current containers are of adequate design and have adequate testing and are safe for the general public. It goes through my mind there's a container that was in Europe that was put on a flat-bed truck, put across the railroad tracks, a locomotive and four cars hit that container at 100 miles an hour. The container was usable after that accident. I hate to say that I don't know of any other shipping container out there that would withstand that type of abuse; that the containers must be properly marked and properly identified such as under the requirements of the Department of Transportation; route plans which take into account interstate highways, bypasses, heavily populated areas and other such critical factors.

Response
Safety is DOE's primary concern when shipping spent nuclear fuel and high-level radioactive waste and, as stated in Section 2.1.3.2 of the EIS, DOE would comply with applicable regulations of the U.S. Department of Transportation and the Nuclear Regulatory Commission. The U.S. Department of Transportation and the Nuclear Regulatory Commission strictly regulate all aspects of spent nuclear fuel and high-level radioactive waste transportation including packaging; marking, labeling, and placarding; shipping papers; routing; prior notification; and training. More details on transportation regulations are in Section M.2. In addition, Section M.5 discusses cask safety and testing, including crash tests.

8.4 (6215)
Comment - EIS001017 / 0001
After the accident at Three Mile Island, public awareness of the dangers associated with things radioactive was heightened. In 1980, in order to allay public fears surrounding the transportation of radioactive waste, the Energy Department produced public relations films that purported to demonstrate the safety of casks used to transport the waste. The films show five full scale tests and conclude that the casks survived all the tests without releasing any radioactivity. Footage for the film was lifted from tests conducted and filmed at Sandia National Laboratories to check predictions on computers, not cask safety. The conclusions stated in the promotional film are contradictory to the results of the actual tests.

In 1992, a reporter from a Las Vegas TV station interviewed the scientists who conducted the tests. The project manager told the reporter that during the actual fire test a breach occurred in the cask and some of the lead from the cask squirted out through the hole into the fire. The lead was part of the radiation shield.

In the terrorist test, the reporter learned that when scientists shot a cask with a cannon or rocket, the projectile made a hole in the cask one inch in diameter and ripped through the fuel rods inside. The project manager said that the hole itself would have let out "some very small fraction of the contents of the cask." Yet the promotional film maintains that all the casks survived the tests without damage severe enough to jeopardize containment of their contents.

Critics say the tests conducted at Sandia are not really comparable with conditions encountered in the actual transport of casks. Marvin Resnikoff, in his book The Next Nuclear Gamble, cites a litany of misleading concepts and images and omitted facts.

The fuel used in the Sandia tests was fresh fuel. The amount of radiation given off by irradiated fuel rods is much greater than that given off by new fuel rods. The fuel rods had stainless steel cladding which is stronger than the brittle zircaloy currently used in reactor fuel. The casks used in the tests were obsolete and at least one was designed to a higher standard. The casks had lead radiation shielding. Most casks today use depleted uranium.

In the crash tests the cask was cushioned by the cab of the truck and other impact limiters. Many types of crashes would not afford such protection. Also many routine shipments do not incorporate as many impact limiters. Additionally, there are many crash scenarios which could exceed the cask certification requirements. Faulty valves or welds could fail in a fire or under the impact of a crash. Not all casks are secured by the type of tie downs used in the test. A cask secured with ordinary chains used in many routine shipments would have broken loose and hit the wall.

Pressure in the test casks was 26 pounds per square inch, lower than that of many casks. When filled with high-level waste the internal pressure can be from 300-355 psi [pounds per square inch] (Mark Dowie, Mother Jones, 7/82).

The narrator in the public relations video stated that no radiation would have been released in any of the tests, but in fact two of the Sandia tests resulted in leaks of water. If the pressure and temperature in the casks had been higher, as it would be from spent nuclear fuel, the amount of radiation released would have been greater, making it more dangerous for emergency crews. In the Sandia fire test, faulty welds caused the cask to crack at 100 minutes and the lead shield began to vaporize. The test was stopped. In the promotional film there is no mention of the crack. The narrator simply states that after 90 minutes the cask showed no damage. The Nuclear Regulatory Commission claims that the probability of exceeding the 1/2-hour fire in an accident has been studied and found to be small. However many accident scenarios such as a fire in a remote location or the piling up of many cars could result in fires lasting longer than 30 minutes. The Sandia fire tests were conducted at 1475°. Since the fire test was developed, combustible materials are routinely shipped which burn at temperatures up to 4,000°.

In the drop test a crack formed along a weld, forming a pathway for a leak. This was not mentioned in the promotional film.

Response

This comment covers several issues related to the interpretation by DOE of a film of tests performed at Sandia National Laboratories in the 1970s, as well as specific statements about the tests. Some of the latter statements offer interpretations of the tests that lack factual basis. Both types of comments are addressed in this response. For specific information on those tests, please consult the following documents:

- *Full-Scale Tests of Spent-Nuclear-Fuel Shipping Systems* (DIRS 157157-Yoshimura and Huerta 1976)
- *Crash Testing of Nuclear Fuel Shipping Containers* (DIRS 157098-Jefferson and Yoshimura 1978)
- *Analysis, Scale Modeling, and Full Scale Tests of a Truck Spent-Nuclear-Fuel Shipping System in High Velocity Impacts Against a Rigid Barrier* (DIRS 157096-Huerta 1978)
- *A Study and Full-Scale Test of a High-Velocity Grade Crossing Simulated Accident of a Locomotive and a Nuclear-Spent-Fuel Shipping Cask* (DIRS 157097-Huerta and Yoshimura 1983)
- *Analysis, Scale Modeling, and Full-Scale Test of a Railcar and Spent-Nuclear-Fuel Shipping Cask in a High-Velocity Impact Against a Rigid Barrier* (DIRS 157099-Huerta 1981)
- "Modeling of Pool Fire Environments Using Experimental Results of a Two-Hour Test of a Rail/Cask System" (DIRS 157110-Hamann et al. 1980)

DOE sponsored the testing performed at Sandia National Laboratories. The documentation for the tests (reports and films) is available to any member of the public. While the purpose of the tests was to confirm analytical models, the performance of the casks in conditions simulating severe accidents showed that the casks were very durable. They were not significantly damaged and continued to provide containment and shielding as required by Nuclear Regulatory Commission regulations. To suggest that the tests showed that shipping spent nuclear fuel in the casks would be "safe" was not an unreasonable interpretation of the test data.

In paragraph 2, the reply given to the reporter was correct. A crack in the outer skin of the cask resulted from expansion of the lead shielding after an intense fire, three times the duration of the Nuclear Regulatory Commission test fire. The crack released a small amount of lead before the fire was extinguished. The crack was a result of a manufacturing flaw that neglected to allow an expansion path for molten lead (which expands on melting) to flow into a volume provided for that purpose. The crack did not compromise the inner wall of the cask, which forms the containment boundary for the fuel.

The "terrorist test" referred to in the third paragraph was not part of the accident test series referred to earlier. The test was done in 1982. That test was not part of the film referred to earlier as the commenter suggests and the conclusion regarding the accident tests as quoted was correct.

The quote from Resnikoff in the fourth paragraph is correct. The Sandia National Laboratories tests did not mimic transportation conditions. Actual transportation conditions and accidents are much more benign than the accident environments provided in the tests.

The fifth paragraph deals with the fuel used. The facts are correct. The fuel was included to mimic the weight of spent nuclear fuel; it had no other role in the test. The higher temperature the cask might have achieved with real fuel would have had no effect on the results. The casks were lead shielded, as many are today and many would be for the shipping campaign to a repository. While the casks were no longer usable, they were designed to meet the same Nuclear Regulatory Commission standards in use today.

Most casks are equipped with impact limiters. Those in the Sandia National Laboratories tests were typical of the technology at the time. It is true that the truck cab did absorb some energy as it would in the real life high-severity accident situation modeled in the test. A recent report suggests that the assertion that "many crash scenarios could exceed cask certification requirements" is not correct (DIRS 152476-Sprung et al. 2000). Tiedowns in the Sandia National Laboratories tests met U.S. Department of Transportation requirements, but if the casks in both tests had no tiedowns, the results would have been the same. Little energy is absorbed in breaking the tiedowns. The role of tiedowns is keeping the cargo on the vehicle during incident-free transportation.

Paragraph seven of this comment suggests that the pressure in the casks in the Sandia National Laboratories test was lower than the 210,000 to 250,000 kilograms per square meter (300 to 355 pounds per square inch) said to be typical of high-level radioactive waste casks. During the 1970s, it was common practice to have water-filled casks to provide a cooling medium for the thermally hot, short cooled fuel for which the casks were designed. Because no heat rejection was needed for the surrogate fuel and the internal pressure was sufficient to force water from any leaks that might occur in the cask's seals, there was no need for high pressure (though the pressure level suggested as typical for high-level radioactive waste casks seem to be higher than one might expect during the normal conditions of transportation).

Documentation of the Sandia tests indicates a small quantity of cooling waster escaped from the cask as stated in paragraph eight. The documentation indicates that the loss was not beyond that allowed by Nuclear Regulatory Commission regulations after the hypothetical accident test. The Sandia fire burned at temperatures exceeding 854°C (1,600°F); the 766°C (1,475°F) value is used for analysis and, together with other test conditions specified in the regulation, provides generally equivalent thermal input. The fire required for Commission certification must be fully engulfing (no view of the cask through the flames) for 30 minutes. The Commission assertion that this is not common is based on studies of fires that show that fires in accidents can be hotter and of longer duration, but they do not burn in one location and not with constant intensity as required in the test. As a result, the thermal input to the cask is seldom as high as achieved in the test.

The Sandia tests did not include a drop test as mentioned in the last paragraph of the comment, but if a crack appeared after a test for certification, it would likely result in a redesign of the package if it compromised containment. That is one of the functions of certification testing and analysis.

DOE has added Appendix M to the EIS to provide additional information on cask safety and testing.

8.4 (6556)
Comment - EIS001328 / 0012
NCSL [National Conference of State Legislatures] calls upon the federal government to: Proceed to develop dual-purpose (transportation and storage) and universal casks (transportation, storage and disposal) to reduce the handling of spent fuel and, thus reduce the risk of mishaps and lessen worker exposure.

Response
DOE would not develop transportation casks, but plans to contract with the private sector to provide waste acceptance and transportation services, including equipment. All cask designs must contribute to overall efficiency and operability of the entire transportation systems and meet Nuclear Regulatory Commission regulations. Information on the process for acquisition of waste acceptance and transportation services, including casks, through the Regional Servicing Contractors is provided in Appendix M of the EIS.

DOE did not include a multi-purpose canister option for legal-weight truck shipments because the quantity of spent nuclear fuel transported in a legal-weight truck cask is much less than the quantity that would be loaded into a disposal container. In addition, commercial storage casks that use multi-purpose canisters for storage and transportation have capacities much greater than legal-weight truck casks. Designs of disposal containers, dual-purpose and multipurpose canisters, other components, and operations of a nuclear waste repository will implement the principle of reducing exposure to workers to levels that are as low as reasonably achievable (ALARA).

8.4 (6559)
Comment - EIS001328 / 0011
NCSL [National Conference of State Legislatures] calls upon the federal government to: Consult with all affected parties regarding cask compliance with radiation emissions standards. Because cask integrity and safety is of paramount concern in a transportation system, all affected parties must be involved in a consultation process including, but not limited to, states, local governments, Indian tribes, carriers, labor, the Nuclear Regulatory Commission, the Department of Transportation, the Occupational Safety and Health Administration, the Federal Emergency Management Agency and the Environmental Protection Agency.

Response
The Nuclear Regulatory Commission has established and enforces the regulatory requirements for cask designs. All shipments would be made in Commission Certified casks. There would be various opportunities for states, tribes, and stakeholders to work and consult with DOE as the project moved forward to developing the transportation program. For more information, see Appendix M of the EIS.

8.4 (6925)
Comment - EIS001335 / 0003
The DEIS states that the cask design has been tested through simulation to withstand worse case scenario disasters, which includes withstanding a 30-minute all-engulfing fire at 800° Celsius and a 40 inch fall onto a 6-inch diameter steel rod. It is not hard for me to imagine a derailment on a section of multiple main track involving a coal train and a freight train moving in opposite directions at 50 mph less than 15 feet apart. The cask car containing the nuclear waste slams into the coal cars and is buried under 700 tons (10 cars) of coal, from 20 cars back the force of an additional 100 cars hurls two cars of propane, carrying 150,000 pounds of fuel each, into the pile of twisted metal and they ignite. Now you have an all-engulfing fire that won't burn for 30 minutes, but for 8 hours. The men and women and the two fire trucks of the Gibbon, NE Volunteer Rural Fire Department stand back and watch it burn, wondering how they will extinguish the pile of coal after the two tank cars burn themselves out. Hazardous material regulations should separate highly flammable cars from the cars containing nuclear waste lessening the potential for this type of incident but on February 8, 2000, a 120 Car freight left Lincoln, NE. and was 25 miles down the line when a failed equipment detector/car counter at Firth, NE. indicated two extra, unknown cars on the train. After all the paperwork was checked it was discovered that the unknown cars contained hazardous, flammable material.

I would like to emphasize that I am not being an alarmist, with the exception of the flaming tank cars in the derailment, these are all situations that I see on a daily basis. I'm sure if you wanted to check with the Federal Railroad Administration you could find more than one example of burning cars of hazardous material.

Response
In the EIS, train fires were assumed to burn for up to 11 hours, which exceeds the 8 hours cited by the commenter. As discussed in Section J.1.4.2.3 of the EIS, the rail accident data used in the transportation accident analyses were obtained from the Federal Railroad Administration and were for the period 1994 through 1996. These data include accidents involving hazardous materials fires. Information on cask safety and testing is provided in Section M.5.

As discussed in Appendixes J and M of the EIS, most real-world accidents that have been postulated, including truck crashes into bridges, train derailments followed by fires, derailments followed by immersion of a cask into a river, and similar extreme accident conditions, would not likely result in release of radioactive materials from the shipping casks. The performance standards for the casks prescribed by the Nuclear Regulatory Commission were selected to ensure that less than 1 percent of real-world accidents would result in loss of cask integrity and release of radioactivity from the cask. These standards ensure that the casks would be extremely robust.

8.4 (8016)
Comment - EIS000817 / 0067
P. 2-56 -- You say "one or more qualified companies that provide specialized metal structures, tanks, and other equipment would manufacture new shipping casks" -- just as "nonchalant" as that -- simple. -- I say, wait a minute. Have you looked at the track record of cask vendors? Do you know the problems? This is not just an easy thing. These are new designs -- untested, not time tested, and you expect it all to go like clockwork. Well, don't. The demand for casks is great and subcontractors are not used to nuclear QA. Did you ever hear of Sierra Nuclear and March Metalfab and that fiasco? Do you know of the faulty casks Pacific Nuclear sold DOE in Tru-pact agreements long ago? I mean who are we going to really trust to build these things?? And how do you really plan to verify shielding, structure, and heat transfer in these casks? How and when will O-rings be replaced? -- How are casks monitored en route? What if they "weep"? What is "minor cask maintenance," anyway? Has this been carefully thought out?

Response
Section 2.1.3.4 of the EIS addresses cask manufacturing, maintenance, and disposal. Although DOE does not know the specific companies who would build the casks used to transport spent nuclear fuel and high-level radioactive waste, casks have been successfully built and operated in the United States. As a consequence, many companies are experienced in cask construction and others are familiar with construction of nuclear systems and components. DOE is confident that skilled workers and their companies are capable of doing the quality work expected for construction of these casks.

Prior to issuing or renewing a certificate of compliance, the Nuclear Regulatory Commission must determine that a cask design complies with the requirements of 10 CFR Part 71, Packaging and Transportation of Radioactive Material. This regulation requires that an application for package approval be submitted to the Nuclear Regulatory Commission. This application is known as a "safety analysis report for packaging." The standard format and content guide for this application, Regulatory Guide 7.9, contains sections on structural evaluation, thermal evaluation, and shielding analysis. These analyses and evaluations are reviewed and approved by the Nuclear Regulatory Commission as part of the package approval process. The application must describe the maintenance program for the package, which would include the inspection of items such as O-rings.

Casks would be monitored using a satellite tracking system such as TRANSCOM. More details are provided in Section M.3.2.1.5 of the EIS.

The phenomenon of cask weeping can be described as follows: a cask that has been loaded or unloaded in a spent nuclear fuel storage pool becomes contaminated with radioactivity on its surface. Before shipment, the external surface of the cask is decontaminated to levels specified by regulations, but when the cask is inspected on arrival at its destination, contamination above the levels allowed by regulations is found. It is likely that when a cask is repeatedly placed into water-filled spent nuclear fuel storage pools, it becomes contaminated over time, with the contamination penetrating deeper into the pores of the cask body. The cleaning removes the surface contamination, but the contamination that is deep in the pores remains. During transportation of a loaded cask, the surface can become contaminated again as the deep contamination is driven out of the pores by the heat of the spent nuclear fuel.

The levels of contamination associated with the weeping phenomenon are not high enough to be factored into the risk assessment for transportation, and procedures would be used to effectively preclude this problem during shipments. For example, wrapping the cask in plastic before entry into spent nuclear fuel storage pools is an effective practice that is currently used. Therefore, weeping is not expected to be a significant contributor to risk during spent nuclear fuel transportation.

Minor cask maintenance consists of activities such as replacing seals, valves, and bolts that are identified during inspections. Additional information on cask testing and safety is provided in Appendix M of the EIS.

8.4 (8223)
Comment - EIS001021 / 0007
One thing the EIS definitely reinforces is that storage containers DO degrade, and there IS a measurable risk to the public from nuclear waste shipments to Yucca Mountain. The question is how fast does the damage occur and how much radiation exposure will there actually be?

Response
The degradation of storage containers is discussed in Sections K.2.1.1 and K.2.1.2 of the EIS. The results in Table K-1 show that storage canisters are breached within 500 to 5,400 years after the loss of institutional control.

The radiation dose from nuclear waste shipments is presented in Sections 6.2.3.1 and 6.2.3.2 of the EIS.

8.4 (8297)
Comment - EIS000817 / 0107
P. 4-88 Shipping Container -- depleted uranium and lead add to hazards in any accident and add to total waste at close of the repository. Why use these materials?

Response
Depleted uranium and lead are both used in spent nuclear fuel casks as gamma radiation shields. Depleted uranium is similar to natural uranium except that it has a lower concentration of the fissile isotope, U-235, than does natural uranium. Depleted uranium and lead are both very effective gamma absorbers. When used in a cask they would be fully encapsulated within the cask structure. The transport casks, which would contain the encased depleted uranium or lead gamma shields would be reusable. The spent nuclear fuel and high-level radioactive waste would be placed in waste packages, different from the transport casks, for deep geological disposal. At the end of their useful life, casks would be decommissioned and would be sent to appropriate waste management facilities. The depleted uranium and lead used for shielding in spent nuclear fuel casks would not be added to the repository waste inventory.

8.4 (8396)
Comment - EIS002014 / 0002
There is gong to be at least one accident during the transportation of the casks to Yucca Mountain. The tests you have performed on the casks are not good enough. You were only using simulated nuclear waste so you don't know exactly what will happen. What if it is thrown 40 feet? You never tested it on that far of a distance. I am also concerned that if one of the casks is broken, radioactive waste could seep down into the water table contaminating our drinking water.

Response
The potential for an accident involving transportation of spent nuclear fuel and high-level radioactive waste to Yucca Mountain is discussed in Chapter 6 and Appendix J of the EIS. DOE recognizes that accidents would occur. The potential for a release of radioactive material is very small and is not expected to occur during the 24-year period of transportation. Of the thousands of shipments completed over the last 30 years, none has resulted in an identifiable injury through release of radioactive material. In addition, the radioactive material in the cask is in the form of gases or solids, not liquids. The mode of release would be a gas or particulate. The release would be

carried by the wind. Contamination of surface water would be by deposition of the particles, which would be relatively small amounts.

The Nuclear Regulatory Commission regulates the design, construction, use and maintenance of shipping containers or casks for shipments of spent nuclear and high-level radioactive waste. The casks must be designed to withstand a series of impact, puncture, and fire environments, thereby providing reasonable assurance that packages would withstand serious transportation accidents. Additional information on cask safety and testing is provided in Section M.4 of the EIS.

While no test has been done for a 12-meter (40-foot) drop of a spent nuclear fuel cask, all analytical tools that are shown to predict the results of a 9.1-meter (30-foot) drop and the results of tests at other speeds and orientations indicate that a 12-meter drop is not going to produce a leak path to the environment (see DIRS 152476-Spring et al. 2000).

8.4 (8643)
Comment - EIS000817 / 0195
P. J-52....DOE sort of says NRC [Nuclear Regulatory Commission] will make sure everything is OK and prevent anything like this. Are you kidding? This has all happened! Do you know the history of Sierra Nuclear and the VSC-24 and Transtor casks? Nonconformance after nonconformance -- fines and violations, QA [quality assurance] problems over and over, undocumented weld repairs, charpy testing not done right, cracks in side welds found in a loaded canister, more casks fabricated than NRC exemption allowed before certification, unloading procedure not ready, weld cracks in seal lid welds, a coating that causes exploding hydrogen that lifted up the lid on a cask they were loading in Wisconsin, requirement of UT testing on loaded casks already on the pad at Palisades, Pt. Beach and ANO because of weld cracks. Stop work orders and stop loading orders from NRC numerous times, vent holes too small for unloading procedures in some Palisades casks -- (have to be drilled larger in unloading), shims welded in around shield lid and no initial plan as to how to get them out, no soil testing at the Palisades pad until after casks were loaded and on it there -- (the EIS for the plant on bedrock was used for the pad on sand dunes!). Concrete for outer shell not mixed correctly, rebars put in wrong at ANO, equipment not calibrated correctly -- etc., etc., etc., etc. A real fiasco! And then BNFL [British Nuclear Fuels, Ltd.] buys them out and promises to do better. Do they? No! -- we have the mess at Trojan with coatings washing off and clouding the water so you can't see to load. And the repeated hydrogen burns at Palisades even after we were promised they knew how to vent the hydrogen safely. Then we have Nuhoms with too thin walls than specified, and we have the TN casks at Prairie Island where the resin wasn't treated according to specifications as I understand it -- dry cask storage has problem after problem. But do I think Yucca Mountain is better? No! for these problems will be hidden underground instead of on pads where we can repair and test and monitor them. If those VSC-24 casks were underground, you'd have had to haul them all back up again several times by now! Where is a vendor we can trust? Where is a time tested (over long term) cask? Where is spent fuel that has been checked after unloading a cask? I sure can't recommend any.

Response
Sections 2.1.1.1 and 2.1.3.4 of the EIS discuss repository waste package scenarios and shipping cask manufacturing, maintenance, and disposal, respectively. Although DOE does not know the specific companies who would build the shipping casks or repository waste packages used for spent nuclear fuel and high-level radioactive waste, casks have been successfully built and operated in the U.S. As a consequence, many companies are experienced in cask construction and others are familiar with construction of nuclear systems and components. DOE is confident that skilled workers and their companies are capable of doing the quality work expected for construction of shipping casks and repository waste packages.

Long-term testing of repository waste packages would be part of the Performance Confirmation Program for the repository, which is a program of tests, experiments, and analyses that DOE would conduct to evaluate the accuracy and adequacy of the information used to determine that long-term repository performance objectives have been met. More details on this program are provided in Section 2.1.2.4 of the EIS.

DOE would start monitoring and maintenance activities of the repository and the waste packages after the first emplacement of waste packages. These activities would continue through repository closure, and would include monitoring and inspection of emplaced waste packages, investigations in support of predictions of long-term repository performance, and retrieval of waste packages if necessary. This would ensure that repository problems were identified and not hidden underground.

Spent nuclear fuel has been shipped to various locations around the U.S. for examination. Most of this spent nuclear fuel currently resides at the Idaho National Engineering and Environmental Laboratory.

8.4 (9407)

Comment - EIS001888 / 0103

The quality of the report is flawed in fundamental ways. Sources cited by the report in Chapter 6 refer to reports that assumed the use of a Multi-Purpose Canister (MPC) system. The DOE has abandoned the MPC system as unworkable. Despite this, the DEIS uses references about the MPC design to support its conclusions even though they are not relevant for the proposed action described by the DEIS.

Response

None of the calculated environmental impacts of transportation accidents in Section 6.2.4.2 of the EIS, conclusions about the impacts, or decisions to be made from the EIS assumed the use of the multi-purpose canister system. For example, some information in the EIS was derived from previous evaluations of the system, such as *Health and Safety Impacts Analysis for the Multi-Purpose Canister System and Alternatives*. Section J.1.2.1.1 lists shipping cask configurations and their capacities. Note that some of the casks are designated dual-purpose. Information directly applicable to the cask configurations under consideration in the EIS (that is, accidents at commercial facilities during spent nuclear fuel loading operations for single-purpose casks) was taken directly from the study. The probability of a lift-handling accident involving a fuel assembly was estimated to be 0.0001 per handling operation (DIRS 104794-CRWMS M&O 1994), as reflected in Section 6.2.4.1. This estimate is applicable to fuel assembly handling by crane and is independent of the type of cask or canister into which the fuel assembly is being placed. Thus, the information extracted from the reference is relevant to the shipping cask configurations assumed in the EIS.

Adjustments were made to the information extracted from references in cases where bases for the studies were not consistent with the assumptions made in the EIS. For example, the reference listed above assumed a 30-year operational period for the repository. In the EIS, adjustments were made to account for the assumed 24 years of repository operation, where appropriate. There are many similar instances in which data as extracted from a reference and adjusted to account for different bases and assumptions. This is consistent with Council on Environmental Quality guidance and DOE policies and procedures. Each EIS reference has been reviewed in detail, a determination of its applicability has been made, and appropriate adjustments have been made where necessary. As a consequence, DOE believes there is an adequate technical basis for the conclusions presented in the EIS.

8.4 (9582)

Comment - EIS001888 / 0256

The greatest cause for concern is the absence of operational performance data for most of the complex packaging, handling and shipping equipment required to implement the Proposed Action and Modules 1 and 2. For example, the GA-9 transportation cask is one of the primary components of the waste handling system envisioned in the DEIS. However, that cask requires a special trailer to handle and transport. This trailer has not yet been constructed. As was noted in one of the reference documents supplied with the DEIS, only "preliminary sketches" exist. This problem is particularly acute for the heavy haul transportation proposal. No data are presented in the DEIS to support any conclusions about the safety of transporting a 125 ton cask twice daily at 25 mph on an urban bypass with posted speeds of 65 mph through Clark County. No past experience, transporting spent fuel is relevant to the proposed action because there is no operational performance data for the equipment used to handle the waste.

Response

Although the GA4/9 shipping cask is a new design, it has no design features that are new. The shipping cask consists primarily of a thick stainless steel cask body that provides the primary containment of the radioactive cargo. Closure lids are welded to the bottom of the cask body and bolted to flanges at the top. Double elastomeric O-ring seals are provided for the top lid. Aluminum honeycomb impact limiters are provided to absorb energy should an accident occur. Depleted uranium is provided for gamma shielding and a solid hydrogenous material is provided for shielding against neutron radiation. All of these features and materials have been provided in past shipping cask designs and DOE and Nuclear Regulatory Commission are confident that the computer modeling and testing that has been conducted on the GA4/9 cask design accurately predicts the behavior and performance of the shipping cask under severe accident conditions.

In terms of operational characteristics, the GA4/9 is not significantly different than other spent nuclear fuel shipping casks. The cask is shipped horizontally and loaded vertically, incorporates an internal basket for supporting the spent nuclear fuel cargo, and is closed using double O-rings seals and a bolted closure. Nevertheless, commercial and DOE facilities would develop site-specific cask handling procedures and conduct dry runs of cask handling operations prior to loading actual spent nuclear fuel assemblies into the shipping casks. Therefore, based on operating experience with similar spent nuclear fuel shipping casks and requirements to develop site-specific procedures and conduct dry runs, DOE believes that the lack of operating experience with actual GA4/9 shipping casks is not an issue with respect to the transportation impact analysis.

The commenter was concerned about the trailers that would be used to haul the spent nuclear fuel shipping casks. Although the GA4/9 trailer is specially designed for the shipping cask, it is similar to other trailers used to haul concentrated heavy loads. The trailer meets the requirements of American National Standards Institute (ANSI) N14.30-1992, “American National Standard for Nuclear Materials – Semi-Trailers Used in the Highway Transport of Weight Concentration Radioactive Loads Design, Fabrication, and Maintenance.” Modifications would be made to incorporate the devices necessary to secure the shipping cask to the trailer, but otherwise the trailer is little different than other trailers in use today for weight Concentrated loads.

On the other hand, the heavy-haul truck transportation systems are in conceptual stages of development. Preliminary design and engineering studies have been conducted [see “Road Upgrades for Heavy-Haul Truck Routes - Design Analysis” and “Yucca Mountain Potential Nuclear Waste Repository Supplemental Transportation Analysis” in CRWMS M&O (DIRS 155347-1999)] that identify potential upgrades for mitigating the potential impacts of the heavy-haul truck concept shown in Figure 2-33 of the EIS. DOE believes it has adequately demonstrated the feasibility of these alternatives and developed them sufficiently to support comparisons of alternatives and decisionmaking about transportation alternatives.

DOE agrees the mostly rail/heavy-haul truck mode in Nevada is unprecedented, with only the heavy-haul truck campaign in France as a close comparison. However, based on the analysis mentioned above, this mode of transportation is technically feasible and its costs are comparable to rail transportation. Furthermore, DOE believes adequate measures are available or can be developed to ensure the safety of heavy-haul truck shipments. Safety measures currently required for heavy-haul truck shipments include restricting travel to daylight hours and providing escorts in front of and behind the shipments to warn other drivers of the slow-moving vehicles. In addition, DOE proposes to upgrade candidate heavy-haul truck routes to enhance the safety of the heavy-haul truck shipments and other vehicles and drivers on the highway. With these and other safety measures in place, DOE believes the heavy-haul truck implementing alternatives can be conducted safely.

8.4 (9587)
Comment - EIS001888 / 0262
Cask Fleet

No safety performance data exist to provide the basis for a credible transportation risk assessment. How many casks will be built? How long will a cask be used? When will they be built? Once a design is selected, how will it be tested? Will the tests be full-scale or models? How many spare parts will be fabricated? When? When will they be tested? How will changes to cask design be performed? How will the Regional Service Companies (RSCs) manage the spare parts and the cask fleets? None of these questions are addressed by the DEIS.

Response
In the United States, more than 2,700 shipments of spent nuclear fuel have been made over the past 3 decades with no releases of radioactive material due to a transportation accident. About 90 percent of those shipments used truck casks and the remaining 10 percent used rail casks. Although different casks might have been used over that period, they all met the Nuclear Regulatory Commission design standards. Thousands of shipments have been made internationally with casks that are certified to the same standards that confirm the U.S. experience. This safety record for spent nuclear fuel transport in the United States is excellent and is consistent with the overall highway and rail accident data. Risk assessment accident data for commercial transportation has been used in conjunction with

analysis of cask performance to estimate risks associated with spent nuclear fuel transportation. The approach is appropriate and widely accepted in the risk assessment community as the basis for credible risk assessment.

For the purposes of the Draft EIS, details relating to logistics of cask operations are not important. The transportation system would be operated in compliance with Nuclear Regulatory Commission requirements in regards to operation and maintenance of the cask. These requirements would ensure that casks used in operating the system would meet the safety standards on which the Draft EIS analysis was based.

In response to comments, DOE added Appendix M to the EIS. This appendix presents additional details on transportation planned operations and the Regional Servicing Contractors; on cask design, safety and testing; emergency planning and response; and on liability concerns.

8.4 (9590)
Comment - EIS001888 / 0264
Fabrication Issues

In a film of cask tests made in 1977, a cask is shown engulfed in flame as part of the 30-minute fire test required for cask certification. Twenty minutes after the camera was turned off, having recorded an ostensibly successful test, the cask broke open due to a manufacturing defect. An under appreciated aspect of transporting SNF [spent nuclear fuel] is the high level of technical sophistication required to fabricate a waste cask. The challenge of fabricating casks on the massive scale required by the programs proposed by the DEIS is problematic at best and could be greatly complicated by short production schedules, sporadic program financing, and other considerations not mentioned in the DEIS.

The transportation cask is assumed to be the primary component ensuring the safety transportation of spent nuclear fuel. The slightest flaw in manufacturing casks could have a greater impact on safety than many other variables. Although it is not a traditional NEPA [National Environmental Policy Act] consideration, it is an important part of ensuring the safe transportation of waste and a discussion of cask fabrication issues should have been included.

Response
The commenter is correct in stating that the transportation cask is the primary component for assuring the public's safety. This is one of the primary tenets of the radioactive materials transportation regulations. The design of casks and process of certification that is outlined in regulation and carried out by the Nuclear Regulatory Commission is such that casks which do not meet the requirements do not get certified.

Casks do not, in general, show a high degree of technical sophistication, as suggested in the comment. They are a passive structure composed of well characterized materials that are assembled to form relatively simple and massive structures that are within the scope of current technology. Manufacture of the cask is accomplished using many standardized processes and the resulting cask's quality is assured through application of the Commission's comprehensive quality assurance program. The Commission's quality assurance program covers fabrication of casks and requires that measures be established to ensure that special processes, including welding, heat treating, and nondestructive testing, are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements (see 10 CFR Part 71, Subparts D and H). The quality assurance program picks up systematic errors in the product and shuts down production and use of the casks when a problem is found. The Nuclear Regulatory Commission oversight is independent of DOE's schedule and funding and would ensure that quality casks would be produced. The example quoted in this comment was related to a manufacturing defect in a cask that was: (1) too old to be covered by the Commission's quality assurance program; (2) not in any way a threat to containment of the spent nuclear fuel; and (3) so subtle that it was not detected until conditions existed that would be seen in fewer than 1 in 10,000 severe accidents (DIRS 152476-Sprung et al. 2000).

8.4 (10016)
Comment - EIS001932 / 0001
Many of the safety tests on the "packaged for shipment" casks are flawed. The NRC [Nuclear Regulatory Commission] regulations require casks to be able to withstand a fire of 1,475° F for 1/2 hour seems impressive, but it is inadequate for highway and rail conditions. Many hazardous [cargoes], as a result of an accident, burn at

temperatures in excess of 1,475° F and longer than 1/2 hr! Diesel fuel burns hotter, as does propane at 4,000° F, butane at 1,875° F. In fact, the average temperature of a highway accident fire is 1,850° F (with a range between 1,400° F and 2,400° F). In addition, I am concerned about the integrity of the pressure relief valves in case of fire. I also understand that the trucks will be carrying extra fuel to avoid fuel stops or [stopovers]. In the case of rail shipments, rail bed integrity on bridges or trestles over rivers seem particularly vulnerable. Either from terrorists or improper maintenance.

Response
Safety is DOE's primary concern when shipping spent nuclear fuel and high-level radioactive waste and, as stated in Section 2.1.3.2 of the EIS, DOE would comply with applicable regulations of the U.S. Department of Transportation and the Nuclear Regulatory Commission. The standards being questioned by the commenter are established by the Nuclear Regulatory Commission, not DOE. DOE will continue to rely on the Nuclear Regulatory Commission to verify the adequacy of these standards. For example, the design of pressure relief valves would be reviewed and approved by the Nuclear Regulatory Commission during the package approval process.

Because of the weight of the truck casks analyzed in the EIS, it is likely that the trucks would carry less than typically carried.

Adequate rail lines, crossings, bridges, and tunnels exist to support spent nuclear fuel and high-level radioactive waste transportation, which requires no special transportation infrastructure that is not necessary for the safe transportation of commodities in the United States.

More details on cask safety and testing, including crash testing, are provided in Appendix M of the EIS.

Section 6.2.4.2 of the EIS addresses accidents including acts of sabotage. Sabotage of rail infrastructure would yield consequences similar to those estimated for transportation accidents.

8.4 (11360)
Comment - EIS002242 / 0002
Now, in the 1970's I was asked to conduct some experiments to evaluate whether or not our analytical tools were accurate in predicting what would happen to these shipping containers in severe accidents.

The other thing that I wanted to do was to try to develop some understanding of the environment of a severe accident, so that we would have a better handle on how to analyze these things. These tests were conducted with public involvement. On the first test we had 900 people show up for the test. Everybody loves to see smashing and crashing. The first test involved a 60-mile-an-hour impact of a truck mounted-shipping cask into a 20-foot cube of reinforced concrete. 960 tons of it.

The second test we took the same cask, since it suffered no damage, and impacted it on another truck at 84 miles an hour -- that's roughly twice the kinetic energy. Again no problem. We did a series of five full-scale tests during the time I was with Sandia Labs -- we did a total of about 1500 tests involving transportation of these materials.

The result was, of these tests -- since the public was involved, I would get up in front of people and say here is what we are going to do, here is what we expect after the tests. They were free to go up and look for themselves. And in every single case we predicted the damage accurately. If there was any inaccuracy, we overpredicted the damage.

Response
This commenter shares his personal experience in conducting the test program at Sandia National Laboratories in the mid-1970s. That experience suggests to the commenter that the capability to estimate the upper limit of the results of a wide variety of accident scenarios exist. DOE agrees with this comment and points to the work by Lawrence Livermore National Laboratory (DIRS 101828-Fischer at al. 1987) and, more recently by Sandia National Laboratories (Sprung et al. 2000), in demonstrating analytical capability related to cask response and estimation of risk to the public. Additional information on cask safety and testing is provided in Section M.4 of the EIS.

8.4 (11480)
Comment - EIS002247 / 0008
And I would like to know what casks are currently NRC [Nuclear Regulatory Commission] certified and whether or not they have the Transcom system in them, or in the trucks that are carrying them.

Response
The casks DOE is considering would have a valid Nuclear Regulatory Commission certificate of compliance when shipments began. Examples of truck casks certified by Commission include the General Atomics GA-4, the NAC International NLI-1/2, the NAC International NAC-LWT, and the Transnuclear TN-8 and TN-9.

The TRANSCOM system is a device attached to a vehicle that monitors vehicle movement by satellite tracking. DOE would use such a tracking system to monitor shipments when shipping began.

Appendix M of the EIS provides information on the transportation casks, regulations, and the operational protocols including shipment monitoring.

8.4 (11579)
Comment - EIS002235 / 0002
There are questions as to the crash test studies that were performed on the casks as to whether they are adequate to withstand the rigors of our Cajon Pass.

Response
As discussed in Sections 6.2.4 and J.1.4 of the EIS, neither the EIS nor the Nuclear Regulatory Commission's (NRC) transportation regulations (10 CFR Part 71) address specific hazards on specific highways or railways. However, both address the types of hazards that could be encountered over highways and railways. Casks certified by the NRC for transportation are designed to perform their radiological protection functions under normal and accident conditions of transportation. These radiological protection functions ensure public health and safety. Section J.1.4.2 considers the likelihood and consequence of accidents for transportation of spent nuclear fuel in estimating risk. The likelihood or probability of the occurrence of an accident with specific characteristics is based on historic statistical behavior. The consequence of an accident with specific characteristics is based on engineering factors and the fact that casks used by DOE would be NRC-certified. Because of these considerations (statistically based accident rates and cask performance), the risks estimated for the EIS are expected to cover transportation of spent nuclear fuel anywhere in the United States, even over highways and railways that might have more severe conditions or be prone to higher than average accident rates. The conditions that exist at El Cajon Pass (long steep grades) are covered by the analyses in the EIS.

8.4 (11929)
Comment - EIS000817 / 0200
P. 6-29. And, frankly, seeing how the NRC [Nuclear Regulatory Commission] handled the VSC-24 fiasco, I have not a great deal of confidence in what they predict for cask performances either. NRC staff is overworked and can't handle the gigantic amount of problems that vendors and utilities have dropped in their lap dealing with cask certification and use. Every reactor wants casks; every vendor wants certification -- there is a big push by the industry to get everything done as fast and as cheaply as possible.

Exemptions to regulations and codes are handed out all over the place. This leads to trouble! Safety analysis documents are not current with what is really being done with casks as the procedures and designs are constantly changed by each utility. The "generic" cask has become a chameleon and is "site specific" at each location in the end. Also, the lack of communication between vendor, utility, and NRC on problems and troubleshooting has led to repeated problems that were not necessary. They could have been prevented. Workers don't even know when to call a fire a fire apparently when it comes to hydrogen flames vented from a cask. And then, at Palisades, they vented it through a flammable plastic tube attached to the machine by duct tape and was way too close to the cask. So it burned again! Do you really expect public trust when such stupid things go on with dry cask storage? And of course the mess at Trojan with Transtor was predictable -- but they did it anyway knowing full well the coating wasn't completely baked on as it was supposed to be. And other casks have problems too -- you know it. So don't act as if casks will work as expected. They won't.

Response
The Nuclear Regulatory Commission (NRC) is an independent agency of the Federal Government. NRC responsibilities include regulation of the Nation's civilian use of radioactive materials to ensure the protection of public health and safety. The NRC and its licensees share the responsibility for protecting public health and safety (DIRS 153561-NRC 2000). When the licensee fails to carry out its responsibilities to public health and safety, the NRC takes appropriate enforcement action. In the example given by the commenter, the NRC did that. The NRC learned of the problem and took appropriate enforcement action.

The NRC was established 25 years ago by the Energy Reorganization Act of 1974. The NRC record for regulating civilian use of radioactive materials is outstanding. DOE would use only Commission-certified casks for activities conducted under the NWPA. The Department is confident that the NRC will perform its mission, and the Department will uphold its responsibility for protecting public health and safety. Appendix M of the EIS provides additional information on applicable regulations and cask testing and safety.

8.4 (11980)
Comment - EIS002101 / 0014
Then you bounce them across our highways all the way out to here. All that corrosion's falling off of the casks. 750°, thousands of times background radiation emitting off of these things.

Response
Section 6.2.4.2 of the EIS addresses transportation accident scenarios and the radiological impacts from accidents.

Because of the strength and construction of a certified cask, it is not expected that a transportation accident could result in the ejection of spent nuclear fuel though the release of spent nuclear fuel would be a source of corrosion and large doses. The former would be a containment concern, the latter a shielding concern, since the shielding surrounds the containment vessel. The type of failure suggested would require large forces and cask designs that used brittle structural materials for their containment systems. The structural materials used in cask containment systems are characterized as ductile materials. Such materials, should they fail, would tend to stretch beyond their design limits, or in severe cases, tear. Although accident forces could be large, casks are designed with large safety margins to limit such stretching to meet regulatory requirements even for large accident forces. They are designed to preclude tearing or breaching of the containment system. Neither the forces possible in transportation accidents, nor the cask materials used, are consistent with the suggested scenario.

8.4 (12573)
Comment - EIS001887 / 0324
Page 6-31 to 6-32; Section 6.2.4.2.1 - Impacts from Accidents - National Mostly Legal-Weight Truck Scenario

Impact Issues Specific to Use of GA 4/9 Casks

The Draft EIS mostly legal-weight truck national transportation scenario fails to consider unique circumstances of the transportation system being evaluated. Specifically, the Draft EIS assumes that all shipments will be made in the new General Atomics GA4/9 truck casks, but fails to explicitly address aspects of the design and performance of those casks which may increase the probability and consequences of highway accidents.

Nevada's 1995 scoping comments requested that DOE consider the following issues. In order to achieve a four-fold increase in cask capacity, the GA4/9 casks utilize a number of new design features and materials. Further, the weight of the loaded GA4/9 cask requires that it be used in conjunction with a specially designed trailer, a lower weight cab-over-engine tractor, and a single fuel tank, in order to comply with legal weight limits. To date, there is no operating experience with spent fuel shipments in actual GA 4/9 casks, although DOE contractors have conducted operational tests using mock-ups. To our knowledge, no GA 4/9 casks have yet been manufactured under the recently issued NRC [Nuclear Regulatory Commission] certificate. The validity of the Draft EIS LWT [legal-weight truck] transportation risk assessment therefore rests entirely upon speculative assumptions about the performance of casks which have never been used.

Nevada believes the Draft EIS must demonstrate that the GA4/9 cask, trailer, and tractor system is appropriately designed for use in a decades-long, nationwide shipping campaign to Yucca Mountain. DOE's risk assessment must evaluate issues such as: the power and handling characteristics of the tractor relative to long hauls in mountainous terrain under winter driving conditions; noise and vibration levels within the cab, and the potential impacts on driver fatigue and increased probability of human error; and the constrained fuel capacity of the tractor, requiring refueling every 300 to 400 miles, which could may additional safety and safeguards risks. The performance of GA4/9 cask's depleted uranium gamma shield in high-speed collisions with relatively unyielding structures, and the vulnerability to terrorist attack with armor piercing weapons and commercial shaped charges, must specifically be evaluated.

Response
As stated in Chapter 6 of the EIS, all shipping casks used to ship spent nuclear fuel and high-level radioactive waste to Yucca Mountain would be certified by the Nuclear Regulatory Commission. These casks would meet the design, performance, and testing requirements in 10 CFR Part 71.

The shipping cask performance data used to estimate the radiological risks of transporting spent nuclear fuel are from the Nuclear Regulatory Commission report *Reexamination of Spent Fuel Risk Estimates* (DIRS 152476-Sprung et al. 2000). These data represent the best available information on the performance of shipping casks during accidents, including shipping casks that use depleted uranium shielding. In addition, the report *Projected Source Terms for Potential Sabotage Events Related to Spent Fuel Shipments* (DIRS 104918-Luna, Neuhauser, and Vigil 1999) evaluated shipping casks that use depleted uranium shielding.

In terms of operational characteristics, the GA4/9 is not significantly different than other spent nuclear fuel shipping casks. The cask is shipped horizontally and loaded vertically, incorporates an internal basket for supporting the spent nuclear fuel cargo, and is closed using double O-ring seals and a bolted closure. Nevertheless, commercial and DOE facilities would develop site-specific cask handling procedures and conduct dry runs of cask handling operations prior to loading actual spent nuclear fuel assemblies into the shipping casks. Therefore, based on operating experience with similar spent nuclear fuel shipping casks and requirements to develop site-specific procedures and conduct dry runs, DOE believes that the lack of operating experience with actual GA4/9 shipping casks is not an issue with respect to the transportation impact analysis.

The commenter was concerned about the tractors and trailers that would be used to haul the spent nuclear fuel shipping casks. Although the GA4/9 trailer is specially designed for the shipping cask, it is similar to other trailers used to haul concentrated heavy loads. The trailer meets the requirements of ANSI Standard N14.30-1992, *American National Standard for Nuclear Materials – Semi-Trailers Used in the Highway Transport of Weight Concentration Radioactive Loads Design, Fabrication, and Maintenance*. The tractor is commercially available and is used today for long hauls and to traverse difficult terrain under adverse weather conditions. The operating characteristics of the tractors and trailers are not significantly different than other load Concentrated shipments. Therefore, the power and operating characteristics of the tractor-trailer are adequately addressed in the transportation impact analysis. In addition, noise and vibration levels in the truck cab would be no different than other similarly designed truck-tractor combination vehicles and would not contribute any more to human error than other truck-tractor systems.

The transportation impact analysis incorporates the constrained fuel capacity of the tractor, which does not appear to DOE to be a source of additional safety and safeguards concerns. In terms of safeguards concerns, the shipments would meet the Nuclear Regulatory Commission requirements in 10 CFR Part 73. Stops, including refueling stops, are addressed in the route plans submitted to the Nuclear Regulatory Commission for approval. Appropriate safeguards and security provisions are specified during the preshipment planning process and are implemented for each shipment. See Appendix M of the EIS for additional information.

A number of activities are conducted to provide assurance that the shipping casks and vehicles are not deteriorating over time. The shipping casks are visually inspected for damage, their sealing surfaces and seals are inspected and replaced or repaired, and a leak test is performed prior to each shipment in accordance with operating procedures at the commercial, DOE, and Yucca Mountain sites. In addition, the fabricated casks are tested, including weld and hydrostatic tests, before they are placed in service. The shipping casks are subject to periodic inspections in accordance with the Certificate of Compliance issued by the Nuclear Regulatory Commission. Furthermore, periodic inspection and maintenance requirements for the vehicle (including in-transit brake, tiedown, and undercarriage inspections conducted by state agencies) provide assurance that the tractors and trailers used to haul the shipping casks are in proper working order. Further information on cask testing, operational protocols, and test and inspection procedures is provided in Sections M.4 and M.5 of the EIS.

8.5 Intermodal Transfer Facilities and Heavy-Haul Trucks

8.5.1 INTERMODAL FACILITY OPERATIONS

8.5.1 (180)
Comment - 8 comments summarized
Commenters said that the range of environmental, social, and economic impacts from the construction and operation of an intermodal transfer station was not adequately addressed in the EIS.

For the Caliente intermodal transfer station, commenters were concerned about the radiological risks to residents of Caliente because of the proximity of the facility to the city. Some wanted to know if the spent nuclear fuel and high-level radioactive waste would be repackaged at the facility, thereby increasing the risks of radiation exposure. Others said that this site is not an appropriate place to build such a facility. Some said that people in Caliente have already been adversely affected by the possibility of having an intermodal transfer station so close to the city and that citizens have become polarized just from the planning and decisionmaking associated with the facility. Others said that such a facility could adversely affect the lifestyle of residents. Commenters were concerned that businesses would not locate in Caliente because of the threat of constructing an intermodal transfer station or would move out if such a facility were constructed.

For the Sloan/Jean intermodal transfer station, commenters said that air quality and health impacts associated with this facility were not addressed in the EIS.

For the Apex/Dry Lake intermodal transfer station, commenters were concerned about the proximity of this facility to Las Vegas.

Response
Section 6.3.3 of the EIS discusses the impacts of Nevada heavy-haul truck implementing alternatives, including the impacts associated with an intermodal transfer station. The discussion indicates that, because spent nuclear fuel and high level radioactive waste casks would not be opened at the intermodal transfer station, the potential for accidents that could threaten the integrity of the casks is remote. These casks would be designed and certified by the Nuclear Regulatory Commission to withstand a range of severe transportation accident conditions, including collision impacts, drops, fires, and immersion in water. These conditions are much more severe than any expected at an intermodal transfer station. Therefore, the radiological risks from accidents to workers at an intermodal transfer station would be low, and the risk to the public from accidents at the facility would be negligible.

Section 6.3.3.1 of the EIS covers the impacts, including socioeconomic impacts, that would be common to the five heavy-haul truck alternatives. For example, it states that the total increase in employment (direct and indirect) that would result from construction of the intermodal transfer station, "… would peak in 2008 and would include about 135 workers. It also states that, "Increases in real disposable income from constructing an intermodal transfer facility would peak in 2008 at between about $2.7 million and $3.1 million." Air quality impacts common to operation of an intermodal transfer station at the Caliente, Apex/Dry Lake, or Sloan/Jean site are listed in Table 6-83. Health and safety impacts common to the alternative locations for an intermodal transfer station are listed in Tables 6–85, 6-86, and 6-87. Specific impacts associated with the construction and operation of an intermodal transfer station for each heavy-haul truck route analyzed are discussed in EIS Section 6.3.3.2.1 to 6.3.3.2.5. Radiological impacts to the health and safety of workers and persons living along transportation routes in Nevada, including impacts to persons who lived in the vicinity of an intermodal transfer station, are included in the results presented in Tables 6-93, 6-107, 6-112, and 6-117. The possible cumulative impacts from the operation of an intermodal transfer station at Caliente for shipments from the Proposed Action and shipments of low-level radioactive waste are discussed in Section 8.4.2.

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in

predicting future behavior based on perceptions had advanced sufficiently since the EIS scoping process to enable DOE to quantify the impacts of public risk perception on economic development or property values in potentially affected communities (see Section 2.5.4 and Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate either to Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. In addition, DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods by which such impacts could be predicted with any degree of certainty.
- Much of the uncertainty is irreducible.
- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

If Yucca Mountain was recommended and approved as the site for a monitored geologic repository, DOE would strive to provide clear, accurate information to the public regarding the repository and transportation planning, including potential risks.

8.5.1 (328)
Comment - EIS000028 / 0003
As for transporting low-level nuclear waste, a good truck route currently exists from the rail at Yermo, California. That area is practically void of human population. Yermo is isolated and could serve as a rail/truck terminal.

Response
A heavy-haul truck route originating in Barstow or Yermo, California, using State Route 127 would be similar to a route originating in Baker, California. A route originating from Baker using State Route 127 was considered but eliminated from further detailed study (see Section 2.3.3.2 of the EIS). A route originating from Barstow or Yermo would be eliminated from detailed study for reasons similar to that of the Baker route.

8.5.1 (911)
Comment - EIS000139 / 0001
It appears that intermodal transportation is the most effective and efficient way of transporting both low-level and high-level radioactive materials. We definitely would like to see the DOE seriously consider and push, if possible, the intermodal option preferably out of Caliente, Nevada.

Response
DOE has noted the commenter's preference for intermodal transportation in Nevada. However, DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. The choice of a rail corridor or intermodal transfer station location and heavy-haul truck route within Nevada would not be based solely on the potential environmental impacts identified in the EIS. DOE would consider factors such as engineering feasibility, safety, input from the State of Nevada and surrounding communities, and cost in its decisionmaking. Consultations also would consider mitigative measures necessary to preclude or reduce potential impacts.

8.5.1 (997)
Comment - EIS000235 / 0003
The Draft EIS does not describe the type of staff that will be required to operate an intermodal facility in Caliente. Such staff will presumably include persons with training in the proper handling of radioactive materials (i.e., radiation health physicist) and emergency first response. The availability of specialists in Caliente would provide a capability to manage risks associated with other hazardous materials being shipped through the community every

day by rail. The Final EIS should characterize the types of specialists who would be required at an intermodal facility and how their presence in Caliente would help to manage existing risks from shipments of hazardous materials through the community.

Response
A preliminary description of the staff at an intermodal station is given in the *Intermodal Transfer Station Preliminary Design* (DIRS 104849-CRWMS M&O 1997). Specific staff capabilities at an intermodal station that could supplement and/or support the surrounding communities emergency response capability, would be addressed during the development of the system under the Acquisition of Waste Acceptance and Transportation Services for the Office of Civilian Radioactive Waste Management (see Section M.3 of the EIS for details). If a decision to proceed with an alternative that includes intermodal transfers was made, detailed designs of the intermodal facility would be developed as well as detailed staffing plans.

However, DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. The choice of a rail corridor or intermodal transfer station location and heavy-haul truck route within Nevada would not be based solely on the potential environmental impacts identified in the EIS. DOE would consider factors such as engineering feasibility, safety, input from the State of Nevada and surrounding communities, and cost in its decisionmaking. Consultations would consider mitigative measures necessary to preclude or reduce potential impacts.

8.5.1 (2431)
Comment - EIS000683 / 0009
In the interest of doing this, we've asked that our local oversight committee give a special attention to identifying the impacts that would be associated with this intermodal facilities in Caliente.

Our officials came out and actually said that they supported having the facility as early as 1995, but the studies so far have not been done to show what the impacts of this would be.

There's no way of knowing what the cumulative impacts would be of this proposal with the possibility of low level nuclear waste shipments through Lincoln County which might use the same facility.

So it's a major concern of mine that though I understand that finally at the late day, a certain amount of money from the County's funding has been diverted to do a study of the risks of this new mobile facility.

The results of the study are not out yet. They will probably barely be out in time to have input to you guys by the end of the comment period, and it's fairly clear that the citizens will not have an opportunity to review these findings or to say whether or not the results are being used to adequately protect the citizens or simply to support a benefits package, which I certainly do not.

Response
DOE cannot comment on the study being conducted by local officials until the study is complete and made available. Actual data generated by the study would be considered as the project develops. The specific impacts associated with the construction and operation of an intermodal transfer station for each heavy-haul truck route analyzed are given in EIS Section 6.3.3.2. Radiological impacts to the health and safety of workers and persons living along transportation routes in Nevada, including impacts to persons who lived in the vicinity of an intermodal transfer station, are included in results presented in the section. The possible cumulative impacts from operation of an intermodal transfer station at Caliente for shipments from the Proposed Action and shipments of low-level radioactive waste are discussed in Section 8.4.2.

8.5.1 (3080)
Comment - EIS000735 / 0008
When the EIS considers intermodal transfer stations, no consideration is given to a potential location in Barstow or Yermo, California. This is a well established rail yard with a large capacity with easy access to route 15 north bound to Baker then northwest though Death Valley and into the southern entrance to the Test Site.

Response
A heavy-haul truck route originating in Barstow or Yermo, California, using Route 127 would be similar to a route originating in Baker, California. A route originating from Baker using Route 127 was considered but eliminated from further detailed study (see Section 2.3.3.2 of the EIS). A route originating from Barstow or Yermo would be eliminated from detailed study for reasons similar to that of the Baker route.

8.5.1 (5407)
Comment - EIS001887 / 0110
Page 2-51; Section 2.1.3.3.3.1 - Intermodal Transfer Stations

This section describes the possible locations, configurations, and operations at an intermodal facility. It points out the increased handling and logistics introduced into any multi-modal transportation campaign to the Yucca Mountain site. It refers to transfer cranes and movement of casks from rail cars to heavy-haul trucks. This added transfer of the casks introduces increased risks to any transportation campaign. This movement, which would not be necessary in a rail-only shipping campaign, increases the possibility of an accident or damage to the shipping casks or the containers inside.

This scenario also contemplates heavy-haul truck transport primarily through congested metropolitan highway systems where impacts of such transport have not been adequately assessed.

The issue of general freight versus dedicated trains is expanded upon in this section. Intermodal transfer station operations would depend on whether the railcars that carried spent nuclear fuel and high-level radioactive waste arrived on dedicated or general freight trains. DOE states that there will be operational differences for the intermodal transfer station between the dedicated train and general freight options. The Draft EIS, however, does not contain sufficient information on these differences to allow an evaluation of the difference in impacts between the two options. The difference between staging requirements for the heavy-haul vehicles for the two options should be described. If general freight is used, the Draft EIS states that the "General freight trains would switch from the main Union Pacific track to an existing or newly constructed passing track." The Draft EIS does not state where the existing or newly constructed passing track would be located. If it is located at the intermodal transfer station, this would significantly alter the design of the station. If a new passing track is constructed at a location independent of the station, this would create potential impacts that have not been evaluated. Even if an "existing passing track" is used, this would probably require the Union Pacific to construct a new passing track for other railroad traffic.

Any delivery by dedicated trains would move directly into the intermodal facility for cask inspection and transfer to trucks. Shipments via general freight would be "set out," as is typical for railroad operations, on a siding at the intermodal facility. Then a "local" or rail yard locomotive would make the final move into the facility. Again, this clearly introduces another move that involves coupling and uncoupling cars, adding another element of potential human error or mechanical failure.

Response
Section 6.3.3 of the EIS discusses the impacts of Nevada heavy-haul truck implementing alternatives, including the impacts associated with an intermodal transfer station. The discussion indicates that, because spent nuclear fuel and high-level radioactive waste casks would not be opened at the intermodal transfer station, the potential for accidents that might threaten the integrity of the casks is remote. These casks would be designed and certified by the Nuclear Regulatory Commission to withstand a range of severe transportation accident conditions, including collision impacts, drops, fires, and immersion in water. These conditions are much more severe than any expected at the intermodal transfer station. Therefore, the radiological risks from accidents to workers at the intermodal transfer would be low, and the risk to the public from accidents at the intermodal transfer facility would be negligible.

The impacts of heavy-haul truck transportation for routes that would pass through the Las Vegas metropolitan area are evaluated in Section 6.3.3.2 of the EIS.

An intermodal transfer concept of operation for both dedicated and general freight train operation has been included in the *Intermodal Transfer Station Preliminary Design* (DIRS 104849-CRWMS M&O 1997). The conceptual design of an intermodal transfer station would have staging for eight heavy-haul vehicles. DOE anticipates that the staging provided for in the conceptual design would have sufficient staging for heavy-haul vehicles for dedicated or general freight trains. The intermodal transfer station design evaluated in the EIS would accommodate both dedicated and general freight shipments (DIRS 104849-CRWMS M&O 1997). DOE anticipates that operation of an intermodal station would be consistent with current Union Pacific operating practices and would not require construction of an additional passing track at sites in which one exists.

8.5.1 (7073)
Comment - EIS001337 / 0026
Lincoln County and the City of Caliente recommended that alternatives for accomplishing operation of the intermodal facility should be evaluated for their contribution to risk management and local economic benefits. It was suggested that DOE and DOE/contractor approaches should be considered against private development and operation. The County and City requested that options for shared use of the facility by other government (i.e. defense) and private industries should be assessed for their contribution to regional economic development. Alternatives for management of throughput at the facility were suggested for evaluation for their relative contributions to risk management. Of particular concern to the County and City was the potential for buildup of loaded shipping containers at the intermodal transfer site. The County and City asked that the DEIS evaluate the exposure risks associated with alternative numbers of in-transit containers resident at the site. The DEIS does not consider any of the specific intermodal operational issues raised by Lincoln County and the City of Caliente during EIS scoping.

Response
At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. Section M.3 of the EIS contains more information on routing regulations and operational procedures and protocols DOE would use if the Yucca Mountain site received approval. Section M.3 also contains more detail on the proposed role of the Regional Servicing Contractor.

As discussed in Section 6.3, the EIS provides estimates of the number of shipments that would be received at an intermodal transfer station in a week. Actual rates of receipt, or throughput, would be determined once a mode and route for transportation has been selected. The throughput volumes were used to develop the preliminary intermodal transfer station design, as described in *Intermodal Transfer Station Preliminary Design* (DIRS 104849-CRWMS M&O 1997).

8.5.1 (7076)
Comment - EIS001337 / 0028
Lincoln County and the City of Caliente requested that the DEIS consider the disposition of the intermodal transfer facility following cessation of waste emplacement at Yucca Mountain. Several alternatives were offered by the County and City for consideration by DOE including: (1) abandon the facility at the end of emplacement; (2) maintain the facility during the period of monitored Retrievability (i.e. 50-100 years) in case waste needs to be removed from the site; and (3) sell or deed the facility to another governmental or private party following emplacement of waste. The County and City requested that consideration of these alternatives evaluate impacts upon local economies, impacts upon other public and private users, and barriers to effective relocation of waste from the site in the event removal is required. The DEIS does not consider the fate of an intermodal facility following cessation of waste emplacement at Yucca Mountain.

Response
If the Yucca Mountain site was recommended and approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor or selection of a site for an intermodal transfer station, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews. These additional evaluations would include an assessment of the impacts for alternate closure scenarios for the intermodal transfer station on local economies,

impacts upon other public and private users, and barriers to effective relocation of waste from the site in the event removal is required.

8.5.1 (7184)
Comment - EIS001337 / 0075
Page 2-51 Section 2.1.3.3.3.1. The description of intermodal transfer stations should be refined to address 1) the length of siding required to accommodate waste shipments as well as other materials destined for Yucca Mountain; 2) the number of locomotives required to perform operations in the; 3) whether the types of support facilities which would be required at the site include maintenance of rail equipment; 4) the number of tractors and trailers required; 5) when and where tractor and trailer inspection would occur; 6) what, if any, emergency first response capabilities would resident at the intermodal station.

Response
If the Yucca Mountain site was recommended and approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor or selection of a site for an intermodal transfer station, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

Preliminary designs were developed for the intermodal transfer station for the Draft EIS and the impacts of construction and operation of the intermodal transfer station evaluated and presented in Section 6.3.3 of the EIS. The preliminary design requirements indicated that the length of a siding or passing track would be dependent on use of dedicated train(s) or general freight. In the case of general freight, a 1,400-meter (4,593-foot) passing track or siding would be necessary to allow general freight trains to pull off the mainline and switch to allow the cask cars to be pushed into the railyard (DIRS 104849-CRWMS M&O 1997). The analysis assumed that one local locomotive would be necessary for operations at an intermodal station. An optional railcar maintenance building is shown in the conceptual design of the intermodal transfer station (see DIRS 104849-CRWMS M&O 1997). DOE has estimated that a heavy-haul vehicle configuration with two tractors per trailer would be necessary for transportation of large rail casks (see Section 2.1.3.3.3.2). Two fleet sizes have been assumed for estimating purposes: a 12-transporter fleet all routes from Caliente, and an 8-transporter fleet for the Apex/Dry Lake and Sloan/Jean routes (see DIRS 154675-Ahmer 1998). Locations and times of tractor and trailer inspections for all routes have been included in *Road Upgrades for Heavy Haul Truck Routes* (DIRS 154448-CRWMS M&O 1998). Determination of the need and scope for resident emergency first-response capabilities at the intermodal transfer station would be determined during subsequent environmental and engineering analyses.

8.5.1 (8097)
Comment - EIS001873 / 0003
The Meadow Valley Wash, a perennial stream which flows to Lake Mead via Moapa Valley, is known for heavy flooding which has destroyed the UP rail line more than once. The DEIS states that the Caliente intermodal site is in a 500 year floodplain. However, I believe it has been inundated within the memory of local people. DOE admits that a flood and surface water analysis of the area has not been performed. This is an example of why, in my view, this EIS is insufficient to support a decision to select this or any other transportation mode or route.

Response
As discussed in Section 6.3 of the EIS, the selection of a specific location for an intermodal transfer station would require additional field surveys, environmental and engineering analyses, State and local government consultation, and appropriate National Environmental Policy Act reviews. Sections 3.2.2.2.3.1, L.3.2.6, and L.4.2.2 contain the most recent information on the proximity of the Caliente intermodal transfer station site to floodplains. If DOE selected the Caliente site, it would conduct a more detailed floodplain assessment for public review.

8.5.1 (8359)
Comment - EIS001873 / 0043
P. 3-127. Caliente intermodal site appears to be about 200 meters from the stream.

Response
Section L.3.2.6 of the EIS contains information on flooding and the presence of wetlands at the Caliente intermodal transfer station site. The selection of a specific location of an intermodal transfer station would require additional field surveys, environmental and engineering analyses, State and local government consultation, and appropriate National Environmental Policy Act reviews.

8.5.1 (8381)
Comment - EIS001873 / 0065
P. 6-57. The negative socioeconomic impacts from transportation including accidents are missing here and throughout the DEIS as I have said.

DOE should specifically address the issue of how security requirements around the intermodal sites would affect the residents of Caliente. For example, would access be denied to areas near the facility that are presently available for public use?

Response
Section 6.3.3.1 of the EIS covers the impacts, including socioeconomic impacts, that would be common to the 5 heavy-haul truck implementing alternatives. For example, it states that the total increase in employment (direct and indirect) that would result from construction of the intermodal transfer station, "… would peak in 2008 and would include about 135 workers. It also states that, "Increases in real disposable income from constructing an intermodal transfer facility would peak in 2008 at between about $2.7 million and $3.1 million." Air quality impacts common to operation of an intermodal transfer station located at the Caliente, Apex/Dry Lake, or Sloan/Jean sites are presented in the section. Health and safety impacts common to the alternative locations for an intermodal transfer station are given in tables in the section. The specific impacts associated with the construction and operation of an intermodal transfer station for each heavy-haul truck route analyzed are given in Section 6.3.3.2. Radiological impacts to the health and safety of workers and persons living along transportation routes in Nevada, including impacts to persons who lived in the vicinity of an intermodal transfer station, are included in results presented in the section. The possible cumulative impacts from operation of an intermodal transfer station at Caliente for shipments from the Proposed Action and shipments of low-level radioactive waste are discussed in Section 8.4.2.

DOE has completed a conceptual design of a generic intermodal transfer station. It covers an area of approximately 0.2 square kilometer (50 acres). Security would be achieved by enclosing the entire intermodal transfer station with a security fence, with gated entries at road and rail entrance/exit points, and continuous security monitoring. Access to this facility would be restricted requiring approval from DOE.

Section 2.1.3.3.3.1 of the EIS provides descriptions of the several proposed intermodal transfer stations associated with the heavy-haul truck implementing alternatives. The section addresses size, operations, access, and security of the stations. Sections 6.3.3.1 and 6.3.3.2 discuss the impacts of construction and operation of the facilities at the several proposed sites, including land use, access, and security.

8.5.1 (8666)
Comment - EIS001837 / 0026
The San Bernardino County Association of Governments has been receiving intermodal funding for about a year now. The first time PARD heard the term intermodal was in connection with nuclear waste shipments at the DOE annual conference in Salt Lake City in 1998. [What are] the connections between intermodal funding for the Needles depot (El Garces Harvey House?) and the DOE? Were DOE funds routed through the State Department of Transportation and on to SANBAG and the City of Needles for the preparation of an intermodal nuclear waste transfer station where waste from the Palo Verde Nuclear reactor would be boarded on trains?

Response
Funding of intermodal transportation studies are not a part of environmental impact studies and are not addressed in this EIS.

8.5.1 (8842)
Comment - EIS000869 / 0015
Paragraph six [in Section S.4.1.12] addresses the development of an emergency services team to respond to an accident at the repository but does not address transfer station or transport situations which would involve more members of the public. There are no public HazMat [hazardous materials] teams available qualified to intervene in a nuclear situation. This again appears to be a situation where the DOE is more concerned with its own employees than with the American population.

Response
DOE would, as required by Section 180(c) of the NWPA provide technical assistance and funds to states for training for public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions spent nuclear fuel or high-level radioactive waste would be transported. Therefore, there would be personnel along all the routes qualified to respond to an incident during transportation. Personnel at transfer stations would be trained in responding to an emergency at the station.

In addition, as discussed in Section M.5 of the EIS, if requested by a state or tribal authority, DOE would provide assistance from its Regional Coordinating Offices located across the United States to reduce the consequences of accidents related to the transportation of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. The assistance would involve providing equipment, logistical and medical resources, and qualified personnel as necessary. States and tribes can request and obtain assistance from other Federal agencies including the Federal Emergency Management Agency, Environmental Protection Administration, Nuclear Regulatory Commission, Department of Transportation, and Department of Defense.

Section 6.3.3 of the EIS discusses the impacts of Nevada heavy-haul truck implementing alternatives, including the impacts associated with an intermodal transfer station. The discussion indicates that, because spent nuclear fuel and high-level radioactive waste casks would not be opened at the intermodal transfer station, the potential for accidents that might threaten the integrity of the casks is remote. These casks would be designed and certified by the Nuclear Regulatory Commission to withstand a range of severe transportation accident conditions, including collision impacts, drops, fires, and immersion in water. These conditions are much more severe than any expected at the intermodal transfer station. Therefore, the radiological risks from accidents to workers at the intermodal transfer facility would be low, and the risk to the public from accidents at the intermodal transfer facility would be negligible.

The specific impacts associated with the construction and operation of an intermodal transfer station for each heavy-haul truck route analyzed are given in EIS Section 6.3.3.2. Radiological impacts to the health and safety of workers and persons living along transportation routes in Nevada, including impacts to persons who lived in the vicinity of an intermodal transfer station, are included in results presented in the section. The possible cumulative impacts from operation of an intermodal transfer station at Caliente for shipments from the Proposed Action and shipments of low-level radioactive waste are discussed in Section 8.4.2.

8.5.1 (9560)
Comment - EIS001888 / 0233
The DEIS does not provide a thorough description of intermodal handling operations. What are the risks of cask handling at intermodal sites? Does cask-handling equipment exist? Has it been tested? Who will test it? When? When will a decision about intermodal site selection be made?

Response
The *Intermodal Transfer Station Preliminary Design* (DIRS 104849-CRWMS M&O 1997) contains an operating plan for the proposed station. Sections J.3.3.1, J.3.4.3, and J.3.5.3 of the EIS discuss the risks associated with cask handling at an intermodal transfer station. Commercial nuclear powerplants with dry cask storage use cask-handling equipment similar to the equipment DOE would use at an intermodal station. The equipment design would accommodate a number of cask types. The design effort would occur during detailed design activities for an

intermodal transfer station, and would comply with “Special Lifting Devices for shipping Containers Weighing 10,000 Pounds (4500 kg) or More” (American National Standards Institute standard ANSI.N14.6), against which DOE would test the equipment. In addition, inspections of the equipment by the intermodal transfer station contractor would comply with this standard.

Section 6.3.3 of the EIS discusses the impacts of Nevada heavy-haul truck implementing alternatives, including the impacts associated with an intermodal transfer station. The discussion indicates that, because spent nuclear fuel and high level radioactive waste casks would not be opened at the intermodal transfer station, the potential for accidents that might threaten the integrity of the casks is remote. These casks would be designed and certified by the Nuclear Regulatory Commission to withstand a range of severe transportation accident conditions, including collision impacts, drops, fires, and immersion in water. These conditions are much more severe than any expected at the intermodal transfer station. Therefore, the radiological risks from accidents to workers at the intermodal transfer would be low, and the risk to the public from accidents at the intermodal transfer facility would be negligible.

DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

If the Yucca Mountain site was recommended and approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor or identification of a specific location for an intermodal transfer station, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

8.5.1 (9600)
Comment - EIS001888 / 0275
Intermodal Handling Risks

One of the challenges for risk analysts is to completely describe the risks of the activity being analyzed. In this case, the DEIS fails to adequately address the risks of transferring a waste Cask from a rail car to a heavy haul transporter. One of the problems with intermodal transportation is that it increases the number of times the waste package is handled. In past campaigns, most accidents occur due to handling. The DEIS should have examined the safety of intermodal handling based on some proposed handling process. No handling process is described in the DEIS.

Both of the intermodal handling facilities proposed in the DEIS are located in urban Clark County. In the case of the Apex facility, the facility is located near a veterans hospital, the jet fuel storage tanks for an air force base, and burgeoning residential areas. The other proposed intermodal facility, in southern western Clark County, is adjacent to two major hotels. Most of those hotel rooms would look out onto the intermodal-handling yard. All of the approximately 24,000 vehicles that use Interstate 15 to travel to or through Las Vegas would pass over the Union Pacific rail line that would carry the spent fuel to the intermodal facility. In order for the DEIS to be sufficient a Risk Management Plan required for SARA Title III facilities should be prepared as part of the final EIS.

Response
Section 6.3.3 of the EIS discusses the impacts of Nevada heavy-haul truck implementing alternatives, including the impacts associated with an intermodal transfer station. The discussion indicates that, because spent nuclear fuel and high level radioactive waste casks would not be opened at the intermodal transfer station, the potential for accidents that might threaten the integrity of the casks is remote. These casks would be designed and certified by the Nuclear

Regulatory Commission to withstand a range of severe transportation accident conditions, including collision impacts, drops, fires, and immersion in water. These conditions are much more severe than any expected at the intermodal transfer station. Therefore, the radiological risks from accidents to workers at the intermodal transfer would be low, and the risk to the public from accidents at the intermodal transfer facility would be negligible.

The transportation analysis within Nevada is in the conceptual stage. If the decision to utilize an intermodal transfer station was made, the preliminary design phase would address safety analysis, based on a more detailed concept of operations. As part of the design process, a risk identification and management plan would be developed and implemented.

8.5.1 (9604)
Comment - EIS001888 / 0278
In order for the intermodal handling and heavy haul sections of the DEIS to be regarded as complete analyses, it is necessary for the following additional reports or supplements to the DEIS: An analysis of the risks at each proposed intermodal facility. This plan should be prepared in accordance with the Risk Management Plans mandated by the Clean Air Act Amendments of 1996. A revised DEIS that provides a specific analysis of the risks of intermodal handling at each of the proposed facilities should be prepared. The handling procedures at each facility must be described.

Response
Section 6.3.3 of the EIS discusses the impacts of Nevada heavy-haul truck implementing alternatives, including the impacts associated with an intermodal transfer station. The discussion indicates that, because spent nuclear fuel and high level radioactive waste casks would not be opened at the intermodal transfer station, the potential for accidents that might threaten the integrity of the casks is remote. These casks would be designed and certified by the Nuclear Regulatory Commission to withstand a range of severe transportation accident conditions, including collision impacts, drops, fires, and immersion in water. These conditions are much more severe than any expected at the intermodal transfer station. Therefore, the radiological risks from accidents to workers at the intermodal transfer would be low, and the risk to the public from accidents at the intermodal transfer facility would be negligible.

The transportation analysis within Nevada is in the conceptual stage. If the decision to utilize an intermodal transfer station was made, the preliminary design phase would address safety analysis, based on a more detailed concept of operations. As part of the design process, a risk identification and management plan would be developed and implemented.

8.5.1 (10594)
Comment - EIS002122 / 0008
There's no description of the security or adequate description of the security requirements around the possible intermodal transfer sites. For those of us in the county who live near the City of Caliente, would our freedom of motion be limited? Would we be able to climb on the hills overlooking the possible site? How far away is it? How large would the buffer area be, especially considering the fact that a terrorist could from above lob some sort of projectile into the area where these casks would be left over the weekend because of the transportation requirements.

Response
A facility such as this would require a Site Safeguards and Security Plan that is site specific. At this time, DOE has not chosen the heavy-haul truck mode of transportation. Should heavy-haul truck be chosen as the mode, addition decisions would be required on the specific route and the specific location of the intermodal transfer station.

DOE has completed a conceptual design of a generic intermodal transfer station. It covers an area of approximately 0.2 square kilometer (50 acres). Security would be achieved by enclosing the entire intermodal transfer station with a security fence, with gated entries at road and rail entrance/exit points, and continuous security monitoring. Access to this facility would be restricted requiring approval from DOE.

Section 2.1.3.3.3.1 of the EIS provides descriptions of the several proposed intermodal transfer stations associated with the heavy-haul truck implementing alternatives. The section addresses size, operations, access, and security of the stations. Sections 6.3.3.1 and 6.3.3.2 discuss the impacts of construction and operation of the facilities at the several proposed sites, including land use, access, and security.

8.5.2 HIGHWAY UPGRADES

8.5.2 (5411)
Comment - EIS001887 / 0114
Page 2-54; Section 2.1.3.3.3.2 - Highway Routes for Heavy-Haul Shipments

The Draft EIS assumes that most borrow material for construction could come from existing Nevada Department of Transportation borrow areas, if the State agreed. Most road design projects attempt to balance cut and fill requirements during construction of the roads. Therefore, it is not reasonable to assume that borrow material will be available in existing borrow areas for the extensive fill requirements necessary to construct truck climbing lanes and other road improvements. Obtaining fill material from other areas could result in significant impacts not discussed within the Draft EIS.

The last sentence in the second paragraph of the first bullet says, "This parking area would be near the U.S. 6 and U.S. 95 interchange at Tonopah." The point where U.S. 6 and U.S. 95 meet in Tonopah is an intersection in town. It is hardly a place to park this type of truck. This is a busy intersection, not a freeway-type interchange.

Response
DOE developed a *Cost Estimate for Heavy Haul Truck Transport Design* (DIRS 154675-Ahmer 1998). This study identifies the estimated embankment material and aggregate material needed to upgrade roads for use by heavy-haul trucks. For example, the cost estimate for the Caliente Route identifies the need for approximately 1.5 million cubic meters (2 million cubic yards) of embankment material, and approximately 190,000 cubic meters (250,000 cubic yards) of aggregate base material. If this material was not available in the Nevada Department of Transportation's current borrow areas, the material would have to be purchased from commercial borrow material suppliers, unless the Project can negotiate borrow area development with the Bureau of Land Management or private landowners in local areas. Details of the borrow requirements and sources would be developed in the detail design, should heavy-haul trucks be selected as the transportation mode in Nevada. The analysis in Section 6.3.3 of the EIS includes estimates of impacts to land areas from which borrow materials would be taken for upgrading roads.

The analysis of the road upgrades (DIRS 154448-CRWMS M&O 1998) includes a potential location for an overnight truck stopping area approximately 48 kilometers (30 miles) east of Tonopah along U.S. 6. A specific location for such a stop has not been identified. DOE does not propose to construct a safe parking area at the U.S. 6 and U.S. 95 interchange in Tonopah.

8.5.2 (5716)
Comment - EIS001887 / 0330
Page 6-35; Section 6.3 - Nevada Transportation

Land Use and Ownership: The Draft EIS makes note of land use and ownership impacts to landowners due to the creation and use of a branch rail line or heavy-haul facility. It does not account for impacts to the Nevada Department of Transportation (NDOT) as a landowner. Negative impacts include corridor degradation, loss of pavement structure, and operational disruptions (queues, etc.). DOE has also failed to assess what will happen to facilities, shipments, and operations when the time comes to rebuild or resurface the roadways sustaining this shipping campaign. These roadways will have to be refurbished, since axle loads of the kind proposed for spent fuel and HLW [high-level radioactive waste] shipments were never anticipated and would accumulate and reduce the service life of affected roadways. The Draft EIS does not consider the fact that during a 24 year shipping campaign, roadways will deteriorate and must be rebuilt. In section 6.3.3.1, the Draft EIS states that resurfacing would occur every eight years. What 'ESAL' calculations are driving this number? What happens to shipments when highway construction closes down roadways for months at a time? In addition, it would appear that field inspections of 'choke points' and areas of operational concern have not been effectively carried out. Areas such as Hancock Summit, for example, may not be able to legally allow a heavy-haul vehicle configuration to pass through the summit and roadway cut. The turning radius may be too small to allow the vehicle to traverse the roadway.

Response
Impacts such as loss of pavement structure and operational disruptions have been addressed in analysis presented in the EIS (see EIS Sections 6.3.1 and 6.3.3.1). As described in *Road Upgrades for Heavy Haul Routes*

(DIRS 154448-CRWMS M&O 1998), use of the conceptual heavy-haul transport vehicle, which is also described in Section 2.1.3.3.3.2, and roadway geometry were taken into account. In addition, for this analysis field surveys of routes were made to determine if roadway geometry would support use of the transport vehicle. A road upgrade design would mitigate areas of operational concern and "choke points" through lane widening, intersection widening, and/or a truck alternate route (DIRS 154448-CRWMS M&O 1998; DIRS 154824-Ridilla et al. 1997). In addition, because transport and escort vehicles would compromise only a small percentage of the average daily traffic along routes, impacts such as corridor degradation would be small.

Traffic control measures would be used in order to accommodate heavy-haul truck shipments during times of road maintenance of routes.

The potential road upgrades that were evaluated in the EIS analysis for each candidate heavy-haul truck route can be found in Section J.3.1.2 of the EIS. These upgrades were based on projected annual average daily traffic for 2010 to 2033. These annual average daily traffic estimates were used to calculate estimated Equivalent Single Axle Loads for 2010 through 2033 combined with estimates for the 17-axle heavy-haul vehicle configuration assumed for the analysis. These combined Equivalent Single Axle Loads were used to calculate the necessary pavement thickness of initial road upgrades with assumed subsequent pavement overlays every 8 years and a road serviceability life of 20 years (see DIRS 154448-CRWMS M&O 1998).

8.5.2 (7069)
Comment - EIS001337 / 0024
Lincoln County and the City of Caliente noted that the DEIS should evaluate alternatives for establishing and maintaining a highway system capable of withstanding repeated heavy-haul loads. They further suggested that where new road construction is required, improved yet unpaved surfaces should be evaluated against pavement. The County and City encouraged DOE to evaluate risk management benefits associated with options for construction of dedicated travel lanes in areas of excessive grades or poor sight distance. The DEIS does not consider paved versus unpaved roadway improvement alternatives. Evaluation of the risk management benefits potentially associated with construction of dedicated travel lanes was not addressed within the DEIS.

The County and City recommended several operational alternatives for consideration within the DEIS including escorted versus unescorted shipments; time of day travel restrictions versus unrestricted transport; and use of local versus nonlocal trucking firms. The first two were recommended for consideration for their contribution to risk management. DOE was encouraged to evaluate the third option set to determine regional economic benefits. The DEIS does not consider specific heavy-haul operational alternatives offered by Lincoln County and the City of Caliente during scoping.

Response
DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

An EIS reference (DIRS 154675-Ahmer 1998) includes a "Cost Estimate for Heavy Haul Truck Transport Design." It includes a detailed cost estimate for the design, construction, and management of upgrades for public roads for each of the five candidate heavy-haul truck routes. DOE based the estimated costs presented in Section 6.3.3.2 of the EIS on those estimates, which include lane widening, truck lane and turnout construction, pavement upgrades, intersection upgrades, and shoulder upgrades. Cost estimates developed for highway upgrades associated with heavy-haul truck scenarios include costs for annual maintenance of the roads. Table J-89 summarizes road upgrades for a proposed Caliente Route.

Before DOE used a heavy-haul truck transportation implementing alternative it would work with the State of Nevada to conduct engineering and environmental studies that would support detailed design and construction of upgrades to highways. The studies would include traffic analysis to identify the specific turnout requirements for each road section based on the estimated increase in annual average daily traffic over the life of the project. Turnouts preliminarily identified by the analysis [see *Road Upgrades for Heavy Haul Routes* (DIRS 154448-CRWMS M&O 1998)] were included in estimating the cost for road upgrades. Although the installation of additional lanes for the proposed routes is not necessary to maintain level of service for the roads that are not heavily used, turnout locations and the number of turnouts could be adjusted to maximize their effectiveness.

DOE would follow State of Nevada requirements for heavy-haul truck shipments. Such requirements include time-of-day travel restrictions and escorts. DOE has developed a draft Request for Proposal for Regional Servicing Contractors for waste acceptance and transportation. The contractor(s) would be responsible for shipping arrangements and transportation services in the servicing region(s). DOE plans for transportation operations are discussed in Section M.3 of the EIS.

8.5.2 (7186)
Comment - EIS001337 / 0125
Page 2-54 Highway Routes for Heavy-Haul Shipments - It is unacceptable to Lincoln County that the DOE is only considering adding up to 4 feet to the existing shoulders. Some of the existing shoulders are only 2-3 feet wide which means at a maximum the shoulder would be only 7 feet wide. With the heavy-haul truck and cask being up to 10 1/2 feet wide, DOE should insure that the shoulders are at least 12 feet wide so that the vehicle could be safely and completely removed from the main part of the road. This section also discusses the routes from each of the intermodal transfer stations to Yucca Mountain. Having to modify intersections in the vicinity of Hiko, SR 375 and U.S. 6 to accommodate the 220 foot long heavy-haul trucks should be relatively easy, however, if any of the intersections at I-15, the new beltway, U.S. 93 or U.S. 95 are inadequate to handle the transporter, both in terms of weight or geometry, this could be a show stopper. DOE needs to evaluate these [intersections] carefully before considering them to be feasible routes.

Also, DOE needs to consult with the Nevada Department of Transportation to determine if NDOT [Nevada Department of Transportation] would issue a heavy-haul permit on these routes.

Furthermore, turnouts located every 20 miles is not acceptable and would adversely impact commerce, tourism and general transportation in Lincoln County and create potentially unsafe passing conditions. This issue would be mitigated via construction of dual lanes in each direction on any highway in Lincoln County used for heavy-haul transport.

Response
DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

Section J.3.1.2 of the EIS provides tables that list potential upgrades for roads in Nevada to handle heavy-haul trucks. This information is summarized from reference (DIRS 154448-CRWMS M&O 1998). The road widening proposed for the two lane roads includes widening two-lane roads to two 4.3-meter (14-foot)-wide lanes with a 0.6-meter (2-foot) shoulder on each side. Existing road widths along the candidate routes for heavy-haul trucks include two 3.7-meter (12-foot) lanes and shoulder widths ranging from 0.3 to 0.6 meter (1 to 2 feet). The existing 3.7-meter-wide lanes support maximum legal vehicle widths of 2.6 meters (8.5 feet). The proposed 4.3-meter lanes would be sufficient for a 3-meter (10-foot)-wide heavy haul transporter. The 0.6-meter shoulder width provides additional road width for the transporter in transit and would help reduce pavement “breakout” along the edge of the road. Truck turnouts would be used to remove a transporter from travel lanes, if needed. For details, see *Road Upgrades for Heavy Haul Routes* (DIRS 154448-CRWMS M&O 1998).

Interstate System intersections were evaluated in the analysis discussed above. Costs associated with upgrading those intersections to support heavy-haul truck transport were included in costs assumed for analysis in the EIS [for additional information, see *Cost Estimate for Heavy Haul Truck Transport Design* (DIRS 154675-Ahmer 1998)].

As described in the analysis *Road Upgrades for Heavy Haul Routes* (DIRS 154448-CRWMS M&O 1998), informal discussions were held with the Nevada Department of Transportation to identify preliminary road upgrade requirements. Permits for heavy-haul trucks have not been discussed with the Nevada Department of Transportation. However, the State routinely issues travel permits to operators of heavy-haul trucks.

Before DOE used a heavy-haul truck transportation implementing alternative, it would work with the State of Nevada to conduct engineering and environmental studies that would support detailed design and construction of upgrades to highways. The studies would include traffic analysis to identify the specific turnout requirements for each road section based on the estimated increase in annual average daily traffic over the life of the project. Turnouts preliminarily identified by the analysis [see *Road Upgrades for Heavy Haul Routes* (DIRS 154448-CRWMS M&O 1998)] were included in estimating the cost for road upgrades. Although the installation of additional lanes for the proposed routes is not necessary to maintain level of service for the roads that are not heavily used, turnout locations and the number of turnouts could be adjusted to maximize their effectiveness.

8.5.2 (11312)
Comment - EIS001814 / 0041
DEIS Page 6-11
The potential impacts from upgrading Nevada highways for heavy-haul truck use would be small because modifications to roads would occur in previously disturbed rights-of-way.

The amount of upgrade required varies significantly between the various heavy-haul route options. Portions of the Caliente Chalk Mountain route will require significant upgrades, resulting in much more impact than some of the other route segments. Realigning roads to avoid significant grades and to improve curvatures will impact areas outside of current rights-of-way. The impact of the heavy-haul alternative on critical habitat for wildlife will be similar to that discussed above for the rail line alternative.

Response
The road upgrades proposed for candidate routes for heavy-haul trucks include (1) increasing the pavement thickness to meet the requirements of the heavy-haul truck axle loads, (2) increasing the lane width and shoulder width to accommodate the width of the 10-ft wide transporters, and (3) installing truck lanes and turnouts adjacent to the existing pavement to allow additional lanes for passing vehicles. All proposed upgrades would occur in existing highway rights-of-way. The upgrades would not change road alignment or hill grade. The routes were evaluated for heavy-haul truck maneuverability, and no unacceptable conditions were identified. Therefore, no critical habitat disturbance has been identified. However, before DOE used a heavy-haul truck transportation implementing alternative, it would work with the State of Nevada to conduct engineering and environmental studies that would support detailed design and construction of upgrades to highways.

8.5.2 (11981)
Comment - EIS000688 / 0003
The second should wait till tomorrow as you commute back to Las Vegas. Try to envision making the trip on that narrow curvy round between here and Alamo in a truck that’s 270 feet long, has forty wheels, two engines and two drivers and weighs almost 300,000 pounds, and then go back to Washington, D.C. and tell someone they need to rethink their transportation plan.

Response
At this time, the heavy-haul truck implementing alternatives for transporting spent nuclear fuel and high-level radioactive waste to the proposed repository are conceptual. Section 2.1.3.3.3.2 of the EIS shows a concept for such a heavy-haul truck. Proposed road upgrades to allow use of such trucks, such as improvements to pavement and construction of turnouts and truck passing lanes, would mitigate impacts on congested roads, traffic flow, and highway infrastructure. However, before DOE used a heavy-haul truck transportation implementing alternative it would work with the State of Nevada to conduct engineering and environmental studies that would support detailed design and construction of upgrades to highways.

DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

8.5.3 HEAVY-HAUL TRUCK OPERATIONS

8.5.3 (190)
Comment - 33 comments summarized
Commenters stated that the Draft EIS did not adequately demonstrate either the feasibility of implementing a heavy-haul truck scenario or evaluate the impacts if such a scenario was implemented. Commenters stated that the implementation of such an approach is totally unprecedented in the United States and were concerned that, since heavy-haul trucks are slow moving oversized vehicles, their presence on the roads would cause more accidents and result in the effective loss of use of the major arterial roads. Commenters stated that DOE would need to consult with the Nevada Department of Transportation before considering heavy-haul truck transport of spent nuclear fuel and high-level radioactive waste as a viable option. Commenters questioned whether the postulated routes would even be feasible for heavy-haul trucks and if additional highway lanes would have to be constructed to accommodate the size of the vehicles. They stated that detailed surveys of roads, bridges, and overpasses would be needed to ensure that heavy loads could be handled. Another commenter was concerned about the potential cost of having to build bypasses to either go around or through towns because the trucks would be so large they would not be able to make a right-angle turn.

Commenters stated that the heavy-haul truck analysis was deficient. Commenters stated that conclusions regarding changes in level of service in congested areas such as Las Vegas were not supported by the analysis and that no evidence was presented to support the speed assumptions [that is, 32 to 48 kilometers (20 to 30 miles) per hour] made for the heavy-haul truck scenario. If the actual speeds were less, traffic impacts would be exacerbated. Other commenters noted that the impacts to normal traffic flows on heavy-haul truck routes were grossly underestimated considering convoy length and frequency and slower travel speeds. Because disruptions on congested highways often continue after the removal of the cause, the duration of the traffic flow disruption would be longer than the time the vehicle would travel on the highways. Commenters also stated that because of the turning radius requirements for heavy-haul trucks, certain intersections and road segments might have to be shut down to allow passage of heavy-haul trucks. Commenters stated that the Draft EIS did not consider in-transit refueling requirements, safety, security, and the perceived risk of overnight parking for heavy-haul trucks.

Other commenters stated that the EIS did not include analysis of accident rates for this type of vehicle or of accident rates for other vehicles caused by the heavy-haul vehicle. Commenters were concerned that the cost to upgrade candidate heavy-haul truck routes in problem areas such as through Hancock Summit, Tonopah, and Goldfield could be 3 to 10 times greater than Draft EIS estimates. Another commenter said that the Nevada highway system as it now exists could not sustain the accumulation of axle loads this type of shipping campaign would produce and that infrastructure improvements, including lane construction and widening, would be required in both directions for almost the entire length of the heavy-haul truck routes evaluated in the Draft EIS.

Commenters were concerned that the use of heavy-haul trucks would increase traffic congestion in major metropolitan areas such as Las Vegas or in smaller communities along the route. Others were concerned that highway travel times could increase because of the use of these vehicles and questioned what the impact would be on local commerce and air quality. Some commenters stated that Interstate System highways could not be used and that the roads might have to be closed to all other traffic.

Response
DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. If the Yucca Mountain site was approved, DOE would issue at some future date a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. A similar process would occur if DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional

field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

At this time, the heavy-haul truck alternatives for transporting spent nuclear fuel and high-level radioactive waste to the proposed repository are in the conceptual stages of development, although preliminary design and engineering studies have been conducted for the heavy-haul truck options (see DIRS 154448-CRWMS M&O 1998; DIRS 154824-Ridilla et al. 1997). These studies identify potential upgrades for mitigating the potential impacts of the heavy-haul truck concept shown in Figure 2-29 of the EIS.

Based on the analysis mentioned above, heavy-haul truck transportation is technically feasible and its costs would be comparable to those for rail transportation. Sections of the Caliente route such as Hancock Summit and affected communities have been evaluated and are feasible options if the recommended road upgrades were completed. The basis for the cost of upgrading the Caliente heavy-haul truck roads are a result of engineering analysis, limited discussions with the Nevada Department of Transportation, input from heavy-haul trucking companies, and actual cost estimates from highway contractors in Nevada. This information is presented in *Cost Estimate for Heavy-Haul Truck Transport Design* (DIRS 154675-Ahmer 1998). This reference includes detailed cost estimates for the design, construction, and management of the initial road upgrades for public roads for each of the five heavy-haul truck routes. DOE believes this is an adequate technical basis to support the EIS cost estimates for the Caliente and other heavy-haul truck routes.

DOE has received input from heavy-haul truck companies on the estimated speed of the heavy-haul vehicle identified in the EIS. The speed depends on the highway grade. At 0-percent grade, the estimated speed is 68 kilometers (42 miles) per hour and at 4-percent grade, 24 kilometers (15 miles) per hour. Thus, an average speed of 32 to 48 kilometers (20 to 30 miles) per hour for an entire trip does not seem unreasonable. The State of Nevada restricts heavy-haul truck transport to daylight hours only. Thus, intermediate overnight stops would be necessary for the longest of the heavy-haul truck routes. Sections 6.3.3.2.1 through 6.3.3.2.3 of the EIS identify the heavy-haul truck routes that would require an overnight stop. The trucks would carry sufficient fuel to travel the entire one-way distance before refueling.

DOE calculated heavy-haul truck impacts using the Primary road rates in *State-Level Accident Rates of Surface Freight Transportation: A Reexamination* (DIRS 103455-Saricks and Tompkins 1999). Although the document does not explicitly address heavy-haul truck accident rates, DOE believes it provides the latest reasonably available data, as relevant to heavy-haul truck as it is to legal-weight truck transport. The accident rates used in the analysis are conservative because of the special precautions taken with heavy-haul truck shipments to prevent accidents, such as restricting travel to daylight hours and providing escort vehicles in front and behind the trucks. The heavy-haul trucks could affect the accident rates for other vehicles. However, the additional precautions described above in addition to the planned road improvements would mitigate these effects.

Section 6.3.3.1 of the EIS states that most of the highways that heavy-haul truck shipments would use are classified as having freely flowing traffic without delays and that the addition of 11round trips each week should not affect the level of service. The EIS also states that the slow-moving heavy-haul trucks could present a traffic obstruction that increased congestion, delayed other vehicles, and caused short queues to form between turnout areas, even after the shipment passed. However, given the low frequency of heavy-haul truck shipments, congestion would occur predominantly on relatively short segments of the heavy-haul truck routes and mitigation measures could be implemented to alleviate congestion concerns.

DOE would meet all Federal requirements for safety and security of the heavy-haul trucks and comply with the conditions of the Nevada Department of Transportation permits, including restrictions that lead to the need for overnight parking areas. The heavy-haul trucks would be escorted at all times, providing safety and security for the vehicles in transit, including warning other drivers on the highway of the slow-moving, oversized vehicles. Restricting the heavy-haul trucks to travel only during daylight hours is a safety-related requirement that would ensure the shipment was visible to other drivers. DOE anticipates that security systems and personnel would be provided at the overnight parking sites. Preliminary sites for the overnight parking areas are identified in Sections 6.3.3.2.1 to 6.3.3.2.3 of the EIS for each heavy-haul truck implementing alternative that would require overnight parking. As discussed in Section 6.3.3.1, workers at an overnight parking area would receive only small radiation doses because the vehicles would not be unloaded. Table 2-10 lists air quality impacts for all heavy-haul truck implementing alternatives. Section 6.3.3.1 discusses the derivation of the air quality impacts of heavy-haul truck transportation.

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since the scoping process for the EIS to enable DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Section 2.5.4 and Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. In addition, DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty.

- Much of the uncertainty is irreducible.

- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

If Yucca Mountain was approved as the site for the geologic repository, DOE would continue to provide clear, accurate information to the public regarding the potential risks of a repository at the site and of transporting spent nuclear fuel and high-level radioactive waste to the site.

8.5.3 (776)
Comment - EIS000096 / 0005
Third, the document grossly underestimates HHT [heavy-haul truck] routine radiation doses to members of the public along the route, particularly in Tonopah and Goldfield. Stop-times and reduced speeds due to intersections, sharp curves, school zones, and other local conditions could result in significant cumulative exposures within 150 yards of the highway.

Response
In responding to public comments regarding individuals in Nevada who live close to candidate transportation routes, DOE used information from a recent report prepared for the City of North Las Vegas (DIRS 155112- Berger Group 2000). This report presents suggested assumptions for a hypothetical maximally exposed individual who lived 15 meters (49 feet) from a roadway used by heavy-haul trucks and who would be present and stay at that location, when, over the 24 years, each shipment stopped for 1 minute. DOE believes that such an exposure scenario is highly unlikely and therefore unrealistic. Nonetheless, DOE estimated the maximum cumulative radiation dose to this hypothetical individual would be about 520 millirem over 24 years of the Proposed Action (see Section J.1.3.2.2.1 of the EIS). This dose would lead to an estimated increase in risk of cancer of 1 in 4,000 over the individual's lifetime. In addition, the analysis in the EIS considered other potential maximally exposed individuals who could live along routes in Nevada. These included:

- A person in Alamo living in a residence approximately 5 meters (15 feet) from U.S. 93 where heavy-haul trucks could pass who could receive a dose of 25 millirem over 24 years;

- A person who could be in the courthouse or fire station in Goldfield, Nevada approximately 5 meters (15 feet) from U.S. 95 where heavy-haul trucks could pass, who could receive a dose of 56 millirem over 24 years;

For perspective, cancer from all other causes is fatal to about 1 in 4 persons.

8.5.3 (1173)

Comment - EIS000229 / 0006

The HHT [heavy-haul truck] routes identified in the DEIS do not meet U.S. Nuclear Regulatory Commission (NRC) safeguards criteria. A curious deficiency in the DEIS HHT routing analysis is DOE's apparent ignorance of the NRC safeguards route approval process and criteria. Advance route approvals are part of a safeguards system designed to "[m}inimize the possibilities for radiological sabotage of spent fuel shipments, especially within heavily populated areas..." [10CFR73.37(a)(1)(i)] In 1980, NRC issued a regulatory guidance document [NUREG-0561, Rev.1] which identified five types of route characteristics that receive special consideration when Commission staff review requests for route approval: (1) routes through highly populated areas; (2) routes which would place the shipment or the escort vehicle in a significantly tactically disadvantageous position (for example, tunnels which would prevent the escort vehicle from maintaining continuous surveillance of the shipment vehicle); (3) routes with marginal safety design features (for example, two-lane routes, absence of guard rails, etc.); (4) routes with limited rest and refueling locations; and (5) routes where responses by local law enforcement agencies, when requested, would not be swift or timely. None of the HHT routes identified in the DEIS meet the safeguards routing criteria established by the NRC.

Response

The five candidate heavy-haul truck routes in the EIS represent reasonable alternatives using existing public highways in Nevada. DOE is required by the National Environmental Policy Act implementing regulations to evaluate a range of reasonable alternatives in addition to its preferred alternative.

The Nuclear Regulatory Commission (NRC) issued guidance to provide added protection of spent nuclear fuel shipments against sabotage and diversion (DIRS 154766-NRC 1980). This document contains route selection criteria used by the Commission. Within the section of the document titled "Route Selection Criteria," a brief explanation is given as to the use of these criteria:

> The following are descriptions of criteria frequently used by the NRC staff to determine the preferability and acceptability of spent fuel shipment planned routes and alternative routes. These criteria apply generally to road, rail and sea modes. In the case of road shipments, in particular, Interstate System highways typically best satisfy these criteria.
>
> Likelihood of swift local law enforcement agency (LLEA) response. Routes that permit more timely responses by the LLEA when assistance is requested are preferred.
>
> Avoidance of tactically disadvantageous positions. Routes are preferred which avoid passage through areas including features or terrain which would place the shipment or shipment escorts in significantly tactically disadvantageous positions (for example, passage through long tunnels or over bridges spanning heavily populated areas).
>
> Availability of appropriate rest and refueling stops. Road shipment routes should feature sufficient locations for rest and refueling stops to allow flexibility in adjusting schedules to accommodate unexpected situations.
>
> Availability of good transportation safety design features. Road and rail routes featuring advanced safety design features (for example, divided highways, guard rails, limited access highways for road shipments; high grade track for rail shipments) are preferred over those including portions that are in disrepair or obsolescent (DIRS 154766-NRC 1980).

These criteria do not include "routes through highly populated areas" as a route characteristic that should receive special consideration when Commission staff members review requests for route approval, as stated by the commenter.

In addition, no route would meet the highest standards of these criteria over its entire length. However, the five candidate routes for heavy-haul trucks that are analyzed in the EIS would meet the overall standards of these criteria if the proposed road upgrades to permit use by the trucks were completed.

As stated in Section 2.3.3.2 of the EIS, "The Department identified highway routes for heavy-haul trucks, and associated intermodal transfer station locations to provide reasonable access to existing mainline railroads, to minimize transport length from an existing mainline rail interchange point, and to maximize the use of roads identified by the Nevada Department of Transportation for the highest allowable axle load limits."

8.5.3 (1267)
Comment - EIS002043 / 0005
In the section that discusses heavy-haul highway routes (Pg. 2-54), the DEIS identifies that shoulder widening and the construction of turnout and truck lanes would occur as needed along the side of the existing pavement and shoulders would be widened from 1 to 4 feet. The shoulders should be widened sufficiently for the transporter to be pulled off the main part of the road and away from the fast moving traffic.

Also, DOE only proposed to provide turnouts every 5 to 20 miles. Along U.S. 95 turnouts at 5 miles would be insufficient and would create additional risk to travelers. People are accustomed to traveling along this route at a high rate of speed. If travelers were forced to follow a long slow moving convoy carrying nuclear waste, drivers would make risky vehicle passes for the purpose of decreasing travel time. DOE should plan to construct two lanes each way if heavy-haul transporters are used.

Response
The road widening proposed for the two lane roads includes widening two-lane roads to two 4.3-meter (14-foot)-wide lanes with a 0.6-meter (2-foot) shoulder on each side. Existing road widths along the candidate routes for heavy-haul trucks include two 3.7-meter (12-foot) lanes and shoulder widths ranging from 0.3 to 0.6 meter (1 to 2-feet). The existing 3.7-meter wide lanes support maximum legal vehicle widths of 2.6 meters (8.5 feet). The proposed 4.3-meter lanes would be sufficient for a 3-meter (10-foot)-wide heavy haul transporter. The 0.6-meter shoulder width provides additional road width for the transporter in transit and would help reduce pavement "breakout" along the edge of the road. Truck turnouts would be used to remove a transporter from travel lanes, if needed. For details, see *Road Upgrades for Heavy Haul Routes* (DIRS 154448-CRWMS M&O 1998).

The analysis of potential road upgrades presented in *Road Upgrades for Heavy Haul Truck Routes – Design Analysis* (DIRS 154448-CRWMS M&O 1998) identifies that the average rate of speed for the heavy-haul vehicles at low grades similar to those on U.S. 95 is between 56 kilometers (35 miles) per hour and 68 kilometers (42 miles) per hour. At that speed, the transporters would pass turnouts that were spaced 8 kilometers (5 miles) apart approximately every 7 to 8 minutes. Therefore, based on this short travel time between turnouts, the few shipments of this type each day, and the limited amount of traffic of other vehicles along the candidate highways, DOE believes the spacing of turnouts would be sufficient to allow queued vehicles to pass and would not adversely affect highway safety. In areas of steeper upgrades, DOE assumed truck lanes would be constructed.

Although proposed road upgrades to allow use of such trucks would mitigate impacts on congested roads, traffic flow, and highway infrastructure, before DOE used a heavy-haul truck transportation implementing alternative it would work with the State of Nevada to conduct engineering and environmental studies that would support detailed design and construction of upgrades to highways.

Section 2.1.3.3.3.2 of the EIS discusses operations of heavy-haul trucks. Section 3.2.2.2.1.1 describes existing traffic on candidate heavy-haul truck routes. Section 6.3.3.1 discusses heavy-haul truck impacts, stating "even with the highway upgrades, heavy-haul trucks would cause delays for other vehicles because of their size and slower travel speeds." Section 6.3.3.1 presents estimates of traffic fatalities associated with heavy-haul truck operations for the five candidate routes.

8.5.3 (4419)
Comment - EIS001472 / 0007
The draft EIS also does not consider the potential of heavy haul truck transportation, and yet we know from the PFS [Private Fuel Storage] facility discussion that's proposed that that's one of the alternatives that will be considered. Recognizing the impact of the PFS facility at Yucca Mountain, those considerations are also to be taken into account.

Response
Similar to the proposed Private Fuel Storage project, DOE has considered the potential of heavy-haul truck transportation in Nevada in Section 6.3.3 of the EIS. Section 6.2 includes the impacts of using heavy-haul trucks to transport rail casks containing spent nuclear fuel from 24 commercial sites that are not served by a railroad to nearby railheads. In addition, the EIS considers the cumulative impacts from the proposed Private Fuel Storage project in Section 8.4.

8.5.3 (5286)
Comment - EIS000968 / 0007
What are the operational characteristics of the proposed heavy-haul system? If heavy-haul trucks are used, how will they effect traffic? It could only move 25-35 miles per hour, on our highways the speed limits are 65 or 75 mph, how many accidents will this cause? Will it warrant additional lane construction? What about where the roads are only two-lanes? How often and by whom will these trucks be inspected? Does the inspection require special tools/equipment? If it breaks down who fixes it and are there special parts needed? Where do they come from? Is there additional radioactive exposure while it sits? Who measures it and with what equipment?

The last several questions also apply to legal weight trucks.

Response
At this time, the heavy-haul truck implementing alternatives for transporting spent nuclear fuel and high-level radioactive waste to the proposed repository are conceptual. Section 2.1.3.3.3.2 of the EIS shows a concept for such a heavy-haul truck. Proposed road upgrades to allow use of such trucks, such as improvements to pavement and construction of turnouts and truck passing lanes, would mitigate impacts on congested roads, traffic flow, and highway infrastructure. However, before DOE used a heavy-haul truck transportation implementing alternative it would work with the State of Nevada to conduct engineering and environmental studies that would support detailed design and construction of upgrades to highways.

Section 2.1.3.3.3.2 of the EIS discusses operations of heavy-haul trucks. Section 3.2.2.2.1.1 describes existing traffic on candidate heavy-haul truck routes. Section 6.3.3.1 discusses heavy-haul truck impacts, stating "even with the highway upgrades, heavy-haul trucks would cause delays for other vehicles because of their size and slower travel speeds." Section 6.3.3.1 presents estimates of traffic fatalities associated with heavy-haul truck operations for the five candidate routes.

DOE would comply with Commercial Vehicle Safety Alliance standards for all truck (heavy-haul and legal-weight) inspections. Federal regulations (49 CFR 397.17) cover hazardous materials transportation inspection of tires. These inspections are required before departure and at regular intervals. Motor carriers are required to conduct load inspections during transport within the first 40 kilometers (25 miles) and after 3 hours or 240 kilometers (150 miles) of transport (49 CFR 392.9). Drivers usually perform these inspections.

Heavy-haul truck transport would require maintenance personnel to assist in the event of breakdowns. At this time, DOE has not determined how, where, or if, maintenance personnel would be positioned along routes.

There could be additional radioactive exposure to transport crews in the event of a vehicle break down. Maintenance personnel would be exposed, with the amount of exposure depending on the length of time required to fix the vehicle. However, the amount of radioactive exposure would be small – within allowable limits set by DOE. Radiological exposure of vehicle crew members and DOE or DOE contractor personnel working near a transportation cask would be subject to controls of a radiological health and safety protection program, which DOE would establish. Radiological exposures would be managed to remain within DOE radiological exposure guidelines.

8.5.3 (5303)
Comment - EIS001887 / 0040
The Draft EIS fails to demonstrate the feasibility of the unprecedented large-scale, long duration heavy-haul transport of SNF [spent nuclear fuel] and HLW [high-level radioactive waste] on public highways. It misrepresents the operational complexity of such shipments; grossly underestimates the amount and cost of infrastructure

improvement required along Nevada highways; and contains an incomplete and inadequate analysis of potential heavy-haul truck (HHT) routes.

Nevada believes that the use of heavy-haul trucks for thousands of shipments of spent nuclear fuel from any of the proposed intermodal transfer facility sites to Yucca Mountain is infeasible and dangerous. The costs associated with highway construction and improvements would be prohibitive, if the necessary infrastructure modifications could be made at all. The disruption to traffic flows and the accident risks posed by these massive, slow-moving, multiple unit vehicles and their escorts would pose unacceptable and unmitigable problems for Nevada's highways. In addition, the frequency of heavy-haul trips required to deliver waste and return the empty vehicle to the intermodal facility would place an unprecedented and unacceptable burden on Nevada's highway transportation infrastructure.

The Draft EIS should have evaluated heavy-haul transport in Nevada against the other alternatives for delivering spent fuel and HLW to Yucca Mountain, and DOE should have determined that such shipments are costly and impractical at best, dangerous and irresponsible at worst. Simply examining the heavy-haul option as a stand-alone alternative, as the Draft EIS does, is inadequate.

Response
In developing its concept for heavy-haul truck transportation in Nevada of large rail shipping casks containing spent nuclear fuel, DOE solicited and obtained information from several companies that routinely use heavy-haul trucks to transport large and heavy equipment. DOE's conceptual operating plans for heavy-haul truck operations involving up to 11 trips per week are based on this input and the experience of these companies in transporting similar size and weight loads both in one-of-a-kind and multiple shipments. Based on this information, DOE believes that use of heavy-haul trucks to transport spent nuclear fuel contained in large rail casks over highways in Nevada would be feasible and could be accomplished without causing large impacts to Nevada transportation infrastructure or the flow of traffic on Nevada highways. In fact, DOE believes that improvements to highway infrastructure that could be made to make routine use of heavy-haul trucks possible could benefit transportation in the State.

In addition to obtaining information from others, DOE employed qualified engineers to conduct mile-by-mile analysis of existing highways in Nevada that would be used for each of the five candidate routes for heavy-haul trucks. This analysis included an evaluation of each candidate route for Nevada Department of Transportation restrictions on axle loading. Using this information, the concept design of a heavy-haul truck, and information obtained from the Nevada Department of Transportation, DOE developed a conceptual design-level engineering analysis that identified potential road upgrades. With the upgrades that this analysis estimated could be needed, the five candidate routes for heavy-haul trucks evaluated in the EIS would be placed in the highest category of allowable axle loading published by Nevada Department of Transportation. DOE used the engineering and operations information developed in these studies to develop cost estimates for the highway upgrades, highway maintenance, and shipments using heavy-haul trucks. These cost estimates, which DOE believes are reasonable and realistic, are the basis for estimating socioeconomic impacts discussed in Section 6.3.3 of the EIS.

Section 6.3.3 of the EIS identifies potential traffic impacts and health and safety risks of transporting spent nuclear fuel in Nevada using heavy-haul trucks. The analysis in this section observes that even with highway upgrades, DOE anticipates that use of heavy-haul trucks would cause some delay in the free flow of highway traffic. Tables 2-10 and 2-11 provide side-by-side presentations of estimated impacts in Nevada of using a branch rail line in each of five candidate rail corridors and of using heavy-haul trucks on each of five candidate routes to transport spent nuclear fuel.

8.5.3 (5406)
Comment - EIS001887 / 0109
Page 2-50; Section 2.1.3.3.3 - Nevada Heavy-Haul Truck Scenario

Heavy-haul vehicles of the type and quantity described in the heavy-haul truck scenario present significant concerns and impacts not addressed in the Draft EIS. Training for inspectors to properly inspect these unique vehicles must be scheduled and performed in a timely manner to insure the safety of all concerned. Vehicle inspection areas must be established at the intermodal transfer station and include appropriate equipment, manpower, and environmentally safe employee working areas.

Escorts for these heavy-haul vehicles will not only provide the usual escort responsibilities, but will also include responsibilities to control and clear large expanses of roadway and conduct preventative sweeps ahead of the load, keeping other traffic moving in an orderly fashion, and interacting with security teams.

Impacts from non-fatal (injury/property) accidents are not addressed in the Draft EIS. However, it is likely that most accidents involving heavy-haul truck (and legal-weight truck) shipments would cause injury or property damage, rather than fatalities.(21) These accidents will have a substantially larger impact than portrayed in the Draft EIS, especially with traffic congestion, reduced travel lane expectancy, and the necessity to reroute traffic due to highway blockage.(22)

The projected speed of 20 to 30 miles per hour for heavy-haul vehicles is highly optimistic, especially during peak or congested traffic periods. The Nevada Highway Patrol estimates that a more realistic speed would be 12 to 18 miles per hour, which will significantly increase traffic congestion and disruption along affected highways.

(21) Section 6.2.4.2.1

(22) See Attachment S for comparing fatal and injury crash rates for large trucks.

Response

Inspections for heavy-haul truck shipments would be completed at the intermodal transfer station and at the Yucca Mountain site prior to and after transport in accordance with Commercial Vehicle Safety Alliance standards, U.S. Department of Transportation regulations, Nuclear Regulatory Commission regulations and applicable state and local codes and standards. During transport, heavy-haul vehicles would make periodic stops for inspections at Commission-approved areas (approved in accordance with Commission safeguards and security regulations in 10 CFR Part 73) and in accordance with U.S. Department of Transportation regulations (see 49 CFR 397.17 and 392.9). Personnel completing inspections would receive training specific to their job function prior to transportation. Escorts used in heavy-haul truck transportation would maintain allowable distances from the heavy-haul vehicles in accordance with Nevada Administrative Codes (see NAC 484.545) and permitting requirements. Escorts used in transport could be used for security in accordance with Nuclear Regulatory Commission regulations (see 10 CFR 73.37). The EIS assumes the use of escorts discussed here. It therefore includes analysis of impacts to the health and safety of this group of workers and of the socioeconomic impacts of the escort jobs.

Potential impacts from operation of the heavy-haul vehicles, including impacts on traffic congestion, are presented in Section 6.3.3 of the EIS. These impacts include estimates of traffic fatalities that could occur for the heavy-haul truck implementing alternatives. Traffic fatality estimates are also presented for commuting workers. Fatalities were used as the measure of the total impact because non-radiation-related traffic fatalities can be combined with radiation-related latent cancer fatalities to yield an estimate of the total number of fatalities for the Proposed Action and the No-Action Alternative. In contrast, combining non-radiation-related measures of impact such as traffic related injuries, illnesses, and other environmental impacts with radiation-related latent cancer fatalities would not yield an easily understandable estimate of total impacts. For the same reason, genetic effects, nonfatal cancers, and other radiation effects were not included in the estimates of the total impact.

The EIS analysis assumed that heavy-haul transport vehicles would utilize two tractors with a reference design of 650 horsepower each. With this reference design, transporter travel times were calculated based on input from commercial operators of overweight and overdimensional vehicles similar to the vehicles in consideration. The estimated speeds of the transported were calculated based on road grade. Estimated heavy-haul transport vehicle speeds ranged from 68 kilometers (42 miles) per hour at a zero-percent grade to 10 kilometers (6 miles) per hour at a 6-percent inclined grade (see DIRS 154448-CRWMS M&O 1998). For the highways in Nevada that would be used, DOE assumed truck lanes would be constructed in areas with road sections longer than 61 meters (200 feet) having grades greater than 4 percent. It also assumed turnout lanes would be constructed on each side of the road at intervals of 8 to 32 kilometers (5 to 20 miles) depending on a route's average daily traffic (see CRWMS M&O 1998). These truck lanes and turnouts would alleviate traffic congestion behind slower moving transport vehicles.

8.5.3 (5730)
Comment - EIS001887 / 0338
Page 6-96; Section 6.3.3.1 - Impacts Common to Nevada Heavy-Haul Truck Implementing Alternative

Incident-Free Transportation

The Draft EIS does not adequately evaluate the radiological impacts of routine HHT [heavy-haul truck] transportation. The Draft EIS appears to significantly underestimate HHT routine radiation exposures to the general public, especially in Tonopah, Goldfield, Beatty, and other locations where residences and businesses are located within 25 to 200 feet of the U.S. 95 road shoulder. The RADTRAN model is not sufficiently sensitive to local conditions and probable HHT operating characteristics. DOE must recalculate the annual and cumulative collective dose and maximum individual dose, assuming a range of HHT speeds and stop-times. The analysis must consider the actual location of all occupied buildings within ¼ mile of the route. The analysis must accurately reflect the actual population within ¼ mile of the route during daylight hours on week days, including children in schools and nonresidents in hotels and commercial establishments. Nevada believes that numerous individuals could receive annual doses from HHT operations equal to ten to thirty percent or more of annual background radiation exposures.

Response
Section 6.3.3 of the EIS presents estimates of radiological impacts for each of the five alternative routes in Nevada. Section J.3.1.2 describes calculation parameters used for each of the Nevada routes including distances through rural, suburban, and urban areas along the routes and the populations along each route. Tables of times, speed, and distances used in estimating parameters for the analysis of impacts are provided in *Road Upgrades for Heavy Haul Truck Routes* (DIRS 154448-CRWMS M&O 1998). Estimated speeds through towns and around sharp corners for heavy-haul trucks range from 8 to 24 kilometers (5 to 15 miles) per hour. The analysis used route-specific data such as length and population within 800 meters (about 2,600 feet) of the route provided by a Geographic Information System analysis. To estimate the risks, DOE used accepted methods and data that it has used in other recent environmental documents.

In addition, in responding to public comments regarding individuals in Nevada who live close to candidate transportation routes, DOE used information from a recent report prepared for the City of North Las Vegas (DIRS 155112-Berger Group 2000). This report presents suggested assumptions for a hypothetical maximally exposed individual who lived 15 meters (49 feet) from a roadway used by heavy-haul trucks and who would be present and stay at that location, when, over the 24 years, each shipment stopped for 1 minute. DOE believes that such an exposure scenario is highly unlikely and therefore unrealistic. Nonetheless, DOE estimated the maximum cumulative radiation dose to this hypothetical individual would be about 520 millirem over 24 years of the Proposed Action (see Section J.1.3.2.2.1 of the EIS). This dose would lead to an estimated increase in risk of cancer of 1 in 4,000 over the individual's lifetime. The analysis in the EIS considered other potential maximally exposed individuals who could live along routes in Nevada. These included:

- A person in Alamo living in a residence approximately 5 meters (15 feet) from U.S. 93 where heavy-haul trucks could pass who could receive a dose of 25 millirem over 24 years;

- A person who could be in the courthouse or fire station in Goldfield, Nevada approximately 5 meters (15 feet) from U.S. 95 where heavy-haul trucks could pass, who could receive a dose of 56 millirem over 24 years;

- A person who would live at the edge of a 60-meter wide (196 feet) right-of-way for a branch rail line where all rail shipments would pass, who could receive a dose of 2 millirem over 24 years; and

- A person who would live in southern Nevada approximately 11 meters (35 feet) from a roadway used by legal-weight trucks who could receive a dose of 20 millirem over 24 years.

For perspective, cancer from all other causes is fatal to about 1 in 4 persons.

DOE believes that the risks of transporting spent nuclear fuel and high-level radioactive waste in Nevada to Yucca Mountain would be very small for the Proposed Action and for the Inventory Modules.

Should the heavy-haul truck scenario be selected, additional engineering and environmental studies could be conducted as a basis for detailed design and appropriate National Environmental Policy Act reviews. These studies would be used in selecting final roadways, upgrades, and associated facilities for heavy-haul trucks. Consultation with responsible agencies and interested stakeholders would provide for input to these studies and become part of the National Environmental Policy Act reviews.

8.5.3 (7048)
Comment - EIS001847 / 0006
The DEIS fails to address the fact that the number of shipments and the amount of radioactive material that will be shipped is unprecedented in world history. About 90% of the volume would be spent fuel from nuclear power plants, and virtually none of this type of material has ever been shipped before.

Response
Of the thousands of spent nuclear fuel shipments completed over the last 30 years, none has resulted in an identifiable injury from the release of radioactive material. Future shipments will be conducted under the same regulations that have contributed to the safe transportation of more than 2,700 shipments conducted in this country over the last 30 years. For additional information on the regulations, procedures, and equipment that would be followed and used to ensure this safety record continues with shipments to a repository, see Appendix M to the EIS.

8.5.3 (7187)
Comment - EIS001337 / 0076
Page 2-51 Section 2.1.3.3.3.2. This section [should] provide an indication of maximum and minimum speeds that heavy-haul trucks will travel. The length of time to complete trip for each route should be discussed.

Response
The maximum and minimum speeds, and route travel times are included in *Road Upgrades for Heavy Haul Routes* (DIRS 154448-CRWMS M&O 1998). A review of information in this report indicates that the travel speeds would range from about 16 kilometers (10 miles) per hour on steep grades and through towns to about 65 kilometers (40 miles) per hour on open highways. Each table lists the mileage by road condition type, the speed over the section, and the time to travel the section. This information includes inspection stops and intersections to be navigated on each route and were used for estimating road upgrades and operating plans. Section 6.3.3.2 of the EIS presents estimated travel times for heavy-haul trucks for each of the five candidate routes for heavy-haul trucks in Nevada.

8.5.3 (7653)
Comment - EIS001912 / 0097
Heavy haul truck options. There is no indication of roadway wear and the cost to upgrade and maintain this type of facility. Will DOE commit to roadway and other improvements needed? Is the Nevada Department of Transportation a cooperating agency on this DEIS? Has DOE discussed the infrastructure improvements needed for a heavy haul route?

Response
Section J.3.1.2 of the EIS lists potential upgrades for the five candidate heavy-haul truck implementing alternatives in Nevada. This information is summarized from *Road Upgrades for Heavy Haul Routes* (DIRS 154448-CRWMS M&O 1998). Estimates of costs to upgrade and maintain the highways that would be used over 24 years for the Proposed Action are detailed in *Cost Estimate for Heavy Haul Truck Transport Design* (DIRS 154675-Ahmer 1998). Section 2.1.5 , Table 2-5, lists the estimated project lifetime cost of up to $800 million for transportation in Nevada. This project cost includes costs of upgrading and maintaining highways for heavy-haul trucks. The Nevada Department of Transportation was not a cooperating agency for the EIS. Personnel from DOE and the Nevada Department of Transportation have informally discussed highway upgrades needed to support use of heavy-haul trucks to transport spent nuclear fuel to Yucca Mountain.

8.5.3 (7941)
Comment - EIS001903 / 0008
P. 6-5, text box. "Nine-axle tractor-trailer truck (steering axle and three drive axles on the tractor and three axles on the trailer)…." 1+3+3 is 7, not 9.

Response
The error has been noted and a correction to reflect a seven-axle tractor-trailer has been included in the Final EIS.

8.5.3 (8405)
Comment - EIS001873 / 0071
P. 6-115. I fail to see what objective could be accomplished by heavy-haul from Caliente to Las Vegas.

Response
Section 2.1.3.3.3 of the EIS describes five transportation implementing alternatives that would use heavy-haul trucks to transport spent nuclear fuel and high-level radioactive waste in Nevada. The Caliente/Las Vegas heavy-haul truck route is one of these, which include routes that would be longer and shorter. Section 6.3.3.2.3 describes the potential impacts of upgrading and maintaining highways, constructing an intermodal transfer station, and making shipments using heavy-haul trucks on the route. DOE included this route in the EIS because it is one of three feasible routes that could be used for shipments of spent nuclear fuel contained in rail casks and that would be transferred from railcars to heavy-haul trucks at an intermodal transportation station in Caliente, Nevada. DOE believes the Caliente-Las Vegas route could meet the requirements of the U.S. Department of Transportation requirements for shipments that would originate at a Caliente intermodal transfer station.

8.5.3 (9425)
Comment - EIS001888 / 0116
In addition, the DEIS did not analyze the effects that construction of the heavy haul infrastructure improvements or a rail line would have on the Regional Transportation Plan of Clark County.

Response
Sections 6.3.2 and 6.3.3 of the EIS discusses the potential impacts from Nevada rail and heavy-haul truck implementing alternatives (respectively), including the potential impacts of construction and infrastructure improvements. For the three candidate heavy-haul truck routes through the Las Vegas Valley, DOE assumed the use of the Las Vegas Beltway. For these implementing alternatives, the applicable segment(s) of the Beltway would be completed in time for the beginning of shipments approximately 10 years earlier than the current Clark County estimate for completion in 2020. The assumption used is that this would reduce traffic congestion in the Las Vegas Valley, and would thereby promote the objectives of the Regional Transportation Plan of Clark County. In fact, DOE believes that improvements to highway infrastructure that could be made to make routine use of heavy-haul trucks possible could benefit transportation in the County. In addition, should DOE select one of the three candidate heavy-haul truck implementing alternatives that would use highways in Clark County, additional engineering and environmental studies could be conducted as a basis for detailed design and appropriate National Environmental Policy Act reviews. These studies would be used in selecting final roadways, upgrades, and associated facilities for heavy-haul trucks. DOE would consult with the County regarding the specific impacts to the transportation system that would be caused by the associated highway improvements and use of heavy-haul trucks.

DOE assumed construction and use of a branch rail line in Clark County, in either the Jean or the Valley Modified Corridor, would not disrupt highway traffic. Construction of grade separations over existing highways would have the largest, although temporary, impact on traffic flow. However, grade separations that would be needed are well outside the Las Vegas Valley area.

DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

8.5.3 (10804)
Comment - EIS002043 / 0006
The EIS needs to address what corrective measures will be taken to make the right bend just south of the center of the Town of Goldfield safe for other drivers. In addition, there is insufficient room for the heavy-haul transporter to

pull over to the side of the highway in the more populated business district of Goldfield. If the transport vehicle had a breakdown in Goldfield, there would be no place to pull the vehicle to the side and out of the way of the travel lane. This situation could be mitigated by constructing a roadway that by-passes the center of Goldfield. The EIS should include a by-pass route and address methods for mitigating any potential adverse socioeconomic impacts of a by-pass.

Response
Section 6.3.3.2.1 of the EIS discusses the potential impacts of implementing the Caliente heavy-haul truck implementing alternative. The analysis of this candidate route is based on information contained in *Road Upgrades for Heavy Haul Truck Routes – Design Analysis* (DIRS 154448-CRWMS M&O 1998). The report estimates the needs for highway upgrades including improvements to the Goldfield curve discussed by the commenter. Based on the analysis, a heavy-haul truck such as the one illustrated in Section 2.1.3.3.3.2 could negotiate the curve although in the course of making the turn the vehicle would have to encroach into the opposing lane. The Department's analysis suggests the curve could be widened (both shoulders) so that transit by the heavy-haul vehicles would not require stopping opposing traffic. DOE considered the alternative of constructing a by-pass around Goldfield. However, after preliminary engineering analysis and consideration of vehicle turning capabilities for up to a 140-metric-ton (150-ton) payload DOE concluded a bypass would not be necessary. Nonetheless, although proposed road upgrades to allow use of heavy-haul trucks would mitigate impacts on congested roads, traffic flow, and highway infrastructure, before DOE used a heavy-haul truck transportation implementing alternative it would work with the State of Nevada to conduct engineering and environmental studies that would support detailed design and construction of upgrades to highways.

8.5.3 (11007)
Comment - EIS001896 / 0005
Section 2.1.3.3.3.2

The heavy-haul trucks would travel north on I-15 from the Sloan interchange. The trucks would then exit on the beltway and travel northwest to Yucca Mountain. This route could affect potential annexation areas.

Response
Section 2.1.3.3.3 of the EIS describes the Nevada heavy-haul truck implementing alternatives including the Sloan/Jean route for heavy-haul trucks and intermodal transfer station. Section 6.3.3 discusses the potential impacts, including land use of the Nevada heavy-haul truck transportation implementing alternatives. A Sloan/Jean route would originate from an intermodal transfer station located along the mainline Union Pacific track near Jean. Another possibility would be for the route to originate at an area along the Railroad's mainline near the town of Sloan. Both areas are currently public lands managed by the Bureau of Land Management. The Department is not aware of any plans for annexation in these areas. Should a heavy-haul truck implementing alternative be selected and prior to a specific route and intermodal station location being chosen, further engineering and National Environmental Policy Act analysis could be required. Such analyses would address the potential for land-use impacts. Should DOE select one of the Sloan/Jean heavy-haul truck implementing alternative, additional engineering and environmental studies could be conducted as a basis for detailed design and appropriate National Environmental Policy Act reviews. These studies would be used in selecting final roadways, upgrades, and associated facilities for heavy-haul trucks. DOE would consult with the County and other cognizant agencies regarding specific impacts that would be caused by the associated highway improvements, construction and use of an intermodal transfer station, and use of heavy-haul trucks.

8.5.3 (11017)
Comment - EIS001896 / 0015
Section 3.2.2.2.11

The implementation of the Sloan/Jean heavy-haul route would impact already congested roads. Level of service E&F are currently experienced on Sloan/Jean route.

Response
As noted in Section 6.3.3.1 of the EIS, DOE acknowledges this potential impact. The EIS states that operations of heavy-haul trucks on routes through the Las Vegas valley would cause delays for other vehicles due to the size and

speed of the heavy-haul vehicles and the associated escorts. However, the Department assumes requirements for heavy-haul truck operations that would be contained in permits issued by the Nevada Department of Transportation would include time-of-day and day-of-the-week restrictions to reduce impacts of heavy-haul trucks on traffic congestion.

8.5.3 (11292)
Comment - EIS001814 / 0021
DEIS Page 2-50
Under this scenario, rail shipments to Nevada would go to an intermodal transfer station where the shipping cask would transfer from the railcar to a heavy-haul truck. The heavy-haul truck would travel on existing roads to the repository.

DOE has not demonstrated that heavy-haul truck is a feasible option to transport railroad casks to the proposed repository. States are required to enforce weight and size limitations on Interstate System and on routes providing reasonable access to and from the interstate. The penalty for failure to do so is the withholding of a State's National Highway System apportionment. States may issue permits for overweight and/or oversize vehicles if the load meets the definition of a nondivisible load as defined at 23 CFR Part 658:

Nondivisible load or vehicle.
(1) As used in this part, nondivisible means any load or vehicle exceeding applicable length or weight limits which, if separated into smaller loads or vehicles, would:

(i) Compromise the intended use of the vehicle, i.e., make it unable to perform the function for which it was intended;

(ii) Destroy the value of the load or vehicle, i.e., make it unusable for its intended purpose; or

(iii) Require more than 8 workhours to dismantle using appropriate equipment. The applicant for a nondivisible load permit has the burden of proof as to the number of workhours required to dismantle the load.

(2) A State may treat emergency response vehicles and casks designed and used for the transport of spent nuclear materials as nondivisible vehicles or loads.

The decision as to whether or not to treat casks for the transport of spent nuclear materials is left to the discretion of the states. The Federal Highway Administration (FHWA) adopted a single definition of nondivisible loads to apply to both oversize and overweight loads, since "Congress has authorized the States, in identical terms, to issue overweight and oversize permits 'for those vehicles and loads which cannot be easily dismantled or divided [(23 U.S.C. 127(a); section 4006(a) of the ISTEA, 49, U.S.C. app. 2311(j)(1)].'" (58 *FR* 11455)

Casks designed and used for the transport of spent nuclear materials were added to the definition of nondivisible loads in the preamble to the final rule. FHWA stated, "Spent Nuclear Fuel: The Pennsylvania DOT [Department of Transportation] pointed out that the FHWA informed the American Association of State Highway and Transportation Officials (AASHTO) several years ago that the FHWA regarded overweight casks used to move spent nuclear fuel as nondivisible. This determination was not reflected in the SNPRM (Supplemental Notice of Proposed Rule Making). The casks used to transport spent nuclear materials, especially nuclear fuel, are extraordinarily strong and heavy, both to prevent a release in case the transporter vehicle was involved in an accident and to block radiation that would penetrate lighter materials. Some of these containment devices can make a vehicle overweight even before the nuclear materials are loaded. These vehicles cannot be used for any other cargo or reduced to legal weights without frustrating their purpose. A new provision has therefore been added which essentially states that specially designed casks used to move spent nuclear fuel meet the definition of a nondivisible load." (59 *FR* 30409)

In the Supplemental Notice of Proposed Rule Making, FHWA stated: "Nonetheless, nondivisible load permits should be used sparingly. Loads which are inherently divisible, including bulk items such as liquids, grain, or cement, would not qualify as 'nondivisible.' Nor would shipments consisting of more than one of a unit item or assemble, which by itself may be nondivisible. In such cases, items can be removed until the load meets the legal limits. Nondivisible load permits are not 'loopholes' in Federal law, and the FHWA expects to see the number of nondivisible load permits stabilize or even decline in the next few years." (58 *FR* 11457)

FHWA further clarified the intent of the definition of nondivisible loads with an additional example. "A similar argument has been made, although not in this rulemaking, that tank vehicles weighing more than 80,000 pounds should be eligible for nondivisible-load overweight permits because a partially loaded tank of legal weight is susceptible to cargo surge that can make the vehicle unstable and even cause accidents in turns or emergency maneuvers. By this reasoning, a nondivisible-load overweight permit would be authorized to increase safety. Proponents of this position do not explain the reason tanker operators purchase vehicles that necessarily exceed applicable weight limits when fully loaded. It is certainly true that tank trucks must be operated with particular care; that is the reason the FHWA's commercial driver's license regulations require drivers of these vehicles to obtain a special endorsement. But the fact is that liquids, like two concrete panels, are easily divisible. If a safety element were added to the definition of nondivisible load, the concept of nondivisibility could lose all meaning if economic interests were to masquerade as safety issues." (59 *FR* 11457)

FHWA's intent when adopting the definition of nondivisible loads was to reduce the number of permits issued for overweight and oversize vehicles. Casks for transporting spent nuclear fuel were added to the definition of nondivisible since the design of the cask requires heavy materials for strength and shielding, resulting in some cases, for the need for overweight vehicles. This definition, however, clearly applies to casks that were designed for highway transport, not those designed for rail. In the Supplemental Notice of Proposed Rulemaking, FHWA stated that "shipments consisting of more than one of a unit item or assembly, which by itself may be nondivisible," are not considered nondivisible. DOE can transport the material in casks that meet the requirements for legal weight and size trucks, they are simply proposing to ship "more than one of a unit item or assembly" by putting many more fuel rod assemblies in a cask designed for rail than they could with legal weight truck casks.

In FHWA's example of tank vehicles, they also noted that "the concept of nondivisibility could lose all meaning if economic interests were to masquerade as safety issues." In this case, DOE is not even claiming a safety benefit for the use of rail casks, but rather just one of convenience. Since the use of rail casks is clearly optional, and the material could be shipped in legal weight casks, DOE's proposed use of rail casks transported on overweight and oversize vehicles clearly does not meet the definition of nondivisible load, and does not qualify for an overweight and oversize permit based upon nondivisibility of the load.

Response
Section 2.1.3.3.3 of the EIS describes the Nevada heavy-haul truck scenario and Sections 6.3.3.1 and 6.3.3.2 provide the results on the impacts analysis. Should heavy-haul truck mode be selected, detail engineering and environmental studies would be conducted to provide the basis for detailed design. During these studies, consultations with Federal, State, tribal and local authorities would be initiated to address regulatory, permitting and related issues. Heavy-haul truck permitting would be one topic for consultation with the Nevada Department of Transportation. Those detailed consultations have not yet occurred. However, the definition of "nondivisible loads" pertaining to transportation casks for the transportation of spent nuclear fuel and high-level radioactive waste has been addressed in the preamble to the *Federal Register* Notice that added the 23 CFR 658.5 definition. In general, this definition says that any cask that can be transported on the highways fits the definition of 23 CFR 658.5. This holds true even if the cask must be transported on a heavy-haul truck. This has been acknowledged by the Office of Freight Management and Operations in the Federal Highway Administration, U.S. Department of Transportation.

8.5.3 (11294)
Comment - EIS001814 / 0023
DEIS Page 2-53
The station would accept railcars as they arrived (24 hours a day, 7 days a week), but it would normally dispatch heavy-haul trucks during early morning daylight hours on weekdays, consistent with current Nevada heavy-haul shipment regulations.

The EIS does not contain sufficient information on the schedule of arriving shipments to the station and the schedule on dispatch of heavy-haul trucks from the station to allow an evaluation of the impacts. During winter time, the restriction on travel during daylight hours will significantly limit the time available for travel from the station to the proposed repository. In December, for example, there are only about 10 daylight hours available for travel. Depending on the location of the intermodal transfer station, dispatch of the heavy-haul trucks in the "early morning daylight hours" could result in heavy-haul trucks traveling through the Las Vegas urban area during rush hour.

The EIS does not provide any information on the impact of limiting travel to weekdays. Given the restriction on travel during daylight hours, this means that casks arriving at the station Friday through Monday morning cannot be dispatched until Monday morning. To comply with NRC [Nuclear Regulatory Commission] requirements, a significant number of heavy-haul trucks will have to be dispatched on Monday mornings. The EIS should provide information on this scheduling requirement, and include an evaluation of the impacts of having multiple heavy-haul trucks dispatched during a short time-frame on Monday mornings. Since travel is also prohibited on holidays, this problem will be even worse over three-day holiday weekends.

The number of casks arriving over a weekend could vary significantly depending on whether DOE decides to use general freight or dedicated trains. DOE should state in the EIS its preferred option for the type of service utilized so that an estimate of the number of railcars arriving over a weekend can be made to evaluate impacts of scheduling options. Conceivably, if DOE opts for dedicated train service, the dispatch of trains from shipping sites could be optimized to prevent an excessive number of casks arriving at the intermodal transfer site over weekends.

Response
DOE does not have detailed operational information regarding a concept of operations; however, conceptual level engineering analysis has been completed. For example, the document titled *Road Upgrades for Heavy Haul Truck Routes* (DIRS 154448-CRWMS M&O 1998), contains estimated travel times for the five heavy-haul truck routes identified in the Draft EIS. An assumption used in the EIS for the three routes originating from Caliente, Nevada would be a mid-route overnight parking area, because of the length of the routes, restricted nighttime travel, and allowance for operations contingencies. However, with the exception of the Caliente route, travel times for heavy-haul trucks are estimated to be less than 10 hours, including inspection stops.

For the Caliente/Las Vegas route, heavy-haul trucks leaving Caliente in the morning would arrive in the Las Vegas area at mid-day. Trucks using the Apex/Dry Lake route or Sloan/Jean route could avoid Las Vegas rush-hour traffic in the mornings and evenings. Both of these routes have estimated travel times of about 4 hours.

Regarding the use of dedicated versus general freight trains, Section J.2.3 of the EIS states, "DOE has not determined the commercial arrangements it would request from the railroads for shipment of spent nuclear fuel and high-level radioactive waste." Until this decision is made with sufficient shipment details, transportation logistics cannot be analyzed in detail with any accuracy. However, in its Draft Request For Proposal, *Acquisition of Waste Acceptance and Transportation Services for the Office of Civilian Radioactive Waste Management*, DOE stated, "The RSC [Regional Servicing Contractor] shall provide all transportation services to include heavy haul and intermodal transfer services that make maximum use of special rail service wherever reasonably possible" (DIRS 153487-DOE 1998).

8.5.3 (12195)
Comment - EIS000096 / 0008
The Draft EIS also ignores the potential impacts on Tonopah, Goldfield, and Beatty of legal-weight truck (LWT) shipments of SNF [spent nuclear fuel] and HLW [high-level radioactive waste]. US 6 from Ely to Tonopah and US 95 from Tonopah to Amargosa Valley are identified as potential state-designated preferred routes in Appendix J. According to the Draft EIS, there could be as many as 96,000 LWT shipments to the repository under the mostly truck scenario. The adverse impacts of these shipments would be similar to those of HHT [heavy-haul truck] shipments. The larger number of LWT shipments, averaging 5 to 10 trucks or more per day, could result in higher routine radiation exposures and heightened levels of risk.

Response
DOE believes that the risks of transporting spent nuclear fuel and high-level radioactive waste in Nevada to Yucca Mountain would be very small for the Proposed Action and for the Inventory Modules. Section J.3.1.3 of the EIS presents estimated impacts for the Proposed Action and for the approximately 53,000 shipments under the mostly legal-weight truck scenario if shipments used the routes described in a 1989 Nevada Department of Transportation report (DIRS 103072-Ardila Coulson 1989, all). The route identified as "Wendover via U.S. 95", which is

described in the section and includes U.S. 95 through Tonopah, Goldfield, and Beatty, is one of the routes evaluated as a sensitivity analysis. For this route, DOE estimated the total dose over 24 years to the population along the sections of Interstate-80, U.S. 93, U.S. 6, and U.S. 95 that make up the total route in the State would be about 900 person-rem. A dose of 900 person-rem to the affected population would be estimated to result in a 45-percent chance of 1 latent cancer fatality in the population over the 24 years of operations. The information was compiled to illustrate the sensitivity of impacts nationally and in Nevada to the potential use of different routes in Nevada. The analysis used State-specific data for rates of accidents on primary highways in Nevada for the segments of trips analyzed in these cases. The analysis also used route-specific data such as length and population within 800 meters (about 2,600 feet) of the route provided by a Geographic Information System analysis. To estimate the risks, DOE used accepted methods and data that it has used in other recent environmental documents.

8.5.3 (12548)
Comment - EIS001157 / 0009
A heavy-haul route through North Las Vegas and the Las Vegas Valley is not recommended. The costs of using such routes in terms of congestion and decreased air quality were not adequately addressed in the study.

Response
At this time, the heavy-haul truck implementing alternatives for transporting spent nuclear fuel and high-level radioactive waste to the proposed repository are conceptual. Section 2.1.3.3.3.2 of the EIS shows a concept for such a heavy-haul truck. Proposed road upgrades to allow use of such trucks, such as improvements to pavement and construction of turnouts and truck passing lanes, would mitigate impacts on congested roads, traffic flow, and highway infrastructure. In addition, Section 6.3.3 discusses impacts of implementing and using each of the proposed heavy-haul truck transportation implementing alternatives including potential impacts on the air quality in the Las Vegas air basin. However, before DOE used a heavy-haul truck transportation implementing alternative it would work with the State of Nevada to conduct engineering and environmental studies that would support detailed design and construction of upgrades to highways.

DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

8.6 Rail Transport

8.6.1 DEDICATED TRAINS

8.6.1 (223)
Comment - 13 comments summarized
A number of commenters provided views on the type of train service that should be used for the transportation of spent nuclear fuel and high-level radioactive waste. There was a consensus among the commenters that dedicated trains should be used rather than general freight service; commenters listed the advantages of dedicated trains. The commenters stated that the Draft EIS does not make a decision between dedicated trains and general freight service. Several commenters indicated that DOE should state in the EIS whether the EIS is intended to support the decision between dedicated and general freight trains. One commenter suggested DOE should include the use of general freight and dedicated trains as separate alternatives in the description of the Proposed Action in the EIS.

Response
As indicated in the EIS, DOE believes that the mostly rail case, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. In addition, DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

DOE could decide to use a dedicated train that carried only the material being shipped to Yucca Mountain, or could elect to move the spent nuclear fuel and high-level radioactive waste in general freight. If the material was shipped as general freight, the position of the spent nuclear fuel or high-level radioactive waste car in the train would be regulated by 49 CFR 174.85. This regulation requires that railcars placarded "radioactive" must be separated from a locomotive, occupied caboose, or carload of undeveloped film by at least one nonplacarded car, and it may not be placed next to other placarded railcars of other hazard classes. Section J.2.3 of the EIS presents an assessment of impacts of using dedicated trains to transport spent nuclear fuel and high-level radioactive waste. Based on current information from the U.S. Department of Transportation and the Association of American Railroads, it is the Department's opinion that there is no clear advantage for using either dedicated trains or general freight service.

DOE has not determined the commercial arrangements it would request from the railroads, including the use of dedicated or general freight trains, nor is the EIS intended to develop the scheduling and cost information necessary to make this determination. DOE recognizes the different attributes of dedicated trains and general freight service. DOE believes that general freight service, and dedicated train service are both capable of meeting the performance objectives of 10 CFR 73.37(a)(1) based on successful completion of past shipments of spent nuclear fuel by rail.

8.6.1 (402)
Comment - EIS000088 / 0002
Remember those trucks that delivers those nuclear waste from throughout the world and they go over there to that Nevada Test Site.

When they dump their load, they come on down here to California and go pick up your food. How much radiation is on that truck?

Response
The spent nuclear fuel that would be transported to a repository by truck would be contained in sealed casks. This would prevent the flatbed trailers used to transport the casks from becoming contaminated. In addition, the trucks would be checked for contamination prior to being allowed to leave the repository facility. It is not likely that these particular trucks would be used for any other purpose.

8.6.1 (4464)
Comment - EIS001232 / 0008
Is the proposed rail line to be a single use line or will it have other potential uses?

Will the rail roads handle these shipments as dedicated cargo or will they be shuffled from rail line to rail line and possibly lost?

Will there be buffer zones along the tracks?

Response
Decisions on whether or not to build a branch rail line, management of such a line, and other potential uses would be addressed after a decision on the suitability of the repository site. As discussed in Section 2.1.3 of the EIS, the conceptual design used in preparing the EIS assumed a single set of tracks and rail sidings. Sidings would be an average of 20 miles apart and approximately 0.5 kilometer (0.3 mile) long (see DIRS 154822-CRWMS M&O 1998). Should the mostly rail alternative be selected, additional, more detailed studies and designs would be conducted for the particular corridor and alignment identified. The need for additional sets of tracks and rail sidings would be evaluated during this design stage. Additional National Environmental Policy Act reviews, as required, would be conducted at that time.

A qualitative comparison of attributes of general rail-freight to dedicated train service in Table J-25 and in Section J.2.3 of the EIS, which is based in part on results of a recent U.S. Department of Transportation study, does not indicate a clear advantage for the use of either type of rail service. Thus, impacts discussed in the EIS are estimated based on typical railroad operations. In these operations, railroads transport freight cars, including cars carrying hazardous materials, along with other freight in trains that average 67 cars in length. DOE believes the analysis presented in the EIS supports use of either general-rail freight or dedicated-train service.

DOE's Draft Request for Proposals for Regional Servicing Contractors (see Appendix M of the EIS), states that contractors could be directed to use dedicated train service where it can be demonstrated to enhance operations efficiency and cost-effectiveness.

The branch rail line would be built following applicable Federal Railroad Administration, American Association of Railroads, and State of Nevada requirements.

8.6.2 BRANCH RAIL LINE CONSTRUCTION

8.6.2 (137)
Comment - 3 comments summarized
Commenters expressed concern with the estimated time to complete preconstruction activities associated with branch rail line construction, including environmental reviews and approvals, acquisition of rights-of-way, resolution of Native American tribal rights issues, and any associated legal issues. In addition, commenters expressed concern with the estimated time to complete branch rail line construction activities due to difficult terrain, environmental sensitivity, and unidentified Native American tribal cultural resources. Commenters believed that the estimated time for construction is optimistic and underestimates the difficulty of construction. A commenter noted that the EIS failed to provide a detailed description of rail construction activities and impacts.

Response
To ensure that the EIS analyses reflect the latest reasonably available information, DOE has incorporated information that has become available since the publication of the Draft EIS or modified existing information to accommodate conditions likely to be encountered over the life of the Proposed Action. For example, the EIS now includes additional and more detailed mapping of minority populations, and additional mapping and information that describes the proximity of tribal lands and cultural and ceremonial areas to candidate rail corridors in Nevada.

The cost estimates and schedules for the construction of branch rail lines were prepared after surveying the candidate corridors, investigating the topography, and reviewing potential environmentally and culturally sensitive areas. The conceptual design for rail implementing alternatives, the "Rail Alignments Analysis," attempted to minimize impacts to areas of known environmental concern or archaeological significance (including Native American cultural resources) by choosing corridor alignments that minimized or eliminated crossing of known sensitive areas (DIRS 131242-CRWMS M&O 1997). These corridor alignments include variations that could mitigate environmental or engineering issues. The analysis was then used in the development of a detailed cost estimate for rail construction, the *Nevada Transportation Study Construction Cost Estimate* (DIRS 154822-CRWMS M&O 1998). The construction cost estimates considered the cut and fill operations necessary to traverse the terrain associated with each route. Through the use of the estimated worker-hours for construction activities contained in this study rail construction schedules were developed (DIRS 155356-CRWMS M&O 1999) for conservative estimates of the duration of rail construction. Rail construction was estimated to take from 3 years and 4 months to 3 years and 10 months on a normal construction schedule.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. If the Yucca Mountain site was approved, DOE would issue at some future date a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. A similar process would occur in the event DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

Because DOE cannot anticipate the length of any agency delays or legal challenges, including issues related to Native American tribal treaty lands, contingencies were not placed in estimated activity durations for preconstruction activities.

8.6.2 (186)
Comment - 18 comments summarized
Commenters stated that the EIS did not provide sufficient information on branch rail line system specifications, construction activities, and operations to allow the complete assessment of impacts and risks as required under National Environmental Policy Act. Other commenters asked what the costs would be to construct the five rail routes and which of the five could be constructed at the least cost. Commenters stated that the EIS did not contain sufficient information on branch rail line system specifications, including rail weight, tie materials, grade crossing separations, road crossings and crossing signals, overpasses, administration and maintenance facilities (including any remote water supply and sanitation specifications), seismic standards, flood standards, train control signal systems, platform dimensions, ditch dimensions, bench dimensions, and ballast and sub-ballast requirements. Other commenters questioned what the fencing specifications would be, including location and type, because this would affect the ability of wildlife to cross the tracks. Commenters stated that the EIS did not contain sufficient information on branch rail line construction activities, including defining what the buffer zone would be during construction to protect human health and safety, defining cut and fill requirements, and identifying sources for ballast and sub-ballast material. Commenters stated that the quarrying of ballast and sub-ballast materials, the reclamation of ballast and sub-ballast source areas, the installation of water wells and their locations, and construction and safety oversight by State and Federal agencies were not addressed in the EIS. Finally, commenters stated that the EIS did not contain sufficient information on rail branch line operations, including safety oversight of rail line operations by Federal and State agencies, to allow the complete assessment of impacts and risks. Another commenter is interested in whether union labor would be required to construct the branch rail line.

Response
If the Yucca Mountain site was approved, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. However, follow-on implementing decisions, such as the selection of a specific rail alignment in a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

If the site was approved, transportation system specifications would be developed during detailed design activities. Specifications for items such as administration and maintenance facility and any associated remote water supply and sanitation needs, train control signal systems, and road crossing signals would be developed during these activities. Detailed field studies and geotechnical work would be required for development of specifications for seismic, flood, platform dimensions, ditch dimensions, bench dimensions, ballast requirements, and sub-ballast requirements. Specifications for grade crossing separations, road crossings, fencing locations, and fencing type would be developed in conjunction with government agency consultations, environmental analyses, and any necessary National Environmental Policy Act reviews, which would be conducted at the time of detailed design activities.

Based on standard engineering practices, DOE developed assumptions for the branch rail line conceptual designs analyzed in the EIS (DIRS 131242-CRWMS M&O 1997). In addition, conceptual engineering designs were developed for each of the rail corridors. These conceptual designs are referenced in the EIS and are available to the public. They incorporate assumptions based on regulatory requirements, established engineering practices, and existing railroad design. The documents contain sufficient design information to allow estimation of the environmental impacts of constructing and operating a branch rail line, but were not intended to provide specifications and detailed design descriptions, such as the information requested by the commenters, for constructing, maintaining, and operating a branch rail line. Additional information on operational protocols is provided in Section M.3 of the EIS.

DOE assumed for the purpose of the EIS that operations of trains on a branch rail line and the maintenance of the line would be conducted in compliance with applicable regulations and standards for railroads and that the safety of operations would meet or exceed that of mainline railroads in the United States.

The conceptual design assumed a rail weight of 115 pounds per yard of rail, which is equivalent to that used by railroads for mainline track and grade crossings at all major public crossings. The conceptual design also assumed that seismic and flood specifications for railbed structure would use national standards contained in the American Railway Engineering Association *Manual for Railway Engineering* (DIRS 106860-AREA 1997, all) (see EIS Section 3.2.2.1.3.1 for a description of the avoidance of wetlands and riparian lands). For cost estimation, specifications for fencing type, ballast requirements, sub-ballast requirements, tie material, train control signal systems, and road crossing signals have been assumed in *Nevada Transportation Study Cost Estimate* (DIRS 154448-CRWMS M&O 1998). DOE used these specifications in the analysis of Nevada transportation activities in Section 6.3.

The life-cycle cost estimates for each rail corridor alternative in Nevada are presented in the EIS Summary, Section 6.3.2.1. The conceptual designs and cost estimates for all five rail corridor alternatives were developed at similar levels of detail and have similar uncertainties, so valid comparisons can be made. DOE anticipates that the cost estimates would change, albeit not substantially, as a result of detailed engineering and design studies.

If there was a decision to proceed with the development of a repository at Yucca Mountain, DOE would determine the type of contractual relationships that would be implemented to construct the branch rail line, if that implementing alternative was selected. As a consequence, DOE is uncertain at this time whether union labor would be used to construct the branch rail line and cannot determine the implications on rural resident employment opportunities. Decisions such as this are administrative in nature and would be unlikely to have environmental impacts.

Though field studies and geotechnical work are needed to determine true cut and fill quantities, quantities have been estimated as a part of the cost estimating process. These quantities have been used in the analysis of branch rail line construction in Section 6.3 of the EIS. As a part of the cost estimate, DOE has assumed that ballast material would be obtained from existing quarries and shipped to the branch rail line by rail (DIRS 154822-CRWMS M&O 1998). DOE would comply with Federal Railroad Administration regulations (see Section 2.1.3.3.2.2), including inspections during construction and operation in accordance with 49 CFR Parts 212 and 213, which require safety inspections by the Administration and allow joint State participation in inspections.

8.6.2 (804)
Comment - EIS000201 / 0002
Build a railroad. Get it off our highways. If you're going to transport it, do the railroad, build it.

I realize that we are not an isolated place in our nation. There are highways like this all through this nation. Little towns, large cities that it will have to be transported to get it to Yucca Mountain.

Again, build the railroad, period. Who cares how much it cost?

Response
DOE has noted the commenter's preference for rail transportation within Nevada. DOE has identified in the EIS the Nevada rail scenario as the preferred transportation alternative in the State.

8.6.2 (3165)
Comment - EIS001195 / 0003
We would expect DOE to work closely with Cortez Gold Mines in designing a reasonable route [Carlin Corridor] through our properties that minimizes impacts to not only our existing facilities and operations but, also to future potential orebodies and associated facilities. We would also expect an assurance that DOE would relocate the rail track at no expense to Cortez Gold Mines should future operational needs require. This is important, as portions of the identified corridor cross some of our mining claims that have not yet been explored for mineral potential. One solution that may be considered by DOE is to cooperatively fund deep condemnation drilling in selected areas.

Response
DOE appreciates the involvement of the Cortez Gold Mines and anticipates working with the Cortez Gold Mines in the event that the Carlin Corridor was selected. The EIS addresses the potential for a land-use and ownership impacts with the Cortez Gold Mine Projects (see Sections 8.1.2.3 and 8.4.2 of the EIS), and DOE would work with

the Cortez Gold Mines to minimize these impacts. Because detailed design work for a rail branch line would be completed at a later time, it is premature to determine DOE's involvement in funding for deep condemnation drilling or relocation of rail track should Cortez Gold Mines future operational needs require such actions.

8.6.2 (6496)
Comment - EIS001241 / 0009
If the alternate rail route alignment of the Carlin route in Crescent Valley would be used, would my land and home be inside or outside the corridor? If inside: exactly how much, and when would I be compensated? If my land and home are immediately outside the corridor, would I be compensated in any way or "merely" exposed to disruption, disturbance, discomfort, inconvenience, and health hazards without compensation?

Response
DOE has developed a conceptual rail design that identifies candidate corridors (DIRS 155022-CRWMS M&O 1997). If a rail implementing alternative was chosen for transport within Nevada, environmental and engineering field studies would be conducted during the rail design phase. These field studies would be used in selecting a final alignment that minimizes, to the extent possible, impacts to stakeholders along the final rail alignment. DOE has included in its cost estimate for rail construction (DIRS 154822-CRWMS M&O 1998) costs for obtaining right-of-way for each candidate rail corridor. Because a final alignment for any candidate rail corridor would be determined at a later date, it is premature for DOE to specify any dollar amount that would be used to compensate any private stakeholder for land within a final rail alignment right-of-way. DOE does not anticipate compensating stakeholders with land adjacent to any final rail alignment.

8.6.2 (9601)
Comment - EIS001888 / 0274
Infrastructure Improvements

The DEIS does not assign specific roles and responsibilities for significant actions. For example, what agency will construct road improvements and facilities, what agency will maintain them, when will these be constructed, when will the NEPA [National Environmental Policy Act] analysis be done. The sparse information contained in the DEIS makes it impossible to negotiate mitigation or even understand the proposed action. The DEIS must specify when construction on infrastructure improvement will begin, what agency will construct and maintain them, and provide a schedule for the required National Environmental Policy Act documentation for the projects.

Response
Roads under consideration for heavy-haul truck transport are under the jurisdiction of the Nevada Department of Transportation (State and Federal highways) and Clark County (the Las Vegas Beltway). DOE anticipates that the Nevada Department of Transportation would perform road upgrade construction activities under its jurisdiction and Clark County would perform road upgrade construction activities under its jurisdiction. Road maintenance would be conducted under the jurisdiction of the Nevada Department of Transportation. Any National Environmental Policy Act activities associated with road upgrades would be conducted in conjunction with road upgrade design activities, *Road Upgrades for Heavy Haul Truck Routes – Design Analysis* (DIRS 154448-CRWMS M&O 1998). DOE's procurement strategy continues to rely on private industry and would seek competitive proposals for the construction of facilities (an intermodal transfer station) associated with transportation. Any National Environmental Policy Act activities associated with construction of an intermodal transfer station would be conducted in conjunction with intermodal transfer station design activities. It is uncertain at this time when DOE would make any transportation-related decision that would indicate when potential road upgrade or intermodal transfer station construction would occur.

8.6.2 (11896)
Comment - EIS001878 / 0087
The DEIS also leaves many unanswered questions, such as:

Would there be one or more sets of tracks, and would there be sidings?

Who would own the tracks, trains, rights-of-way, and support facilities, and who would operate them?

Would all of the tracks and access roads be fenced, or only portions, with what types of fences, maintained and paid for by whom, and owned by whom? How wide would the fenced corridors be? Would consultation regarding fences be limited only to other federal agencies, to the exclusion of agricultural producers, local governments, and public safety officials?

How would the access roads be constructed and surfaced, and who would be allowed to use them?

If roadbed and access roads would be constructed using balanced cut and fill techniques, where would the DOE obtain the fill necessary to elevate many miles of roadbed above anticipated flood levels in Nevada's valleys and playas?

Would blasting be utilized?

Response
As discussed in Section 2.1.3 of the EIS, the conceptual design used in preparing the EIS assumed a single set of tracks and rail sidings (DIRS 131242-CRWMS M&O 1997). Sidings would be an average of 32 kilometers (20 miles) apart and approximately 0.5 kilometer (0.3 mile) long (DIRS 154822-CRWMS M&O 1998). Should the mostly rail alternative be selected, additional, more detailed studies and designs would be conducted for the particular corridor and alignment identified. The need for additional sets of tracks and rail sidings would be evaluated during this subsequent design stage. National Environmental Policy Act reviews, as required, would be conducted at that time.

In keeping with DOE's policy to utilize private industry to the extent possible, DOE would seek competitive bids for the operation and maintenance of a rail branch line. The contractor would be responsible for operation of the rail branch line and for maintenance of appurtenances within the right-of-way, including any fencing that DOE installed. Analysis of fencing location would be evaluated in subsequent engineering and environmental analyses and public and government agency consultations (see Section 2.1.3.3.2.1). Stakeholders would be able to provide comments during these National Environmental Policy Act reviews. DOE would negotiate land withdrawal or right-of-way with the Bureau of Land Management and other responsible agencies for all public land used and purchase required private land. DOE would own all tracks and support facilities, and the operations and maintenance contractor would own or lease all operating and maintenance equipment, including locomotives.

The rail branch line would use balanced cut and fill techniques to the extent possible, however spoil and borrow areas could be needed to establish a stable platform for the rail track (see Section 2.1.3.3.2.1). These borrow and fill areas would be identified during geotechnical surveys that would be conducted during subsequent design stages and evaluated in appropriate National Environmental Policy Act reviews. Rail branch line maintenance roads would be built adjacent to the branch rail line. Maintenance roads would be constructed using a gravel surface and balanced cut and fill techniques adjacent to the rail branch line. Temporary access roads would be used only by the construction contractor during construction and the maintenance roads used only by the operation and maintenance contractor for maintenance and inspection of the rail branch line. Track roadbeds would be evaluated to meet flood requirements established for the detailed design criteria. Blasting would be used as necessary.

8.6.3 OPERATIONS

8.6.3 (3364)
Comment - EIS001242 / 0013
What effects will earthquakes have on the rr [railroad] tracks? The trains, the site and the canisters.

Response
There was an earthquake with a Richter magnitude of 7.4 in El Asnam, Algeria in October 1980. At the time of the main shock a train was straddling the fault. The train was completely overturned. At another site nearby the railroad tracks were bent; it is suspected that this might have been caused by a secondary fault. If a train carrying a shipment of casks containing spent nuclear fuel or high-level radioactive waste was involved in a similar earthquake, the impact on the train would probably be comparable. However, it is not expected that any radioactive material would be released from the transportation casks. They are designed to survive a much more severe shock than that resulting from an overturned or derailed train.

8.7 Transportation Operational Policy and Procedures

8.7 (28)
Comment - 20 comments summarized
Commenters said that the EIS should examine the effects on the transportation of spent nuclear fuel and high-level radioactive waste from earthquakes, faulting, floods, range fires, areas of high winds, tornadoes, lightning strikes, and severe weather. Commenters wanted to know what is being done to protect trains and trucks during these events, and suggested that road safety and train-track safety be tested. Some wanted to know if spent nuclear fuel and high-level radioactive waste would be transported through northern Nevada during the winter when severe blizzards can strike. Commenters also wanted to know whether safe havens or alternative routes could be designated on short notice based on real-time data sources, and who would decide when a shipment should be halted. The responsibility for checking and interpreting road conditions, stopping a shipment, or allowing it to proceed was also questioned.

Response
At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. Section M.3 of the EIS provides a discussion of the protocols and procedures that would be implemented by a Regional Servicing Contractor and its subcontractors under adverse weather or road conditions. The procedures are in two parts.

One part of the procedure relates to preshipment planning, which would use available data related to expected conditions. Shipments would not be dispatched on a route where expected conditions would not comply with the requirements in the procedures. Weather forecasts would be obtained by the Regional Servicing Contractor as part of the preshipment planning, and forecasts for rain, snow, fog, high winds, and tornado warnings would be considered in the determination of the shipment schedule. In general, Regional Servicing Contractors would be responsible for the planning, implementation, and control of the shipments, including responding to changing conditions, as necessary. A contractor would acquire information of road or highway construction that could temporarily affect the planned route. Through consultations with the affected states along the planned route, the contractor would obtain road and highway conditions and information on anticipated construction, along with planning information on long-range highway construction.

The other part of the procedure relates to problems along the route and is for those persons actually involved in making the shipment who would be best able to discuss and report expected and encountered conditions. DOE Protocols, which would be implemented by the Regional Servicing Contractors, require that shipments would not travel when severe weather conditions along routes or adverse road conditions would make travel too hazardous to proceed. Driver and crew communications with the control center would provide advanced warning of potential adverse conditions along the route. If unanticipated severe weather or adverse road conditions were encountered, the driver and crew would contact the control center to coordinate routing to a safe parking or stopping area if it became necessary to delay the shipment until conditions improved. Section M.3.2.1.3 of the EIS provides detailed information on the selection of safe parking areas to be used in the event a shipment had to be delayed.

Rail carriers would use train control and monitoring systems to identify the location of their trains within the rail system and to make informed decisions based on this information to avoid or minimize potential weather-related or track Condition risks. Under 49 CFR 174.20, the carrier can impose local restriction on transportation when local conditions make travel hazardous.

The transportation regulations of the Nuclear Regulatory Commission include shipping cask design requirements for normal and accident conditions of transport (10 CFR Part 71). The regulations do not specifically address natural disasters such as earthquakes, floods, or tornadoes. However, if a shipment to Yucca Mountain was involved in any of these natural disasters, the impact on the cask would be within the bounds of the hypothetical accident defined in 10 CFR Part 71. The shipping casks used to transport spent nuclear fuel and high-level radioactive waste would be massive and tough with design features that complied with strict regulatory requirements that would ensure the casks performed their safety functions even when damaged. Numerous tests and extensive analyses have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents. In addition, since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of*

Spent Fuel Shipment Risk Estimates (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

8.7 (140)
Comment - 5 comments summarized
Commenters stated that truck safety had been left up to private industry and yet, with these standards, accidents still occurred. Commenters expressed concern about the plan and the protocol that would be used to recover a heavy cask that was displaced from the conveyance vehicle. Commenters questioned how a cask would be recovered if there was a train or truck wreck and the cask dropped to the ground, fell down the side of a mountain, a flash flood overturned a shipment, a cask fell into a gorge, or a cask rolled into a river or lake. Commenters asked, if there was a crash from a collision that involved fire, would the cask remain intact and would there be a chance of a serious nuclear release. Other commenters wondered how a massive cask would be lifted and stated that to lift a 91-metric ton (100-ton) or larger cask would require a portable crane that might not available.

Response
DOE agrees that accidents could occur during transportation of spent nuclear fuel and high-level radioactive waste to a repository. However, the shipping casks that would be used to transport these materials would be massive and tough with design features that complied with strict regulatory requirements that ensured the casks performed their safety functions even when damaged. Numerous tests and extensive analyses have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents. In addition, since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

Recovering 23-metric-ton (25-ton) truck casks or rail casks weighing up to 136 metric tons (150 tons) loaded with spent nuclear fuel or high-level radioactive waste would use methods commonly used to recover heavy trucks or railcars and locomotives following accidents. The capability to lift such weights exists and would be deployed as required. Railroads use emergency response contractors with the capability to lift derailed locomotives that could weigh as much as 150 tons. Difficult recoveries of equipment as heavy as spent nuclear fuel casks have been accomplished in areas such as those identified by the commenters. DOE anticipates that if such a recovery was necessary, it would be accomplished using methods and equipment similar to those used in prior difficult recoveries.

The Operational Protocols that the transportation contractors would have to follow are included in Section M.3 of the EIS. These protocols require the transportation contractors to be responsible for providing DOE with specific written procedures that clearly define detailed actions to be taken in the event of an abnormal event. These procedures would address repair or replacement of equipment, or recovery, as appropriate. These requirements would apply to transport by both truck and rail. Section M.5 addresses emergency response.

8.7 (141)
Comment - 31 comments summarized
Commenters asked questions about the potential for individual radiation exposure, including radiation doses to people living along the transportation routes as a result of normal cask radiation emissions. Of concern was monitoring of public and worker exposure and compensation for effects of radiation on public health.

Response
Transportation workers' exposure would be the responsibility of their employers.

Exposure to the public under incident-free conditions is discussed in Sections 6.2.3.1 and J.1.3.2.1 of the EIS. An analysis was done to determine the amount of radiation exposure to the maximally exposed individual, a hypothetical person who would receive the highest dose.

The U.S. Department of Transportation routing requirements, along with regulatory requirements to limit radiation dose external to a shipping cask, help to ensure that radiation dose to persons living along routes would be low. The analysis in Chapter 6 of the EIS for the mostly legal-weight truck scenario estimates the doses to persons who would drive alongside the trucks as they traveled on the highways, who would be stopped in locales where truck shipments stopped, and who lived along the routes that would be used. In response to public comments, DOE forecasted growth in populations along routes to improve its estimates of impacts that could occur during shipments. However, the estimated dose to an individual living along a route would not change with changes in population: only the integrated dose to the whole population would change. The dose for a maximally exposed individual who lived along a route would be an average of about 0.25 millirem per year. This is about 400 times less than the maximum dose permitted for members of the public in 10 CFR Part 20 (100 millirem).

Based on public comments, the Final EIS includes estimated public health impacts along transportation routes. This analysis accounted for factors such as the locations of intersections, commercial establishments and residences, and traffic signals. The impacts of incident-free transportation would be so low for individuals who lived and worked along the routes that these individual impacts would not be discernible even if the doses could be measured. The total impacts of transportation would be similar for different routes that might be used.

Although DOE has characterized the environment along the candidate transportation routes and corridors in Nevada, it has not performed a baseline health assessment. DOE believes it has estimated the potential environmental impacts, including health impacts, in sufficient detail to allow decisionmakers to determine the relative merits of each transportation scenario. However, DOE would assess the environmental and engineering conditions along the selected corridor in the appropriate National Environmental Policy Act document.

The Price-Anderson Act establishes a system of financial protection (compensation for damages, loss, or injury suffered) for the public in a nuclear accident, regardless of who causes the damage. See Section M.8 of the EIS for a discussion of the Price-Anderson Act. Responsibility for cleanup of released materials would be shared between DOE, the owners of the materials, and carriers under regulation of the Motor Carrier Act of 1980.

8.7 (142)
Comment - 27 comments summarized
A number of commenters expressed concern about the safety of shipments by rail. Commenters expressed concern with both mainline and branch rail line shipments to the repository. Commenters expressed concern with adherence to Federal and state regulations (and allowing Nevada oversight on branch line operations). Other commenters suggested specific operational restrictions to ensure safety. Commenters also expressed concern that privatization of rail operations would jeopardize the relationships and agreements that have been developed between DOE and states, tribes, and other responsible jurisdictions, including planning, operations (when, where, and how), training, technical assistance, and funding. A specific concern was having a low bidder planning and transporting spent nuclear fuel and high-level radioactive waste. Other commenters were concerned with the degraded conditions of railroads, including the inadequacies of rail crossings and increased collisions. Several commenters expressed concern with the rail maintenance programs and the need to switch from reactive maintenance to preventive maintenance programs to improve safety. Several commenters expressed concern with the placement of cars carrying spent nuclear fuel and high-level waste in a train indicating that cars near the front seem to be less affected by rail breaks and displacements than cars near the end of a train. Part of this concern was related to the signal systems on rail lines and data that indicate that rail malfunctions have occurred without a corresponding signal. All in all, the commenters' focus was on a recommendation that trains carrying spent nuclear fuel and high-level radioactive waste need to be operated in a different, more controlled mode than regular freight trains and that ownership and operational management of any new branch rail line should be evaluated against the contribution to risk management and regional economic benefit.

Response
In response to these and other public comments, DOE has added information on proposed transportation activities to the EIS (see Appendix M). Information added includes the regulations that govern spent nuclear fuel and high-level radioactive waste transportation, the proposed process that DOE would use to acquire commercial transportation services, and the expected operational details and protocols DOE would follow if the Yucca Mountain site was approved.

Transportation of hazardous materials in the United States is a very highly regulated activity, and transportation to a repository would be conducted under the umbrella of these regulations with oversight, as applicable, of various local, Native American tribal, state, and Federal agencies. This would ensure that all shipments would be made safely (see Section M.2 of the EIS).

At this time, DOE plans to use private industry, including railroads, to the maximum extent possible, to accomplish its transportation mission. Such an arrangement, however, would not jeopardize the relationships and agreements that have been developed between DOE and its stakeholders. DOE would retain responsibility for policy decisions, stakeholder relations, final route selection, and implementing Section 180(c) of the NWPA. DOE would award contracts for acceptance of spent nuclear fuel and high-level radioactive waste and transportation services to bidders whose proposals DOE considered to be most advantageous to DOE, with cost being only one of a variety of selection factors. One of the qualifications that must be met by a successful bidder would be to have performed a major transportation and logistics coordination project involving railroad, truck, or intermodal carriage of radioactive, toxic, or other types of hazardous materials within the past 10 years. DOE would require the transportation contractor to provide for maximum use of dedicated train service and advanced rail equipment features where this type of service or equipment can be demonstrated to enhance operating efficiency, dependability, and cost-effectiveness or lessen the potential of adverse railroad equipment incidents. See Section M.3.1 of the EIS for more information on the acquisition of contractor services.

Oversight of branch rail line operations in Nevada, if there was a decision to build such a line, would depend on several factors not known at this time. Maintenance of rail lines is prescribed by Federal Railway Administration regulations and the maintenance is checked by the Administration. The U.S. Department of Transportation has issued regulations designating the placement of cars carrying spent nuclear fuel in the makeup of a train (49 CFR 174.85 and 49 CFR 174.700).

8.7 (143)
Comment - 7 comments summarized
Commenters wanted to know what specific guidelines govern the movement of spent nuclear fuel and high-level radioactive waste. They stated that the designation of the rail routing should be determined in advance, that the U.S. Department of Transportation does not regulate the routing of rail shipments or radioactive materials, and that some entity must assume authority for routing and that designee should be identified in the EIS. Other commenters stated that the shipment of spent nuclear fuel would be regulated by the Nuclear Regulatory Commission and the U.S. Department of Transportation and that routing would be strictly controlled with input from states and Native American tribal groups.

Another commenter stated that the Public Utilities Commission regulates the safe transportation of radioactive and other hazardous materials on the state's highways and railways and that it has adopted the U. S. Department of Transportation safety regulations. A representative from the Public Utilities Commission of Ohio stated that it was the Commission's intention to involve local communities when routes were designated in communities under its jurisdiction. Another commenter stated that the U.S. Department of Transportation and the Nuclear Regulatory Commission, as overseers of spent nuclear fuel and high-level radioactive waste storage and transportation, are both demanding organizations that would not allow activities to occur if they did not meet the prescribed requirements.

Response
In response to public comments, DOE has added to the EIS information on the regulations that govern the transportation of spent nuclear fuel and high-level radioactive waste (see Appendix M). The Nuclear Regulatory Commission and the U.S. Department of Transportation share primary responsibility for establishing and enforcing requirements for the safe transportation of radioactive materials, including spent nuclear fuel and high-level

radioactive waste, and DOE would comply with these regulations when transporting spent nuclear fuel and high-level radioactive waste to the proposed repository.

U.S. Department of Transportation regulations set the standards for packaging, transporting, and handling radioactive materials, including labeling, shipping papers, placarding, loading, and unloading requirements (49 CFR Part 173). These regulations specify training needed for personnel who perform handling and transport of hazardous materials, which includes spent nuclear fuel and high-level radioactive waste.

The NWPA requires that DOE use casks certified by the Nuclear Regulatory Commission when transporting spent nuclear fuel and high-level radioactive waste to a repository. The Commission certifies that a cask meets the requirements of 10 CFR Part 71, which prescribes radiological performance standards for casks subjected to specific test conditions. These test conditions represent the kinds of forces that a cask would encounter in a severe transportation accident. In addition, the Commission establishes safeguards and security regulations to minimize the possibility of theft, diversion, or attack on shipments (10 CFR Part 73).

The representative highway routes identified for the EIS analysis conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, developed for transport of Highway Route Controlled Quantities of Radioactive Materials, require such shipments to be on preferred routes selected to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or an alternate route designated by a state or tribal routing agency. Alternate routes could be designated by states or tribes under Department of Transportation regulations (49 CFR 397.103) that require consideration of the overall risk to the public and prior consultation with local jurisdictions and other states and tribes. Federal regulations do not restrict the routing of rail shipments. However, for the analysis, as discussed in Section J.1.1.3 of the EIS, DOE assumed routes for rail shipments that would provide expeditious travel and the minimum number of interchanges between railroads. See Section M.3.2.1.2 for more information on route selection. As required by regulations in 10 CFR Part 73, routes must be submitted in advance to the Nuclear Regulatory Commission for approval.

8.7 (144)
Comment - 15 comments summarized
Commenters stated that the Draft EIS did not address the provision for state notification regarding routes and mode of transportation and that states and tribes needed to be informed if spent nuclear fuel and high-level radioactive waste were to be shipped through their state or community. One commenter stated objection to secret unescorted shipments and stated that local and state authorities had the need to know where spent nuclear fuel would be traveling. Other commenters stated their opposition to shipments pending reliable safeguards being in place to protect their communities. Other commenters expressed concern that notification was necessary so the right people could be available including local response agencies, workers, inspectors, and maintenance workers, and also stated that signage should be posted on the transportation vehicles to clearly notify the public of the hazardous cargo. Other commenters stated that they would expect DOE to voluntarily comply with their state's prenotification requirements to assure the residents of their states that spent nuclear fuel and high-level radioactive waste shipments could cross their states safely.

Response
DOE would comply with Nuclear Regulatory Commission regulations requiring notification to the governor or the governor's designee by mail or messenger [10 CFR 73.37(f)]. Governors would notify state and local safety officials, as appropriate, of the pending shipments. Tribes would receive notification if the Commission amended the regulation to allow such notice. In response to comments, additional information on the notification process is included in Section M.3.2.2.1 of the EIS.

Nuclear Regulatory Commission physical security regulations apply only to shipments of spent nuclear fuel; notification is not required for shipments of high-level radioactive waste. However, DOE intends to follow the same procedures for these shipments and for all unclassified shipments of DOE-owned spent nuclear fuel and other material, that could be shipped to Yucca Mountain. Notification procedures already in place would apply to shipments of naval spent nuclear fuel. The Nuclear Regulatory Commission has promulgated regulations for guards and escorts for spent nuclear fuel shipments that DOE would follow.

All vehicles (trucks and railcars) carrying spent nuclear fuel or high-level radioactive waste would be placarded in accordance with U.S. Department of Transportation regulations in 49 CFR Part 172, Subpart F. More information on these marking requirements is provided in Section M.2.2 of the EIS.

8.7 (147)

Comment - 13 comments summarized

Several commenters expressed concern about privatization of the transportation system. A common theme was that DOE cannot privatize or delegate to a contractor any key transportation responsibilities because of conflicts between transportation safety and the profit motivation of the private industry. One commenter stated concerns that many critical policy decisions would be improperly delegated to a contractor, such as the responsibility for selecting modes, routes, and casks, as well as the development of institutional plans and the preparation of an EIS addressing transportation. Several commenters referred to DOE's draft "Acquisition of Waste Acceptance and Transportation Services for the Office of Civilian Radioactive Waste Management." Commenters were concerned that privatization could interfere with emergency response and DOE's interactions with tribes and local and state governments.

Response

Section 137(a)(2) of the NWPA requires the Secretary of Energy to utilize private industry to the fullest extent possible in each aspect of transportation of spent nuclear fuel under the Act. At present, DOE plans to implement this requirement by contracting with private industry to provide equipment such as casks and transport vehicles, to provide training of utility personnel in the use of the equipment, and to provide the transportation of the loaded and unloaded casks between the generator sites and Yucca Mountain. The exact form of the contracts with private industry continues to be studied. In response to public comments, DOE added Appendix M to the EIS, which discusses planned operational policies, procedures, and protocols for transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Section M.3.1 contains more information on the acquisition of contractor services.

DOE's draft request for proposal for Regional Servicing Contractors requires that all bidders must meet certain qualification criteria and technical requirements. Each bidder must have performed a major transportation and logistics coordination project involving railroad, truck and/or intermodal carriage of radioactive, toxic, or other hazardous materials within the past 10 years as well as have a Nuclear Regulatory Commission-approved Quality Assurance Program. Bidders would be evaluated on their past performance and the degree to which their technical approach addresses the safety, operational, and logistical requirements of the program. Cost would be the last factor to be evaluated. Most important, DOE would continually assess the performance of each of the transportation contractors in relation to the contract.

DOE would retain responsibility for approval of routes to be proposed to the Nuclear Regulatory Commission in consultation with states, tribes, and local authorities (see Section M. 3.2.1.2 of the EIS). DOE would implement and administer programs that implemented Section 180(c) of the NWPA for routine transportation and emergency response planning and training. DOE would be responsible for working with the states and tribes to ensure their input was factored into the development of a national transportation program. DOE would work with the states and tribes to develop communication, training, and security plans (see Section M.6). If additional National Environmental Policy Act reviews for transportation activities were necessary, DOE would be the responsible agency.

8.7 (153)

Comment - 40 comments summarized

Commenters stated that DOE should improve its coordination and consultation with local and state communities, planning organizations, and other national organizations (for example the National Conference of State Legislatures), and develop a comprehensive transportation plan for the Final EIS. As written, the EIS is inadequate without such planning information because it did not consider the true complexities and management of a large-scale transportation program. If such comprehensive planning were included, DOE would have reached different conclusions than those presented in the Draft EIS.

The Waste Isolation Pilot Plant transportation program, which was developed cooperatively with affected states, was touted as the model that should be followed by DOE for the Yucca Mountain transportation program. In the context of transportation planning, commenters identified many issues that should be addressed, including the following:

- Federal/state/local cooperative agreements and DOE support, including (1) financial support for highway and rail improvements, maintenance, and rehabilitation; (2) financial support and training, equipment, materials, personnel, and coordination years before the first shipments to ensure the preparedness of involved agencies; (3) training and planning and preparedness sessions for state and local jurisdictions near shipment routes; (4) route coordination with state and local jurisdictions, and route identification for each generator site to the repository years before anticipated shipments; (5) review of accident and terrorism responses and responsibilities of all involved; (6) coordination and the supply of equipment for responses, tracking, record keeping and communications; (7) a prior commitment for needs assessment by state and local agencies for safety improvements, signing, signals, emergency crews, equipment, training, overall route improvements (rehabilitation, reconstruction and improvements); and (8) formation of a working committee of state and local jurisdictions years prior to the first shipment to facilitate coordination, cooperation, communications, and training.

- Local community criteria and relevant resolutions (for example, those of Nye County),

- Local community emergency-response capabilities, route planning, and selection to minimize shipments through highly populated areas or avoid Native American tribal lands,

- Provisions for contract carriers, shipment methods, accident prevention, cask testing, financial and technical assistance, potential for terrorism and sabotage, timetables for shipments, mitigation measures including highway maintenance and improvements, contingency planning, operation of the transportation system (for example, how many casks would be built, their lifetimes), organizational structure and management practices, field operations and provisions for these services by the Regional Servicing Contractor, and safe parking areas.

Commenters urged DOE to consult with communities in making future decisions regarding the mode of transport and rail corridors.

Response

DOE agrees that detailed, comprehensive planning would be required prior to the start of shipments to a repository. The level of planning suggested by many of the commenters, however, would be useful only when carried out closer to the time any rail or truck transportation would be scheduled to begin. Otherwise, the information upon which such planning was based would be likely to change before shipments could begin. Operational protocols for transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain are presented in the draft Request for Proposal, *Acquisition of Waste Acceptance and Transportation Services for the Office of Civilian Radioactive Waste Management* (DIRS 153487-DOE 1998). They are summarized in Section M.3 of the EIS. The *Waste Isolation Pilot Plant Transportation Safety Program Implementation Guide* (DIRS 156384-WGA 1995) protocols were used as a model for Yucca Mountain-related protocols. The Department expects to interact with affected stakeholders on routing and related local issues if the repository site is approved.

The number of highway and rail shipments required to transport all of the spent nuclear fuel and high-level radioactive waste to Yucca Mountain, under any of the scenarios analyzed, would be a very small fraction of the total number of highway and rail shipments throughout the country on a daily, monthly, or yearly basis. Therefore, the impact of the repository shipments on the transportation infrastructure would be small. If the repository was approved, DOE would discuss transport details with stakeholders, including financial support, before the start of shipments. If the heavy-haul truck implementing alternative was used extensively in Nevada, DOE would provide funds for highway upgrades and maintenance, as appropriate. If rail was the selected mode in Nevada, DOE would construct a branch rail line.

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions the Department would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using a planning grant and based on availability of funds in annual Program budgets specified by Congress. Additional Federal response capabilities, such as expert services from the Radiological Assistance Program Team, could be activated, as requested by states and tribes. The schedule in the proposed policy and procedures for implementation of Section 180(c) (63 *FR* 23753, April 30, 1998) is designed to provide adequate time for training of first responders in advance of the first shipments. If there was a decision to proceed with the development of a repository at Yucca Mountain, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. See Section M.6 of the EIS for a discussion of the DOE Section 180(c) Policy and Procedures.

First responses to accidents would be the responsibility of the jurisdiction where the accident occurred. DOE and the transportation contractors would be available to provide assistance as requested. DOE would comply with the requirements of the Nuclear Regulatory Commission to ensure that shipments were properly safeguarded and met security requirements (see Section M.7 of the EIS).

As discussed in Section 1.5 and Appendix C of the EIS, throughout the scoping process and development of the EIS, DOE has encouraged broad participation in this National Environmental Policy Act process. DOE held 15 public scoping meetings, held Draft EIS public hearings in 21 locations across the United States held hearings on the Supplement to the Draft EIS in three locations in Nevada, and consulted and interacted with various government agencies, other organizations, and stakeholders across the country.

8.7 (184)
Comment - 19 comments summarized
Commenters expressed concern about measures to be taken to ensure safe transportation of spent nuclear fuel and high-level radioactive waste. The concerns include condition of the highways and railroads; inspection of old, deteriorating roads and bridges; and consideration of weather and temperature and their effects on roads, rails, and bridges. Commenters stated that actions should be taken to prevent derailments. Commenters stated that during transport, railroads and highways should be cleared, drivers and crews should have comprehensive training, drivers with records of violations should be excluded, there should be controls at crossings, and there should be buffer cars and security guards. Commenters expressed concern about the designation and acceptance of responsibility for accident response and cleanup, radiation monitoring of trains and trucks, and contamination control. Some commenters made suggestions for restrictions on the shipments, restrictions on routing, restrictions on time of day, restrictions around population centers, and the use of dedicated or special trains. Other commenters stated that careful plans should be developed and implemented (including risk minimization strategies) to ensure that proper measures are taken to ensure safe transportation of spent nuclear fuel and high-level radioactive waste.

Response
In response to these and other public comments, DOE has added information on proposed transportation activities to the EIS. Appendix M includes additional information on the regulations that govern spent nuclear fuel and high-level radioactive waste transportation, the proposed process that DOE would use to acquire commercial transportation services, and the expected operational details and protocols DOE would follow if the Yucca Mountain site was approved (see Sections M.2 and M.3).

DOE is required to follow Nuclear Regulatory Commission, U.S. Department of Transportation, and applicable state, Native American tribal, and local regulations and use Commission Certified casks when transporting spent nuclear fuel and high-level radioactive waste to a repository. DOE is confident that by implementing these regulations and using Commission Certified casks, this transportation can be carried out in a safe manner. Of the thousands of shipments completed over the last 30 years, none has resulted in an injury through release of radioactive material.

U.S. Department of Transportation regulations require carriers of spent nuclear fuel and other materials with a high level of radioactivity to use preferred routes that reduce time in transit. A preferred route for highway shipments is an Interstate System highway or alternate route selected by a state or tribe. Rail routes for shipping radioactive materials are determined by the shipper and the railroad companies based on safety, available trackage, schedule efficiency, and cost-effectiveness. See Section M.3.3.1.2 of the EIS for additional information on route selection.

At present, DOE intends to purchase services and equipment from Regional Servicing Contractors that would perform waste acceptance and transportation operations. The contractor providing transportation services would be required to prepare a transportation plan that would discuss the various steps it would take to ensure the shipments were conducted in a safe and efficient manner. Among other things, the plan would provide for the use of dedicated train service where this type of service could be demonstrated to enhance operating efficiency, dependability, and cost-effectiveness, or lessen the potential of adverse railroad equipment incidents (see Section M.3.1 of the EIS).

DOE could decide to use a dedicated train that carried only the material being shipped to Yucca Mountain, or could elect to move the spent nuclear fuel and high-level radioactive waste in general freight. If the material was shipped as general freight, the position of the spent nuclear fuel or high-level radioactive waste car in the train would be regulated by 49 CFR 174.85. This regulation requires that railcars placarded "radioactive" must be separated from a locomotive, occupied caboose, or carload of undeveloped film by at least one nonplacarded car, and it cannot be placed next to other placarded railcars of other hazard classes. Section J.2.3 of the EIS presents an assessment of impacts of using dedicated trains to transport spent nuclear fuel and high-level radioactive waste. Based on current information from the U.S. Department of Transportation and the Association of American Railroads, it is DOE's opinion that there is no clear advantage for using either dedicated trains or general freight service.

Drivers would be required to meet the qualifications specified in U.S. Department of Transportation regulations (49 CFR Part 391). They would also be required to complete the training called for in 49 CFR 177.816 (see Section M.3.2.1.7 of the EIS).

The radiation levels on the surface of casks carrying spent nuclear fuel and high-level radioactive waste to a repository would be measured prior to the shipment to ensure levels were within regulatory limits. Additional measurements could be made en route any time the shipment underwent an inspection.

As with any traffic accident, local, tribal, and state public safety officials would be the first to respond to accidents involving radioactive materials. Additional assistance could be requested from Federal agencies. Damages from the accident caused by the release of radioactive materials would be handled under the provisions of the Price-Anderson Act. Any damages caused by a non-nuclear accident (an accident not involving the release of radioactive materials or authorized precautionary evacuation) would be covered by the carrier's private insurance and handled through state tort law as with any other transportation accident.

8.7 (197)
Comment - 14 comments summarized
Commenters expressed a concern for safe transportation of spent nuclear fuel and high-level radioactive waste under routine conditions. They indicated a need for ensuring that the transportation contractor conducted business properly (for example, followed procedures, routinely inspected equipment, used safety Conscious drivers) and only permitted transport on the safest rails or roads. Other commenters questioned driver behavior and questioned whether relief drivers would be used. One commenter asked if staffing points for refueling would be identified ahead of time and publicized. Another commenter expressed specific concern with travel through rural areas, in particular if the vehicle was unescorted, since rural driving could be more hazardous and there would be no one available to call for help. A few commenters stated that the community, or at least the state or tribal government, should be informed when Yucca Mountain-bound shipments were traveling through their community. One commenter suggested independent inspections (mechanical and radiological) at the point of origin, mid-transport, and prior to acceptance at the Yucca Mountain site. One commenter stated their county would require additional services to monitor DOE. Commenters questioned who would supervise the suitability of the vehicle used in transport and expressed concern with the protocols to be followed in the event of a spill or leak.

Response
In response to comments, the transportation regulations and operational protocols the shipping contractors would be required to follow have been included in Sections M.2 and M.3 of the EIS. The Nuclear Regulatory Commission and the U.S. Department of Transportation regulate the transportation of spent nuclear fuel and high-level radioactive waste. As a result of strict compliance with their regulations, thousands of shipments have been completed over the last 30 years, none of which has resulted in an injury through release of radioactive material.

At present, DOE intends to purchase services and equipment from Regional Servicing Contractors that would perform waste acceptance and transportation operations. DOE would ensure that its contractors providing transportation services for the repository abided by all applicable regulations at the time of transport.

DOE's draft Request for Proposal for Regional Servicing Contractors requires the contractors selected to provide transportation services must demonstrate that they have had successful experience transporting hazardous materials. Carriers would be required to develop and maintain a driver and crew training program that meets the requirements of 49 CFR 172.600 and 177.825. For more detailed information, see Appendix M of the EIS. Driver scheduling would ensure that the hours of service regulations in 49 CFR Part 395 could be met. The transportation contractor would be required to prepare a transportation plan that would include proposed routes and other information such as safe emergency parking areas and other planned stops. DOE would make the plan available to states and tribes for comment before the shipments took place. The carrier would be able to communicate to its dispatch center and others through various means of communication, including a satellite-based tracking system. This would enable the carrier to communicate problems even in remote areas (see Section M.3.1).

Inspections of highway shipments, including the vehicle, load, and driver, at point of origin and elsewhere as required, would be conducted in accordance with the procedures developed by the Commercial Vehicle Safety Alliance. Rail shipments would be inspected according to Federal Railroad Administration policy (see Section M.3.2.1.5 of the EIS).

Under Nuclear Regulatory Commission regulations, information regarding the time and date of shipments of spent nuclear fuel is restricted. States would receive advance notification of impending shipments in accordance with Nuclear Regulatory Commission regulation 10 CFR 73.37. Tribes would receive notification if the Commission amended the regulation to allow such notice (see Section M.2.5 of the EIS).

In the event of a transportation accident, first responders would follow their local procedures. Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using a planning grant and based on availability of funds in annual Program budgets specified by Congress. Additional Federal response capabilities, such as expert services from the Radiological Assistance Program Team, could be activated, as requested by states and tribes. The schedule in the proposed policy and procedures for implementation of Section 180(c) (63 *FR* 23753, April 30, 1998) is designed to provide adequate time for training of first responders in advance of the first shipments. If there was a decision to proceed with the development of a repository at Yucca Mountain, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. See Section M.6 of the EIS for a discussion of the DOE Section 180(c) Policy and Procedures.

8.7 (247)
Comment - 11 comments summarized
Several commenters requested that DOE provide ways to monitor shipments so that officials, states, and tribes as well as individuals, would know the locations of the shipments and supporting equipment at all times. Other commenters asked if trucks and rail cars would be marked and tracked and stated that the public has a right to know when and where shipments would take place. Concerns were expressed about a missing cask, or other problem such as O-ring failures, human error, vehicular accidents, or sabotage. Commenters wanted to know who would take the responsibility for these events. One commenter summarized the capabilities of the TRANSCOM system but questioned how DOE could measure health and safety impacts and emergency management mitigation needs if it is not clear how DOE plans to communicate with local entities. Several commenters expressed the concern that letting the public know when and where shipments will take place would increase the risk of terrorism.

Response
In response to public comments, DOE provided additional information on the planned operational aspects of transportation in the EIS (see Section M.3). DOE and the transportation contractors would use the latest version of the TRANSCOM system, or a similar satellite-based tracking system, to provide continuous real-time position

tracking for all shipments. In addition, DOE continues to improve its tracking system based on lessons learned during actual shipments. As a result, DOE does not expect that a cask could be "missing" as suggested in a comment. The currently operational TRANSCOM system allows messages to be sent from the drivers and crew directly to the control center. Any unusual or unexpected situations encountered or any problems with the cask or other equipment would be immediately communicated to the control center. DOE intends to make satellite tracking information available to the states and tribes, subject to Nuclear Regulatory Commission determination that use of satellite tracking technology would be allowed by safeguards and security regulations in 10 CFR Part 73. Thus, there would be information on which to base requests for aid to local law enforcement or emergency response personnel as needed (see Section M.3.2.1.5).

Casks would be prepared for shipment under quality assurance procedures approved by the Nuclear Regulatory Commission. The casks and transporter would be inspected prior to shipment. Truck shipments would not be allowed to leave the waste generator site unless found to be defect-free, as required by the Commercial Vehicle Safety Alliance inspection procedures. Rail shipments would be subjected to railroad hazardous materials inspections prior to being accepted by a railroad for transportation. Inspections would occur along the route and at the repository destination. More information on inspection activities is provided in Section M.3.2.2.2 of the EIS.

Trucks and railcars carrying spent nuclear fuel and high-level radioactive waste would be placarded in accordance with U.S. Department of Transportation regulations. Placarding and labeling requirements for shipments are discussed in Section M.2.2 of the EIS.

The Nuclear Regulatory Commission would publish the routes the shipments would take. However, regulations at 10 CFR Part 73 require shipment schedules to be held as confidential safeguards information. DOE would comply with Nuclear Regulatory Commission regulations requiring notification to the governor or the governor's designee by mail or messenger [10 CFR 73.37(f)]. Governors would notify state and local safety officials, as appropriate, of the pending shipments. Tribes would receive notification if the Commission amended the regulation to allow such notice. In response to comments, additional information on the notification process is included in Section M.2.5 of the EIS.

8.7 (905)
Comment - EIS000116 / 0004
As you look at the maps back here and as this audience looks at those maps on the walls, you've -- you've told us that virtually any public state highway coming into Nye County could be a potential route for a truck borne transportation of high-level waste, that there's a number of routes that are proposed for rail routes.

So we have to be prepared and integrate into our planning for the next eight to ten years all possibilities for all those routes and all those modes.

You haven't given us precise information on quantities, scheduling, and certainly as you heard here tonight, the public understanding of the risks associated with this document are poorly understand -- understood.

Response
DOE evaluated the potential environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste from 5 DOE and 72 commercial sites to the proposed repository at Yucca Mountain. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, states or tribes may designate alternate preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved, DOE would identify for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In response to public comments, DOE has included, state maps of representative highway routes and rail lines it used for analysis in Appendix J of the EIS (see Figure J-53 for the Nevada map). Section J.4 includes potential health and safety impact estimates associated with shipments for each state through which shipments could pass.

In response to comments on the Draft EIS, DOE prepared Appendix M to provide additional information on transportation regulations and the operational aspects of spent nuclear fuel and high-level radioactive waste transportation (see Sections M.2 and M.3 of the EIS). This information includes more details on how DOE would select transportation routes if the Yucca Mountain site received approval. The routes selected would comply with the applicable regulations in place at the time of shipment.

8.7 (1673)
Comment - EIS000461 / 0007
You got all this nonsense about money. Why are you worried about how much money you are spending on this issue? You don't seem to care. You go around spending money like drunken sailors until it comes to a point now we're worried about health and children. And now all of a sudden, it's a money issue. It doesn't make any sense.

Response
Much of the money used to characterize Yucca Mountain comes from the Nuclear Waste Fund, and DOE cannot spend money from this Fund for purposes not authorized by law. With regard to adequate funding, Congress annually determines the appropriate funding for the DOE Office of Radioactive Waste Management, based on appropriate requests from the Secretary of Energy and the President. DOE believes that Congress, having directed the Government to begin this project, would continue to fund it adequately to protect the public health and safety and the environment.

8.7 (2066)
Comment - EIS000599 / 0002
There is insufficient transportation analysis in it. This is one of the most glaring omissions in the statement itself. There is not a clear picture of where the transportation routes are going to be, how the waste is to be transported. How is the public to make a decision on the impacts when we're unclear how it is going to be transported?

The mode of transportation and the stopping points along the routes are unknown as well. So routine exposure on route cannot be properly evaluated either.

There is also, to my knowledge, still the possibility that the transportation may be privatized. If that is the case, then all bets are off. That is another unknown or are we yet to swallow? So that is a question also. Is privatization off the books, or is it still a possibility?

Response
Based on the results of the impact analyses presented in Chapter 6 and Appendix J of the EIS, as well as the results published in numerous other studies and environmental impact analyses cited in the EIS, DOE is confident that spent nuclear fuel and high-level radioactive waste can be and would be safely transported to Yucca Mountain. DOE believes, as the EIS reports, that the potential impacts of this transportation would be so low for individuals who live and work along the routes that these individual impacts would not be discernible even if the corresponding doses could be measured. The analysis presented in the EIS factored in the characteristics of spent nuclear fuel and high-level radioactive waste, the integrity of shipping casks that would be used in transport, and the regulatory and programmatic controls that would be imposed on shipping operations (see Section M.2). The EIS analytical results are supported by numerous technical and scientific studies which have been compiled through decades of research and development by DOE and other Federal agencies of the United States, including the Nuclear Regulatory Commission and the U.S. Department of Transportation, as well as by the international community, including the International Atomic Energy Agency.

DOE believes that the EIS adequately analyzes transportation-related impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site is approved. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. The reader is referred to the introduction to Chapter 8 of the CRD for additional information.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, state or Native American tribal governments may designate alternate preferred highway routes, and highways and rail lines may be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12). In response to public comments, DOE has included maps of the representative highway routes and rail lines for the 45 states it used for analysis in the EIS (see Section J.4). Section J.4 includes potential health and safety impacts associated with shipments for each state through which shipments could pass.

At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. The Department has issued a draft Request for Proposals requiring the Regional Servicing Contractor to prepare a transportation plan that describes the Contractor's operational strategy and delineates the steps it would implement to ensure compliance with all regulatory and other DOE requirements. Section M.3.1 of the EIS contains more detail on the proposed role of the Regional Servicing Contractor.

8.7 (2203)
Comment - EIS000615 / 0001
The U.S. Navy has an EIS concerning welfare of sites in Smoky Valley where the proposed train route is. I want to know if the Navy or the DOE has interacted and taken this into consideration and worked together.

And did the DOE interact and work with the BLM [Bureau of Land Management] and U.S. Forest Service on lands in Lander County that they would go through.

Response
Land use and ownership in the Carlin Corridor are discussed in Section 6.3.2.2.2 of the EIS. DOE is aware of the Fallon Range Training Complex Requirements Naval Air Station EIS, but chose not to hold formal consultation meetings with the Navy or other Federal agencies on it. The reason is that the size and number of electronic warfare sites is small in the Smoky Valley area, and would not be affected by the rail corridor (DIRS 148199-USN 1998).

The documents cited in Section 3.2 of the EIS are source documents used by DOE for land-use considerations and they include possible future actions within the transportation corridor. The more notable land-use features and potential influences that exist on lands within the corridors are presented in Section 6.3.2. For example, the land features within the Carlin Corridor are presented in Section 6.3.2.2.2. Commenters are referred to the corridor-specific sections of Section 6.3.2.2, where DOE identifies potential conflicts with existing or future land uses and land-use plans that could be affected by a given corridor.

As stated in Chapter 6 and Section 11.2.2 (subsection on Compliance with Floodplain/Wetlands Environmental Review Requirements), more detailed field surveys, government consultation, analyses, and appropriate National Environmental Policy Act reviews would be prepared if a decision is made to select a specific rail alignment within a corridor or a specific location of an intermodal transfer station or the need to upgrade the associated heavy-haul truck routes. These would include consultations with State wildlife management agencies, the Bureau of Land Management, the Army Corps of Engineers, and other applicable government agencies. They also would include field surveys (as applicable) and more detailed assessments and analyses of wetlands and other waters; floodplains; sensitive species; effects of habitat fragmentation, interruption of movements, mortality, and harassment on wildlife, horses, and burrows; loss of hunter-generated revenue, spread of noxious weeds, and soils.

8.7 (2311)
Comment - EIS001888 / 0531
[Clark County summary of comments it has received from the public.]

Carriers should respond to all driver advisories and notification of delays and adjust routes accordingly. All vehicles should be inspected quarterly and display appropriate safety inspection stickers.

Response
DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. Section M.3.2.1.4 of the EIS provides a discussion of the protocols and procedures that would be implemented by a Regional Servicing Contractor and its subcontractors under adverse weather or road conditions. The procedures are in two parts.

One part of the procedure relates to preshipment planning, which would use available data relating to expected conditions. Shipments would not be dispatched on a route where expected conditions would not comply with the requirements in the procedures. Weather forecasts would be obtained by the Regional Servicing Contractor as part of the preshipment planning, and forecasts for rain, snow, fog, high winds, and tornado warnings would be considered in the determination of the shipment schedule. In general, Regional Servicing Contractors would be responsible for the planning, implementation, and control of the shipments, including responding to changing conditions, as necessary. A contractor would acquire information of road or highway construction that could temporarily affect the planned route. Through consultation with the affected states along the planned route, the contractor would obtain road and highway conditions and information on anticipated construction. Planning information on long-range highway construction provided by state highway departments would be given to the contractor.

The other part of the procedure relates to en route problems and is for those persons actually involved in making the shipment who would be best able to discuss and report expected and encountered conditions. DOE Protocols, which would be implemented by the Regional Servicing Contractors, require that shipments would not travel when severe weather conditions along routes or adverse road conditions would make travel too hazardous to proceed. Driver and crew communications with the control center would provide advanced warning of potential adverse conditions along the route. If unanticipated severe weather or adverse road conditions were encountered, the driver and crew would contact the control center to coordinate routing to a safe parking or stopping area if it became necessary to delay the shipment until conditions improved. Section M.3.2.1.3 of the EIS provides detailed information on the selection of safe parking areas to be used in the event a shipment had to be delayed.

Casks would be prepared for shipment under quality assurance procedures approved by the Nuclear Regulatory Commission and the casks and transporter would be inspected prior to shipment. Truck shipments would not be allowed to leave the waste generator site unless found to be defect free as required by the Commercial Vehicle Safety Alliance inspection procedures. Rail shipments would be subjected to railroad hazardous materials inspections prior to being accepted by a railroad for transportation. Inspections would occur en route and at the repository destination. More information on inspection activities is provided in Section M.3.2.2.2 of the EIS.

8.7 (2874)
Comment - EIS001100 / 0003
Every stop along the way and every time the waste is handled would cause some contamination. An expert from a firm that deals with cleaning up disasters said at a public meeting in St. Louis that homes within a 1/4 mile of the tracks would receive a dose of radiation comparable to leaving an x-ray machine on night and day for thirty years.

Response
The spent nuclear fuel or high-level radioactive waste would be handled only twice; once while loading the material into the transportation cask at the generator site and once while unloading the material at the repository from the transportation cask and transferring it to the disposal package. In both cases, the operation takes place in a building

designed for this with the objective of protecting the public and the environment from contamination. The transportation cask is designed to protect the public and the environment from contamination and radiation while the material is being shipped.

The U.S. Department of Transportation routing requirements, along with regulatory requirements to limit radiation dose external to a shipping cask, help to ensure that radiation dose to persons who live along routes would be low. Exposure to the public under incident-free conditions is discussed in Sections 6.2.3.1 and J.1.3.2.1 of the EIS. An analysis was done to determine the amount of radiation exposure to the "maximally exposed individual (MEI)." The MEI is a hypothetical person who would receive the highest dose. The EIS estimates the dose to persons who would drive alongside the trucks as they travel on the highways, who would be stopped in locales where truck shipments stop, and who live along the routes that would be used. In response to public comments, DOE forecasted growth in populations along routes in order to improve its estimates of potential impacts that could occur in the future when shipments would occur. However, the estimated dose to an individual living along a route would not change with changes in population - only the integrated dose to the whole population would change. The dose for an individual who lived along a route would be an average of about 0.008 millirem per year. This is more than 30,000 times less than average annual background radiation in the United States and less than one-one thousandth of the dose from a chest X-ray.

8.7 (3323)
Comment - EIS001002 / 0003
Neither science nor industry has figured out how to clean up an oil spill; imagine radioactive spills! To avoid accidents, will you close down the highways every other day as another shipment passes by? That is a lot of logistical planning and citizen inconvenience. If you are worried about terrorists, will you be able to announce the routes and slowdowns or closures in advance? Will I and other drivers want to share the highways with a nuclear convoy? Or will I get used to the risks and drive anyway? As I understand from my reading, designs for transports, routes and contingency plans have not been prepared yet.

Response
Spent nuclear fuel and high-level radioactive waste are not easily dispersed; they do not readily dissolve in water; they are not liquids or gases that can be easily spilled or leaked, and radiation from them does not make other materials radioactive. Spent nuclear fuel and high-level radioactive waste are solids. They are hard, tough, and dense ceramics, metals, or glasses contained within tough metal barriers. The shipping casks used to transport these spent nuclear fuel and high-level radioactive waste are massive and tough with design features that comply with strict regulatory requirements that ensure the casks perform their safety functions even when damaged. Numerous tests and extensive analyses have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents. In addition, since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

There are no plans to routinely close highways during shipments to a repository. Shipments of spent nuclear fuel have been made safely in this country for many years without having to resort to highway closures. Shipments would be subject to safeguards regulations of the Nuclear Regulatory Commission (10 CFR 73.37) that are designed to minimize the already small potential for sabotage attacks. Additional information on the physical protection of spent nuclear fuel and high-level radioactive waste during transportation can be found in Section M.7 of the EIS. DOE would comply with Nuclear Regulatory Commission regulations requiring notification to the governor or the governor's designee by mail or messenger [10 CFR 73.37(f)]. Governors would notify state and local safety officials, as appropriate, of the pending shipments. Tribes would receive notification also if the Commission amended the regulation to allow such notice. Additional information on the notification process is included in Section M.2.5.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway routes or rail lines could be used. In the interim, states and tribes may designate alternate preferred highway routes, and highways and rail lines could be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). Rail lines were identified based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for the shipment of radioactive materials (see Figure 6-12).

8.7 (3427)
Comment - EIS001160 / 0125
The DEIS should describe time of day, day of week and seasonal characteristics of shipping campaigns. Would there be an effort for shipments to occur during low season traffic times?

Response
At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations (see Section M.3 of the EIS). The contractor providing transportation services would be required to prepare a transportation plan that would discuss the various steps it would take to ensure the shipments are conducted in a safe and efficient manner. DOE's draft Request for Proposal requires the contractors selected to provide transportation services must demonstrate that they have had successful experience transporting hazardous materials. The transportation contractor would be required to prepare a transportation plan that would include proposed routes and other information such as safe, en route emergency parking areas and other planned stops.

DOE expects that shipping rates would be approximately uniform throughout the year for both rail and highway shipments. The issue of restricting hours of operations is covered in the protocols, which require the Regional Servicing Contractors to consider preferred time of day travel through urban areas in their route planning. Many local governmental organizations have time-of day-restrictions for certain types of traffic (for example, no heavy-haul truck traffic on certain highways during rush hours). DOE shipments only observe applicable restrictions. In addition, DOE transportation contractors are required to closely monitor road and weather conditions to be certain that conditions are acceptable for safe vehicle operation.

8.7 (3430)
Comment - EIS001160 / 0128
Would shipments be scheduled to occur during low traffic or high traffic hours, being moved at night or during the day?

Response
DOE expects that shipping rates would be approximately uniform throughout the year for both rail and highway shipments. The issue of restricting hours of operations is covered in the protocols, which require the Regional Servicing Contractors to consider preferred time of day travel through urban areas in their route planning. Many local governmental organizations have time-of-day restrictions for certain types of traffic (for example, no heavy-haul truck traffic on certain highways during rush hours). DOE shipments observe applicable restrictions. In addition, DOE transportation contractors are required to closely monitor road and weather conditions to be certain that conditions are acceptable for safe vehicle operation (see Section M.3.2 of the EIS).

8.7 (3796)
Comment - EIS001272 / 0006
The majority of high-level radioactive waste generated in the North Eastern part of the United States will be transported through the city of Cleveland, OH, and its suburbs. This puts many people, including my family, friends, co-workers, and neighbors at risk when an accident occurs. I have never had a voice in choosing the method of generating electricity, and I had no choice in which electric company would provide power to my home. I would never have chosen a company that built nuclear power plants for my provider, had I been given the choice. I hope

that I may have a voice in deciding if this highly toxic and dangerous waste should journey across the country and across my backyard, putting every person along the route at risk, EVERY DAY FOR 24 YEARS.

Response

In response to public comments, DOE has included maps of the representative highway routes and rail lines for the 45 states it used for analysis in the EIS (see Figure J-41 of the EIS for the representative Ohio routes). It also included potential health and safety impacts associated with shipments for each state through which shipments could pass. Table J-81 lists the estimated number of legal-weight truck shipments of spent nuclear fuel and high-level radioactive waste that would either originate or pass through Ohio. The table also lists the estimated number of rail shipment through Ohio in the mostly rail scenario for each of the candidate Nevada rail corridors and heavy-haul truck routes.

If the Yucca Mountain site was approved, under the mostly legal-weight truck scenario, the estimated total number of truck shipments through Ohio would be 17,258 over 24 years, approximately 2 truck shipments per day (total number of shipments would be 52,786). There would be no rail shipments over the 24-year period.

The estimated numbers of shipments passing through Ohio under the mostly rail scenario are less than the mostly legal-weight truck scenario. According to Table J-81, the number of rail shipments through Ohio would be approximately 2,381. This is less than 1 shipment per day over 24 years. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low.

DOE believes that its public involvement process during the development of the EIS is consistent with Council on Environmental Quality and DOE regulations on implementing the National Environmental Policy Act, and DOE guidance on public participation during the preparation of EISs.

The procedures used by DOE for the development of this EIS provided for public input at hearings and by written submissions. The Nuclear Regulatory Commission during its review of the license application for Yucca Mountain will provide similar opportunities for public input. Therefore, the public does have a voice in the decision of how to solve the nuclear waste problem in the United States.

8.7 (4231)

Comment - EIS001160 / 0046

Can the experience of transport of low-level and transuranic nuclear waste and impacts (i.e. Waste Isolation Pilot Plant (WIPP) and shipments to Nevada Test Site) be used as a model for the Yucca Mountain repository? To what extent was WIPP Program Implementation Guide for transportation considered as a model for Yucca Mountain regarding mitigation within the DEIS? Was the experiences of these other shipping campaigns used as examples to assess community impacts and transport accident rates within the DEIS?

Response

In response to public comments, DOE has added Appendix M to the EIS to provide further information on topics concerning transportation of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. These topics include liability for transportation accidents, emergency management, cask safety and testing, and transportation services acquisition and protocols.

DOE is utilizing Waste Isolation Pilot Plant experience for planning its transportation program. The operational protocols to be used by the transportation contractors are similar to those in the *Pilot Plant Program Implementation Guide* (DIRS 156384-WGA 1995; see Section M.3 of the EIS). DOE would use vehicle inspection criteria and procedures, developed by the Commercial Vehicle Safety Alliance, for all truck shipments to a repository. These are the same procedures that are being used successfully on the Waste Isolation Pilot Plant shipments. They place requirements on these shipments that go beyond those required for shipments of other hazardous materials. In addition, the experience gained from the emergency planning associated with Waste Isolation Pilot Plant shipments would be factored into the planning for repository shipments and the implementation of Section 180(c) of the NWPA (see Section M.5).

The Yucca Mountain EIS uses procedures comparable to those used by the Waste Isolation Pilot Plant for the assessment of community impacts.

8.7 (4244)
Comment - EIS001160 / 0058
The DEIS does not appear to address where and how relief drivers will be stationed or where and how these drivers will stop and park their trucks for meals, vehicle maintenance, fuel, etc. In addition, the DEIS does not address the qualifications of drivers and their respective knowledge in handling vehicle breakdowns or equipment failures as a means to mitigate risk. These issues need to be addressed in the FEIS.

The DEIS does not address restrictions in hours of operations for truck shipments as a possible measure to mitigate exposure risk in communities. For example, shipments could be restricted from passing schools at the beginning and end of each school day.

The DEIS does not consider the availability of specialized equipment which may be needed to transfer shipping casks from one vehicle to another while in transient. Delays in availability of such equipment may exacerbate exposure risks. This information must be considered in the FEIS.

Response
At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. The contractor providing transportation services would be required to prepare a transportation plan that would discuss the various steps it would take to ensure the shipments are conducted in a safe and efficient manner. DOE's draft Request for Proposal requires the contractors selected to provide transportation services must demonstrate that they have had successful experience transporting hazardous materials. Carriers would be required to develop and maintain a driver and crew training program that meets the requirements of 49 CFR 172.600 and 177.825 (see Section M.3.2.1.7 of the EIS). Driver scheduling would ensure that the hours of service regulations found in 49 CFR Part 395 could be met. The transportation contractor would be required to prepare a transportation plan that would include proposed routes and other information such as safe, en route emergency parking areas and other planned stops. DOE would make the plan available to states and tribes for comment before the shipments take place. The carrier would be able to communicate to its dispatch center and others through various means of communication, including the satellite-based tracking system. This would enable the carrier to communicate problems even in remote areas (see Section M.3.2.1.5).

The issue of restricting hours of operations is covered in the protocols, which require the Regional Servicing Contractors to consider preferred time of day travel through urban areas in their route planning.

The Regional Servicing Contractor would be required to provide detailed written procedures for how it would respond to an incident and arrange for repair/replacement of equipment or recovery, as appropriate. In accordance with ANSI N14-27 (DIRS 156289-ANSI 1987), the carrier is expected to provide appropriate resources for dealing with the consequences of an accident, isolating and cleaning up contamination, and maintaining working contact with the responsible governmental authority until the latter has declared the incident to be satisfactorily resolved and closed. Section M.3 of the EIS contains more detail on the proposed role of the Regional Servicing Contractor.

8.7 (4310)
Comment - EIS001160 / 0120
Page 11-10: Department of Transportation Hazardous Materials Packaging and Transportation Regulations 49 CFR: 4th paragraph. These regulations "attempt" to reduce potential hazards. At present, the Department of Transportation does not regulate the routing of rail shipments of radioactive materials. The EIS does not address the environmental impact of an accident using specific rail routes for radioactive materials.

Response
Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict accurately which highway routes or rail lines DOE could use. Before such shipments began, states and tribes may designate alternate preferred highway shipping routes, and highways and rail lines could be built or modified.

Nonetheless, the representative highway routes identified for the EIS analysis conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, developed for transport of Highway Route Controlled Quantities of Radioactive Materials, require such shipments to be on preferred routes selected to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or an alternate route designated by a state or tribal routing agency. Alternate routes could be designated by states or tribes under Department of Transportation regulations (49 CFR 397.103) that require consideration of the overall risk to the public and prior consultation with local jurisdictions and other states and tribes (see Figure 6-11). Federal regulations do not restrict the routing of rail shipments. However, for the analysis, as discussed in Section J.1.1.3 of the EIS, DOE assumed routes for rail shipments that would provide expeditious travel and the minimum number of interchanges between railroads (see Figure 6-12).

DOE believes that the EIS adequately analyzes transportation-related impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site is approved. The introduction to Chapter 8 of this Comment-Response Document contains additional information.

DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties, offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

8.7 (4430)
Comment - EIS001042 / 0005
Training to handle and monitoring of safety concerns involving the railroads and truck fleets that would be used are inadequate to the task. Will the U.S. DOE hire and train a specialty truck fleet just for this job? Or will the contract(s) go, as is usually the case with government contracts, to the lowest bidder?

Response
Section 137(a)(2) of the NWPA requires the Secretary of Energy to utilize by contract private industry to the fullest extent possible in each aspect of transportation of spent nuclear fuel under the Act. At this time, DOE plans to use private industry, including railroads, to the maximum extent possible, to accomplish its transportation mission. Such an arrangement, however, would not jeopardize the relationships and agreements that have been developed between DOE and stakeholders. DOE would retain responsibility for policy decisions, stakeholder relations, final route selection, and implementing Section 180(c) of the NWPA. One of the qualifications that must be met by a successful bidder would be to have performed a major transportation and logistics coordination project involving railroad, truck, or intermodal carrier of radioactive, toxic, or other types of hazardous materials within the past 10 years.

DOE has developed a possible private sector acquisition process. The acquisition process is described in Section M.3.1 of the EIS. A draft Request for Proposal for Acquisition of Waste Acceptance and Transportation Services has been published (DIRS 153487-DOE 1998). If Yucca Mountain was recommended as a repository site, the final request would be issued after the recommendation. There would be from two to four contractors selected to transport the spent nuclear fuel from the waste generator sites to Yucca Mountain. The current plan is to have a contractor for each of the four Nuclear Regulatory Commission regions in the contiguous United States; a single contractor could be assigned to no more than two of the regions. Each contractor would be responsible for providing all necessary casks, transport vehicles and other equipment, and transportation services. All bidders must meet certain qualification criteria and technical requirements. Each bidder must have performed a major transportation and logistics coordination project involving railroad, truck and/or intermodal carriage of radioactive, toxic, or other hazardous materials within the last 10 years. In addition, each bidder must have a Commission-approved quality assurance program. Bidders would be evaluated on their past performance and the degree to which their technical approach addresses the safety, operational, and logistical requirements of the program. Cost would be the last factor to be evaluated.

8.7 (5278)
Comment - EIS000968 / 0002
The DEIS does not adequately address the financial impact of the repository and the transportation thereto. How can the Local Emergency Planning Committee (LEPC) prepare for emergencies when there is no starting point on fiscal impacts? Specific questions that need to be answered are:

1. What will it cost to monitor the transportation program for the life of the project?

2. What is the estimated cost to prepare for and respond to the maximum reasonably foreseeable accident (MRFA)?

3. Does the Price-Anderson Act, the Stafford Act or a combination of both cover the costs if an evacuation is necessary as the result of an accident? This needs to include long term shelter and business losses.

4. What are the financial impacts on our healthcare system? Do they have the equipment/training necessary to deal with the everyday effects of exposure? In the MRFA do we have enough hospital beds or providers? How much will it cost to prepare?

5. Much of the DOE document discusses Grant funding for costs anticipated with the development of Yucca Mountain. However, Grants are discretionary and Nevada would be competing with every State effected by transportation, should not a fixed funding source be identified?

6. Affected areas have no mass Community Warning System other than the Emergency Alert System. What will it cost to create a useful warning system to notify the public in the event of an emergency?

7. Public safety training is not addressed. In large communities you may have experienced Hazardous Materials Response Teams, but in most rural areas the first responders will be volunteers. Ongoing training will need to be addressed for the life of the project.

Response
In response to comments, DOE has revised the EIS by adding Appendix M to provide additional information on DOE funding for improvements in emergency response training and capabilities along the routes (see Section M.5). State and Native American tribal governments have primary responsibility to respond to and to protect the public health and safety in their jurisdictions from accidents involving radioactive materials. However, Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using an up-front planning grant and based on availability of funds in annual Program budgets specified by Congress.

Additional Federal response capabilities, such as expert services from the Radiological Assistance Program Team, could be activated, as requested by states and tribes. The schedule in the proposed policy and procedures for implementation of Section 180(c) of the NWPA (63 *FR* 23753, April 30, 1998) is designed to provide adequate time for training of first responders in advance of the first shipments. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. See Section M.6 of the EIS for a discussion of the DOE Section 180(c) Policy and Procedures.

Specific responses:

1. The EIS does not include an estimate of the cost to state, local, and tribal governments to monitor the transportation program for the life of the project. DOE and the transportation contractors would use the latest version of the TRANSCOM system (see Section M.3.2.1.5 of the EIS), or a similar satellite based tracking system, for providing continuous real-time position tracking for all shipments. In addition, DOE intends to make satellite tracking information available to the states and tribes, subject to Nuclear Regulatory Commission determination that use of satellite tracking technology would be allowed by safeguards and security regulations in 10 CFR Part 73. Thus, there would be information on which to base requests for aid to local law enforcement or emergency response personnel as needed.

2. In response to public comments, Section J.1.4.2 of the EIS discusses the costs of cleanup following a severe transportation accident. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 environmental assessments, and information submitted by the State of Nevada in its public comments on the Draft EIS. This information included estimates of cleanup costs as high as $9.4 billion. The studies included cost data compiled from case studies involving actual cleanup of radioactive contamination. In addition, the studies address consequences for releases of radioactive materials in communities. Although the studies project high costs for cleanup following severe accidents, the accidents evaluated are very unlikely and, as a consequence, the economic risks of transportation accidents would be very small.

3. The Price-Anderson Act establishes a system of financial protection (compensation for personal injury and property damage, including loss of use of property) for the public in a nuclear accident, regardless of who causes the damage. See Section M.8 of the EIS for a discussion of the Price-Anderson Act. The Price-Anderson Act would indemnify any person held liable for damage including cleanup of released radioactive materials.

4 and 6. In the unlikely event someone was contaminated as the result of an accident involving shipments to a repository, there are several means to deal with such incidences. The Department has several programs available to provide assistance to state, tribal, and local governments in response to radioactive material accidents. The Radiological Assistance Program, for example, provides trained personnel with equipment to evaluate, assess, advise, and assist in the mitigation and monitoring of potential immediate hazards associated with a transportation accident. As part of the program, DOE maintains eight Regional Coordinating Offices across the country that are staffed 24 hours a day, 365 days a year. The staff consists of nuclear engineers, health physicists, industrial hygienists, public affairs specialists, and other personnel who provide field monitoring, sampling, decontamination, communications, and other services, as requested. In addition, DOE's Radiation Emergency Assistance Center/Training Site (REAC/TS) focus on providing rapid medical attention to people involved in radiation accidents. REAC/TS maintains a 24-hour response center to provide direct support, including deployable equipment and personnel trained and experienced in the treatment of radiation exposure to assist Federal, state, tribal, and local organizations.

5 and 7. Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using an up-front planning grant and based on availability of funds in annual Program budgets specified by Congress. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. See Section M.6 of the EIS for a discussion of the DOE Section 180(c) Policy and Procedures.

8.7 (5425)
Comment - EIS000323 / 0001
First of all, the international experience with spent nuclear fuel shipments is absolutely irrelevant to what we're talking about in this EIS. I will not belabor the point except to say most of the long-distance experience in the

international area is with water transportation, not being proposed in the U.S. Most of the land-shipment experience is in England or in France, to a lesser extent in Germany, with relatively short land shipments. Until someone makes a compelling case that those shipments are relevant based on the comparability characteristics of the shipments that are being proposed for Yucca Mountain, I suggest we put that one to sleep.

Now, a more interesting question is, how relevant are the past shipments in the United States, given their characteristics? I would argue first that the naval fuel shipments are of no relevance whatsoever because of robust physical construction of naval reactor fuel which, after all, is designed for combat conditions and, secondly, because of the special protocols under which that fuel is shipped.

The real issue is, how relevant are the past shipments of the civilian industry in the United States to what's being proposed for Yucca Mountain? Turn to the database maintained by the Nuclear Regulatory Commission. The best data that we have comes from that source through the public information circular on irradiated fuel shipments. That database begins in 1979. It doesn't include a few of the DOE shipping campaigns like the across Country shipments from Surrey and Three Mile Island to Idaho, but it includes just about everything else including a lot of research reactor shipments. And when people give you this 3,000 shipments, you know, a lot of these shipments contained a piece of fuel rod, small research reactor assembly, and are in no way comparable to what the Department of Energy is proposing. So look, for example, at what the numbers are. Amount shipped between 1979 and 1995: a total of 1,335 metric tons uranium. That's an average of 79 metric tons uranium. Okay, that's equivalent to about eight casks that the DOE will ship in the future. Look at the total number of shipments in that period, 1,306. That's an average of 77 shipments per year. You know, they'll be shipping more than that per month, in some cases maybe that much by week under one of the scenarios that they're talking about in the Draft EIS. No, in the past, truck shipments, not a very good experiential base for people who are talking about a heavily rail scenario, although I will argue that in fact they'll be real lucky if they move 65 percent of the inventory by rail, and frankly I would consider that a real good target for them to be shooting for.

Now, the real issue is distance. Over the last 15 years, guess what the average rail shipment has been. Three hundred and fifty-six miles. In fact, 80 percent of the shipments have been less than 500 miles. And when you look at the truck shipments, you find the average shipment distance has been a little longer, 678 miles; but even there you find that 82 percent of the shipments are less than 900 miles. Now, the average distance for both rail and truck shipments is going to be about 2,200 miles when you average out all the sites in the U.S. And I would submit that that means greater likelihood of equipment failure, greater likelihood of human error and certainly greater likelihood of human error and certainly greater likelihood of bad luck in the way of accidents caused by other vehicles, bad weather, natural disasters and so forth.

Finally, what we haven't talked about, my third point, is if the industry wants to tell us a success story and say, "Base your transportation program on a success story," they have to look no further than the Waste Isolation Pilot Plant in New Mexico. Unfortunately, the DOE has chosen to ignore the lessons learned from the only good transportation campaign that they've planned. Why is that program accepted by the western states affected by it? Why is it endorsed by all the western governors? We haven't had a governor in Nevada saying anything good about DOE for, you know, many, many years; but they've all endorsed this program. The principles are this: one, the shipping casks were physically tested full scale. Whether they needed to be or not, the demonstration and the proof of the pudding was laid on the table where people could see that the containers actually met the NRC [Nuclear Regulatory Commission] performance standard. Some of these tests are boring, you know. You drop it in one orientation. You pick it up, you drop it again, you drop it again, you roast it and so forth. But, you know, as boring as that may sound, there's nothing in the world like showing people a video that shows honest testing and shows the package surviving. And when the earlier version failed, we found out there was a problem with the O-rings that would allow particles to escape from the package, and that was fixed. So sometimes you learn things. It's just like in the old Sandia tests where we found out that the tie downs that hold the cask to the trailer are just as important as the integrity of the cask. So number one, the WIPP program is accepted because of full-scale testing of the package.

Number two, routes have been out there for ten years. They came out in the Draft EIS. Some people didn't like them. Down in New Mexico the routes caused so much controversy that the State Legislature took the authority away from one agency and gave it to another, but in the end they came up with routes that were acceptable to the people of New Mexico. You can't do that unless you're starting with a discussion of the routes and you take input from all parties, and that's how you solve the problem. DOE seems not to have learned the second big lesson form WIPP.

The third big lesson of WIPP is those regulations that some of you guys in the industry think are great -- well, maybe they are, maybe they aren't. But a big advantage in terms of public credibility came about when the DOE guys on the WIPP program said, "You know what? We're willing to go beyond the minimum that the regulations require in two areas, accident prevention and emergency response."

So when somebody comes to you and says here's all this experience in Europe, you ask them to prove to you that the characteristics of the European shipments have some relevance to this. When someone says, oh, we've got this great experience in the U.S. remind them most of the shipments in the U.S. took place over 20 years ago. The great utility people like Howard Schieman (phonetically) form WEPCO and Paul Standish from Westinghouse -- they've all retired; they're not around anymore. One of the problems in the utility business will be they don't have a lot of people who've got hands-on experience with PWR and BWR fuel kind of shipments. But the characteristics of the shipments, I think, are more important than the people; and the characteristics don't tell you anything.

And finally, when somebody says they don't know how to please those people, those crazy people in Nevada who can't seem to find anything good the DOE does, you remind them that the State of Nevada endorsed the transportation and safety protocols that they developed for WIPP. And that's the yardstick that we hope their colleagues at the Office of Civilian Radioactive Waste management will eventually wake up and follow the example that has been set.

Response
DOE believes that all past spent nuclear fuel shipping experience, international and domestic, would be relevant to planning for shipments of spent nuclear fuel and high-level radioactive waste if the Yucca Mountain site was approved. In addition, the operational protocols to be used by the transportation contractors are similar to those in the *Pilot Plant Program Implementation Guide* (DIRS 156384-WGA 1995) (see Section M.3 of the EIS). DOE would use vehicle inspection criteria and procedures, developed by the Commercial Vehicle Safety Alliance, for all truck shipments to a repository. These are the same procedures that are being used successfully on the Waste Isolation Pilot Plant shipments. They place requirements on these shipments that go beyond those required for shipments of other hazardous materials. Furthermore, the experience gained from the emergency planning associated with Waste Isolation Pilot Plant shipments would be factored into the planning for repository shipments and the implementation of Section 180(c) of the NWPA.

In response to public comments, DOE has added Appendix M to the EIS to provide further information on topics concerning transportation of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. These topics include liability for transportation accidents (Section M.8), emergency response (Section M.5), and transportation services acquisition and protocols. Appendix M discusses protocols for managing adverse weather and road conditions (Section M.3.2.1.4) and driver training (Section M.3.2.1.7).

DOE has added information on the safety and testing of transportation casks (see Section M.4 of the EIS). In addition, based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 presents consequences for accidents that could release radioactive materials.

The TRUPACT package used in the Waste Isolation Pilot Plant program is completely different from the spent nuclear fuel casks to be used for shipment to Yucca Mountain. It has relatively thin walls and a different type of seal. Full-scale testing was appropriate for this type of package. However, many types of spent nuclear fuel casks have been certified by the Nuclear Regulatory Commission without full-scale tests being performed on the designs. The Commission is currently conducting a Package Performance Study that might include full-scale testing of a typical spent nuclear fuel transport cask. DOE is monitoring this study closely and will comply with any revised regulations that result from the study.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway or rail lines would be used. For example, in the interim, state or Native American tribal governments might designate alternate preferred highway routes and new highways and rail lines could be constructed or modified. Therefore, for purposes of analysis in the EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) (see Figure 6-11). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for the shipment of radioactive materials (see Figure 6-12).

The final routes would be selected following the requirements and protocols outlined in the Draft Request for Proposals for Regional Servicing Contractors (DIRS 153487-DOE 1998; see Section 3.2.1.2 of the EIS). DOE and its shipping contractors would consult with the states and tribes along proposed routes in a procedure similar to that used for Waste Isolation Pilot Plant route selection. DOE would submit selected routes to the Nuclear Regulatory Commission for approval.

DOE believes that the mostly rail scenario, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. In reaching this conclusion, DOE considered the capabilities of the sites to handle larger (rail) casks, the distances to suitable railheads, and historic experience in actual shipments of nuclear fuel, waste or other large reactor-related components. DOE also considered relevant information published by sources such as the Nuclear Energy Institute and the State of Nevada. In addition, DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

8.7 (5688)
Comment - EIS001887 / 0302
In the Draft EIS Summary document (p. S-21), DOE states that legal-weight vehicles would not require special state-issued permits to transport HLW [high-level radioactive waste] or SNF [spent nuclear fuel]. This statement is not correct. These vehicles would still need valid hazardous materials transport permits to enter and traverse Nevada with such loads.

Response
Section 6.2.1 of the EIS refers only to the special overweight permits that would be required if the weight of the truck were to exceed 80,000 lbs. This type of permit would not be required for shipments on legal-weight trucks, but they would be needed if a large rail cask were loaded on a heavy-haul truck.

All permits required by the State of Nevada, or any local jurisdiction traversed by the shipment, would be obtained by DOE in accordance with the applicable regulations. In Nevada, these permits would be those required by the Nevada Administrative Code and could include a Certificate of Registration or a Hazardous Material Triennial Permit. County or city hazardous material permits or certificates would be obtained as necessary.

8.7 (5755)
Comment - EIS001887 / 0359
Page 9-18; Section 9.3.3.2 - Groundwater

The Draft EIS does not discuss potential impacts to groundwater from an accident occurring during transport.

Response
The shipping casks used to transport spent nuclear fuel and high-level radioactive waste are massive and tough with design features that comply with strict regulatory requirements that ensure the casks perform their safety functions even when damaged and the casks would be designed to be watertight even after a severe accident. Furthermore, the high-level radioactive waste would be in a solid form that would not be easily dispersed (ceramics, metals, or glasses).

Numerous tests and extensive analyses, using the most advanced analytical methods available, have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents. Since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Thus, it is extremely unlikely that an accident that resulted in a cask falling into any body of water would result in surface water contamination, let alone groundwater. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

As discussed in Section J.1.1.4, the EIS does not specifically analyze a transportation accident involving contamination of surface water or groundwater. While small particles generated by the impact forces and driven out of the cask by a severe fire (which would be extremely unlikely because there would be no fuel to sustain an engulfing fire of the type required in order to release radioactive material), might ultimately end up contaminating soils and surface waters outside the cask, this would not be the dominant pathway for radiological exposure and uptake after an accident.

8.7 (5817)

Comment - EIS001802 / 0002

We have heard a lot of talk about earthquakes in Nevada, but I've lived 18 years with the notion that there may be -- it's not may and it's not if, it's when the major earthquake will occur along the New Madrid fault.

I can't quote my specifics at this point, but the New Madrid fault, St. Louis is on the north end. It would extend all the way down to the Memphis area along the Mississippi River, the St. Louis area and the areas to the south all the way to Cape Girardeau consist of soils that are very unstable in the event of a major earthquake. Those of us who are privy to a lot of information can literally see buildings, all unreinforced masonry buildings in the City of St. Louis collapsing in the event of a major earthquake, not to mention the bridges across the river in St. Louis, Cape Girardeau, points north and points south.

The material that's been presented here this evening, in going through some of it, I see scenarios painted whereby over the next 24 years there would be three rail shipments per year through Missouri, for the next 40 years there would be two trucks a day which is 14 trucks per week going through St. Louis, and then as a slight-aside I hear mention of barge traffic which puts barge transport up and down the Mississippi possibly for these cartridges, and what I see -- and the probability of a major, I believe a magnitude of 6.8 or greater earthquake occurring on the New Madrid fault is extremely high for the next 15 years, and it's almost imperative that it will happen within the next 30, if I understand my previous training.

And then when I see a picture of two trucks a day moving through St. Louis through the rush hour traffic, not to mention the three trains a week and the barge traffic and you have painted some of your scenarios about how the casks were treated in the event of accidents, but I didn't read anything that would approximate a building falling on one of these trucks or railroad cars or having the bridge dislodged and it falling into the Mississippi River or a barge accident being in the Mississippi River. When I imagine a terrible earthquake compounded by a nuclear waste spill all happening at the same time in this region, it's more than I can bear, and if these cartridges have to be -- if it's -- in the end, if it's agreed they have to be transported across the country, I think you should take a closer look at routing all of this through the New Madrid fault area, this part of the country.

Response

The transportation regulations of the Nuclear Regulatory Commission include shipping cask design requirements for normal and accident conditions of transport (10 CFR Part 71). The regulations do not specifically address natural disasters such as earthquakes, floods, or tornadoes. However, if a shipment to Yucca Mountain were to be involved in any of these natural disasters, the impact on the cask would be within the bounds of the hypothetical accident defined in 10 CFR Part 71. The shipping casks used to transport these materials are massive and tough with design features that comply with strict regulatory requirements that ensure the casks perform their safety functions even when damaged. Numerous tests and extensive analyses have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents.

In addition, since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway routes or rail lines could be used. In the interim, states and tribes may designate alternate preferred highway routes, and highways and rail lines could be constructed or modified. Final routing decisions would be conducted in accordance with U.S. Department of Transportation routing guidelines. The routing evaluations would consider such parameters as emergency response capabilities; local terrain, road design, and climate characteristics as they affect accident rates; economic effects of accidents; sensitive environments exposed; and locations of special facilities such as hospitals and schools (see DIRS 103718-DOT 1998, *Identification of Factors for Selecting Modes and Routes for Shipping High-Level Radioactive Waste and Spent Nuclear Fuel*). The preferred routes would be submitted to the Nuclear Regulatory Commission for approval.

8.7 (5866)
Comment - EIS001557 / 0002
That being said the [Public Utilities] Commission’s [of Ohio] position can be simply stated in this matter. And that is; that if these shipments are to be made, it’s our desire that these shipments be made as safely as possible for the citizens of Ohio.

Response
DOE shares the Ohio Public Utilities Commission’s objective of making the shipments as safely as possible. As stated in Section 2.1.3.2 of the EIS, DOE would meet all requirements and regulations of the U.S. Department of Transportation and the Nuclear Regulatory Commission (NRC) in transporting spent nuclear fuel and high-level radioactive waste to the repository. DOE would meet these requirements and regulations in consultation with state and tribal authorities. To attain this objective, the waste would be shipped in casks certified by the NRC as meeting strict performance standards, the shipments would be escorted to minimize the possibility of terrorist attacks in accordance with NRC requirements, and the routes would be selected in accordance with applicable Department of Transportation regulations and in consultation with state, tribal, and local authorities.

In response to public comments, DOE has added Appendix M to the EIS to provide further information on topics concerning transportation of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. These topics include the protocols to be used by the Regional Servicing Contractors (see Section M.3) and the training and technical support that DOE would provide under NWPA Section 180(c) (see Section M.6) and cask safety and testing (see Section M.4).

8.7 (5969)
Comment - EIS001879 / 0004
The Draft EIS does not take cognizance of several Nye County Commission resolutions regarding the transportation of nuclear waste in Nye County. The resolutions state that it is unacceptable to ship highly radioactive wastes on Nye County’s Main Street (US-95, between Tonopah and Mercury), or on Nevada Highway-160, the Main Street of the site county’s largest and most rapidly growing community, and its link to the state’s metropolitan center. Commission resolutions also state that shipment of high-level wastes should be by rail (cross country and in Nevada), and that the preferred rail route is one that avoids site county communities to the greatest possible extent.

The Draft EIS examines the shipment of highly radioactive wastes on 220-foot long heavy-haul tractor trailers, moving at average speeds of 20 miles per hour (or less) on two-lane rural public highways directly through Nye County communities. Resolutions by the Nye County Commission have made it clear that such shipment is unacceptable in Nye County.

Nye County Commission resolutions constitute local government plans, and should be recognized and treated as such in the analysis, identification, and evaluation of human health, environmental, and socioeconomic impacts.

Response
DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

If the Yucca Mountain site was approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

Although some counties, towns, and cities have ordinances in place prohibiting the transportation of high-level nuclear waste, these ordinances, in order to be officially recognized by the Federal Highway Administration (FHA) a person, State, or political subdivision thereof, or Native American Tribe directly affected by a highway routing designation, must submit an application for preemption determination to the Administrator of the FHA, to determine if the route designation can be preempted as defined by 49 U.S.C. 5125 and 49 CFR Part 397, Subpart E. After review of the application, the FHA Administrator may grant a waiver of preemption, if the preemption standards of 49 CFR 397.203 are met. Highway routing designation includes any regulation, limitation, curfew, time of travel, restriction, lane restriction, routing ban, port-of-entry designation, or route weight restriction applicable to the highway transportation of hazardous materials (including class 7 radioactive waste) over a specific highway route or portion of a route.

DOE would adhere to all applicable ordinances that have been granted a waiver of preemption by the Administrator of the Federal Highway Administration when transporting high-level nuclear waste or spent nuclear fuel.

8.7 (6206)
Comment - EIS001291 / 0003
The Public Utilities Commission of Ohio requires every motor carrier of radioactive and hazardous materials to register with and obtain a Uniform Permit from the Commission.(iv) This program helps to ensure that every carrier meets basic, minimum safety requirements before transporting radioactive or other hazardous materials in this state.

In addition, the Commission employs rail inspectors who are certified by the Federal Rail Administration in specialties affecting rail safety, such as equipment, track, operating practices and hazardous materials. Under an agreement between the Commission and the FRA [Federal Rail Administration], the Commission rail inspectors will conduct inspections of rail track and equipment and forward any violations on the FRA for enforcement action.

The Commission has been designated by the Governor as the state routing agency for the highway transportation of radioactive materials and other hazardous materials, but we cannot prevent the transportation of these radioactive materials through this state. Any such effort would be viewed as interfering with interstate commerce and would be clearly unconstitutional. However, if the materials are shipped by highway, the Commission does have the authority to require that such transportation take place on routes which minimize the potential radiological risk to the public and the environment.

Please note that the Commission's authority under Federal law is limited to highway routing of radioactive materials; the Commission has no authority to designate routes for shipment by rail. If the Department of Energy chooses to move these shipments by rail, the Department will bear sole responsibility for selecting which rail lines will be used to transport these shipments. However, the Commission will use its knowledge of the rail lines in the State of Ohio to work with the Department of Energy to select the most appropriate rail lines for these shipments. Moreover, the Commission staff will conduct inspections to monitor the safety of the track, equipment and the radioactive materials.

Federal regulations require that certain "highway route controlled quantities" of radioactive materials be transported only on "preferred routes."(v) In the event that a state has not designated an alternative route, the "preferred routes" are considered to be interstate highway system routes; bypasses and beltways, if available, are required to be used around densely populated urban areas.(vi) The state routing agency, however, can designate routes to be used in addition to, or instead of, the interstate highway system as the "preferred routes."(vii) The Commission has not designated any such "alternative routes" at this time.

However, the Commission is examining the possibility of preferred routes for these shipments of radioactive wastes. The Commission has provided a grant of $98,000 to the Ohio State University to research the risk factors involved in routing radioactive materials on the state's highways. This research will provide the Commission with the data necessary to determine which routes would minimize potential radiological risk to the public and the environment.

Before the Commission will designate any such routes, the Commission will be guided by two principles. First, the Commission will only designate routes at the behest of, and where there is a full participation among, the local communities. The Commission strongly believes that recommendations for routing radioactive and other hazardous materials should come from the local communities affected by the transportation. The Commission should not impose routing requirements unless there is full participation among the local communities as to the proper route, and the proposed route minimizes potential radiological risk to the public and the environment.

Secondly, the Commission will not designate routes for radioactive and other hazardous materials which serve to export the risk to other communities or states. Decisions by Federal courts and agencies make it clear that routing designations which serve to export the risk to other communities are preempted by Federal law. Therefore, local communities which are potentially affected by any routing recommendation must be part of the process which proposes the routing recommendation. Likewise, any proposed routing recommendations must not serve to export the risk to our neighboring states.

At the appropriate time, when there is greater certainty as to the timing, volume and routes of the shipments, the Commission staff will be available to provide technical assistance to local communities which desire to prepare routing recommendations. Moreover, the Commission will provide grants through the Hazardous Materials Grant Program to local communities to fund the costs of the planning and study necessary for routing recommendations.

Finally, it is important to bear in mind one additional requirement under Federal law. Any radioactive materials routing designation made by the Commission on behalf of the State of Ohio may have an impact upon, and thus, under Federal law, will require the consent of, any state affected by such a designation. The shipments discussed in the Draft Environmental Impact Statement predominantly would be through shipments, shipments which neither begin in nor end in this state; therefore, any action by the Commission will require close coordination with our neighboring states of Pennsylvania, West Virginia, Kentucky, Michigan and Indiana.

(iv) Ohio Admin. Code Section 4901:2-6-14; Ohio Rev. Code Ann. Section 4905.80(B)(1).
(v) 49 C.F.R. Section 397.101(b).
(vi) 49 C.F.R. Section 397.101(b)(2).
(vii) 49 C.F.R. Section 397.103.

Response
Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this point in time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway routes or rail lines could be used. In the interim, state or Native American tribal governments may designate alternate preferred highway routes, and highways and rail lines could be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate) that reduce time in transit. DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for the shipment of radioactive materials.

DOE would welcome the opportunity to work with the Public Utilities Commission of Ohio to ensure the safety of shipments of nuclear waste in and through Ohio. The Commission's knowledge of local highway and rail conditions would be especially valuable in aiding DOE's selection of routes. DOE appreciates the Commission's recognition of the role of neighboring states.

As required by the NWPA, DOE would acquire Regional Servicing Contractors to support planning and operation of the transportation system (additional details of the responsibilities and process are provided in Section M.3 of the EIS). The Department has issued a draft Request for Proposals requiring the Regional Servicing Contractor to prepare a transportation plan that describes the Contractor's operational strategy and delineates the steps it would implement to ensure compliance with all regulatory and other DOE requirements. This includes identification of proposed routes and associated routing considerations, coordination and communication with all participating organizations and agencies, including other Regional Servicing Contractor(s), DOE, state, Native American tribal, and local governments, and interactions with appropriate Federal and state organizations. The route and mode determinations would be interactive. If, during the course of the mode or route determinations, one of the previously determined factors changed, the site-specific mode and route analysis would be reevaluated to ensure consistency. The Regional Servicing Contractor would consult with other Regional Servicing Contractor(s) as appropriate to ensure continuity and consistency of routes and to ensure trained emergency.

8.7 (6488)
Comment - EIS001774 / 0006
Who will monitor worker and public exposure? Who will implement and evaluate quality assurance and quality control in the NRC [Nuclear Regulatory Commission], DOE and DOT [U.S. Department of Transportation]? Who will run the incident reporting system? Where is the funding for state and local inspectors enforcement? Who pays for or provides for evacuation plans, training and radiological protection equipment? If there is no Price Anderson coverage on theft or sabotage if a truck or train goes off a planned route, who pays for that?

Response
Nuclear Regulatory Commission and DOE regulations require monitoring of radiation workers, records of their exposures, and maintenance of those records. Regional Servicing Contractors would monitor their workers to ensure that no individual's exposure exceeded regulatory limits. The Regional Servicing contract would contain a clause in accordance with DOE Acquisition Regulation 952.223-75 that would require individual occupational radiation exposure records generated in the performance of work under the contract to be subject to inspection by DOE and preservation by the contractor until DOE authorized disposal. The Nuclear Regulatory Commission limits radiation emitted from radioactive packages to protect the public. The Regional Servicing Contractors and responsible agencies would monitor waste casks containing spent nuclear fuel or high-level radioactive waste.

Although the EIS analyses are based on the latest reasonably available information and state-of-the-art analytical tools, not all aspects of incident-free transportation or accident conditions can be known with absolute certainty. In such instances, DOE has relied on conservative assumptions that tend to overestimate impacts. For instance, DOE assumed that the radiation dose external to each vehicle carrying a cask during routine transportation would be the maximum allowed by U.S. Department of Transportation regulations. Similarly, DOE assumed that an individual, the "maximally exposed individual," would be a resident living 30 meters (100 feet) from a point where all truck shipments would pass. Under these circumstances, the maximally exposed individual would receive a dose of about 6 millirem from exposure to all truck shipments (6 millirem represents an increased probability of contracting a fatal cancer of 3 in 1 million). Although it can be argued that individuals could live closer to these shipments, it is highly unlikely that an individual would be exposed to all shipments over the 24-year period of shipments to the repository, even though DOE incorporated this highly conservative assumption in the analysis. Given these very low exposures, DOE has no plans to monitor exposures to the public during transport.

The Nuclear Regulatory Commission has established Quality Assurance requirements that apply to the design, purchase, fabrication, handling, shipping, storing, cleaning, assembly, inspection, testing, operation, maintenance, repair, and modification of waste package components such as the casks that DOE would use to transport radioactive waste to a repository (10 CFR Part 71). The requirements mandate cask designers and fabricators to have an approved Quality Assurance program. The DOE Office of Civilian Radioactive Waste Management (OCRWM) and its contractors must comply with Nuclear Regulatory Commission requirements. DOE has a Quality Assurance program applicable to all its activities and contractors. The Nuclear Regulatory Commission and DOE can audit a contractor's activities at any time to determine compliance with the requirements. The U.S. Department of Transportation does not impose specific Quality Assurance requirements.

U.S. Department of Transportation regulations require a carrier to notify the Department by telephone at the earliest practicable moment after an incident involving certain hazardous materials (49 CFR 171.15). The carrier must report the incident in writing within 30 days. The Department of Transportation keeps a record of such incidents and publishes an annual report. (The latest report is available on the Internet at http://hazmat.dot.gov/ brindex98.htm.) In addition, DOE has a reporting system that includes reporting of unusual, off-normal, and emergency occurrences (Order 232.1A, Occurrence and Processing of Operations Information).

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using an up-front planning grant and based on availability of funds in annual Program budgets specified by Congress. Additional Federal response capabilities, such as expert services from the Radiological Assistance Program Team, could be activated, as requested by states and tribes. The schedule in the proposed policy and procedures for implementation of Section 180(c) of the NWPA (63 *FR* 23753, April 30, 1998) is designed to provide adequate time for training of first responders in advance of the first shipments. Should a decision to proceed with the development of a repository at Yucca Mountain be made, Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. The Department would provide an initial planning grant and a base grant for a need assessment and planning and coordination activities associated with interacting with local jurisdictions and neighboring jurisdictions. A percentage of these funds (25 percent in the first year, 10 percent thereafter) could be used for the purchase of equipment. See Section M.6 of the EIS for a discussion of the DOE Section 180(c) Policy and Procedures.

With respect to compensation for losses associated with an accident involving spent nuclear fuel and high-level radioactive waste, the Price-Anderson Act (discussed in Section M.8 of the EIS) establishes a system of financial protection for persons liable for and for persons injured by a nuclear accident or incident. The Price-Anderson Act establishes a system of private insurance and Federal indemnification that generally ensures that up to $9.43 billion is available to compensate for damages suffered by the public, regardless of who causes the damages. Beyond that level, Congress will consider further action that it determines is necessary to provide full and prompt compensation to the public. Price-Anderson indemnifies all persons liable for the nuclear damage including state, local, and tribal governments, emergency response workers, health care personnel, victims, and any other citizens or members of the public.

Because of the public's interest in transportation, DOE has added to this EIS Appendix M and maps and tables that show the analyzed routes and estimated health and safety impacts for each state through which the shipments would pass. Appendix M provides general background information about transportation-related topics, such as transportation regulations (Section M.2), transportation operations (Section M.3), cask testing (Section M.4), and emergency response (Section M.5).

8.7 (6558)
Comment - EIS001328 / 0007
To assure a technically superior transportation system and to help attain public confidence in the safe transportation of nuclear waste, NCSL [National Conference of State Legislatures] urges Congress and DOE to: Apply special criteria to the shipment of spent fuel, including the development of guidelines for routing when shipping by rail, the use of special trains (unit or dedicated trains; moving at designated safe speeds) for rail shipments, safety inspections at origin and enroute, and full-scale testing of casks used for spent fuel transport.

Response
In response to these and other public comments, DOE has added information on proposed transportation activities to the EIS (see Appendix M). Appendix M includes additional information on the regulations that govern spent nuclear fuel and high-level radioactive waste transportation, the proposed process that DOE would use to acquire commercial transportation services, and the expected operational details and protocols DOE would follow if the Yucca Mountain site was approved (see Sections M.2 and M.3).

DOE intends to purchase services and equipment from Regional Service Contractors who would perform waste acceptance and transportation operations. Section M.3.1.6 of the EIS provides a discussion of the protocols and procedures that would be implemented by a Regional Servicing Contractor and its subcontractors.

DOE would require its Regional Servicing Contractors to follow specific guidelines in the recommendation of rail routes. These guidelines are in the operational protocols in Section M.3 of the EIS.

DOE could decide to use a dedicated train that carries only the material to be shipped to Yucca Mountain, or could elect to move the spent nuclear fuel and high-level radioactive waste in general freight. DOE continues to evaluate the safety, cost, and schedule aspects of dedicated trains, however a decision on their use has not been made at this time. If the material was shipped as general freight, the position of the spent nuclear fuel or high-level radioactive waste car in the train is regulated by 49 CFR 174.85.

Truck shipments would be inspected in accordance with the *Commercial Vehicle Safety Alliance Enhanced North American Standard Level I Inspection Procedures and Uniform Enhanced Out-of-Service Criteria* (DIRS 102209 CVSA 1999). Rail shipments would be inspected in accordance with the rules of the Federal Railroad Administration.

The NWPA requires DOE to use casks certified by the Nuclear Regulatory Commission when transporting spent nuclear fuel and high-level radioactive waste to a repository. The Commission’s certification regulations indicate that cask testing must represent the kinds of forces that a cask would encounter in a severe transportation accident. A cask’s ability to survive the tests prescribed by the regulations (10 CFR Part 71) can be demonstrated either through component analysis or through scale-model and full-scale testing to demonstrate and confirm the performance of the casks. The Nuclear Regulatory Commission would decide which level of physical testing or analysis was appropriate for each cask design submitted.

8.7 (6567)
Comment - EIS001632 / 0055
EPA [the Environmental Protection Agency] suggests that the final EIS provide a section which lays out the responsibilities of various federal, state, local and tribal agencies in regulating, approving and monitoring shipments of nuclear waste. This information should provide additional assurance to the public that a national network of controls is in place designed to ensure public safety.

Response
Because of the public’s interest in transportation, DOE has added to this EIS Appendix M and maps and tables that show the analyzed routes and estimated health and safety impacts for each state through which the shipments would pass. Appendix M provides general background information about transportation-related topics, such as transportation regulations (Section M.2), transportation operations (Section M.3), cask testing (Section M.4), and emergency response (Section M.5).

DOE has issued a draft Request for Proposals requiring the Regional Servicing Contractor to prepare a transportation plan that describes the Contractor's operational strategy and delineates the steps it would implement to ensure compliance with all regulatory and other DOE requirements. This includes identification of proposed routes and associated routing considerations, coordination and communication with all participating organizations and agencies, including other Regional Servicing Contractor(s), DOE, state, Native American tribal, and local governments, and interactions with appropriate Federal and state organizations. The route and mode determinations would be interactive. If, during the course of the mode or route determinations, one of the previously determined factors changed, the site-specific mode and route analysis would be reevaluated to ensure consistency.

8.7 (6631)
Comment - EIS001160 / 0068
Page 1-8: The DEIS does not consider the potential for certain defense high-level radioactive wastes to have security requirements which limits pre-notification of emergency first responders about pending shipments. Measures to mitigate pre-notification restrictions should be addressed within the FEIS.

Response
DOE would comply with Nuclear Regulatory Commission regulations requiring notification to the governor or the governor's designee by mail or messenger [10 CFR 73.37(f)]. Governors would notify state and local safety officials, as appropriate, of the pending shipments. Tribes would receive notification if the Commission amended the regulation to allow such notice. In response to comments, additional information on the notification process is included in Section M.3.2.2.1 of the EIS.

The Nuclear Regulatory Commission regulations require notification to the governor or the governor's designee by mail or messenger [10 CFR 73.37(f)]. If the notification is by mail, it must be postmarked at least 7 days before transport of a shipment within or through the state. If the notification is delivered by messenger, it must reach the office of the governor or the governor's designee at least 4 days before transport of a shipment within or through the state. The Commission is considering amending the regulations to provide for notification of Native American tribes in addition to the governors. DOE intends to notify the tribes along the routes if the regulations are revised. In accordance with these regulations, DOE cannot notify local municipalities or other jurisdictions of upcoming shipments. The governor has the option to notify others in the state of the shipments provided the others agree to protect the schedule information.

8.7 (6905)
Comment - EIS001539 / 0007
Compliance with State Hazardous Materials Routing Regulations: Colorado law precludes the shipment of nuclear materials on much of I-70. The unavailability of I-70 makes Denver highways unattractive as shipping routes to Yucca Mountain.

DOE must comply with the State of Colorado's Rules and Regulations Concerning Nuclear Materials Transportation Route Designation (8CCR 1507-6). Among other requirements, these regulations preclude the shipment of nuclear materials on I-70 west of Denver, between the junction of U.S. 40 and the Colorado-Utah state line, and on I-70 east of I-25 to the junction with State Highway 2. As all shipments directed through Denver must either travel north or south before being directed west to Yucca Mountain, it will be much more effective to direct shipments to the north or south prior to entering the Denver metro area.

Response
Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway route or rail lines DOE would use. In the interim, state or Native American tribal governments may designate alternate preferred highway routes, and highways and rail lines might be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route) that reduce time in transit (see Figure 6-11). DOE identified rail lines based on current rail practices,

as there are no comparable Federal regulations applicable to the selection of rail lines for shipment of radioactive materials (see Figure 6-12).

DOE recognizes that Colorado has designated preferred routes through the state for radioactive materials in accordance with these regulations. In response to public comments, DOE has included maps of the representative highway routes and rail lines for the 45 states it used for analysis in the EIS (see Figure J-35 for the representative Colorado routes). It also included potential health and safety impacts associated with shipments for each state through which shipments could pass. Table J-75 lists the estimated number of legal-weight truck shipments of spent nuclear fuel and high-level radioactive waste that would either originate or pass through Colorado. The table also lists the estimated number of rail shipment through Colorado in the mostly rail scenario for each of the Nevada rail corridors and heavy-haul truck routes.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

8.7 (6971)
Comment - EIS001545 / 0001
But I guess a question that I have is that we have been transporting nuclear waste up to now? Correct? And we are still having hearings, yet we are still doing this. And to me, having these hearings, although they are probably beneficial in some respects, if you 're doing it already, I think we are in harm's way.

I guess I would feel that the idea of having hearings and input from the citizens should be – should come before any transportation of any nuclear waste occurs. I think we're sort of putting the cart before the horse. I don't really have anything other to say than that.

Response
In Section 2.1.2 of the EIS, the Department assumes that, for this EIS, receipt and emplacement of waste materials would begin in 2010. No material coming to the repository is expected to be shipped prior to that time so there should be opportunities for public involvement during the route selection and approval process. Almost 3000 shipments of spent nuclear fuel have been made safely in the United States over the past 30 years by many different organizations. Most of these shipments were not part of a significant Federal action requiring an Environmental Impact Statement, and, therefore, no hearings were required.

The hearings that were held on the Draft EIS for Yucca Mountain gave the public an opportunity to comment many years before the shipments are scheduled to begin. DOE has considered all comments received on the Draft EIS since August 13, 1999, as well as all comments received on the Supplement to the Draft EIS through October 19, 2001 in its development of this Final EIS. In response to comments, DOE has modified the EIS in a variety of ways, including clarifications or changes to the text, new or more recent information (such as 2000 Census data and population projections), and modified analyses (such as those for transportation impacts in which it modified the characteristics of the representative commercial spent nuclear fuel and accident source terms).

At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. The Department has issued a draft Request for Proposals requiring the Regional Servicing Contractor to prepare a transportation plan that describes the Contractor's operational strategy and delineates the steps it would implement to ensure compliance with all regulatory and other DOE requirements. This includes identification of proposed routes and associated routing considerations, coordination and communication with all participating organizations and agencies, including other Regional Servicing Contractor(s), DOE, state, Native American tribal, and local governments, and interactions with appropriate Federal and state organizations. The route and mode determinations would be interactive. If, during the course of the mode or route determinations, one of the previously determined factors changed, the site-specific mode and route analysis would be reevaluated to ensure consistency.

8.7 (7014)
Comment - EIS001600 / 0001
To give a little background, or to get the arms around the question of what I was about to address, I bothered to state a dilemma in the past in the industry. That was when we were ocean bearing nuclear waste. Brookhaven National

Laboratory loaded a barge to be unloaded outside the appropriate boundaries of the United States in water. After it was launched, the law was changed.

Considerations became political, emotional and certainly financial. The barge could not land on the coast of the United States. As a result we had nuclear waste wandering up and down the shoreline of the United States for some period of time. I forget. I know what the specific period of time was, but it was lengthy, at least a year.

This is the kind of thing when I hear a presentation that talks about transportation and reviewing since 1943 all of the shipments that occurred, it becomes very hard to focus on point. It is one instance as opposed to a statistical accumulation of data or miles, et cetera, versus risk, but it seems to me to be the keynote of the issue. The issue was what happens when things don't work correctly.

Not that they blow up, not that some more emotional issue becomes involved, but the issue becomes what happens if there is change in the political climate, the law, and an accident causes some change to occur in the protocol, and we have shipments coming into Yucca for a period of time when Yucca cannot accept it.

And then during the discourse I heard that the NRC [Nuclear Regulatory Commission] set up this protocol to recall waste from the facility, assuming it got incorrectly -- something happened at the Yucca Valley site, to make it less tentative to remain there, they could recall it, but I haven't heard anything that addressed the question of what happens if something goes wrong at Yucca while shipments are being shipped and commitments of shipments to be made, have to be made. Once again, a fait accompli is involved.

I ask, was that evaluated? Since I had asked the question once before, I had made it very specific and I was told no, that the DOE has not evaluated that. I consider it a very important administrative overview, a decision at a very high level to look at outliers and statistics, not to accumulate data and talk about 1943, look for the embarrassment that was a minor embarrassment and not a focus of the nation at the time of the Brookhaven situation, but when it translates into much further exponential amplification of shipments and the risks, that it be raised in the priorities of balance.

Meaning that we don't change the statistic and pull an outlier in to evaluate. I would urge the DOE to make such an evaluation. The response to the question was, no, we didn't.

Response

At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. The contractor providing transportation services would be required to prepare a transportation plan that would discuss the various steps it would take to ensure the shipments are conducted in a safe and efficient manner. One of the functions of this contractor would be the coordination of shipments of waste to meet the requirements of both the waste generators and the repository. Based on comments received on the Draft EIS, Appendix M was added to the EIS that summarizes transportation operations. Section M.3 provides a discussion of the protocols and procedures that would be implemented by a Regional Servicing Contractor and its subcontractors.

If, for any reason, Yucca Mountain was unable to receive shipments of waste, the shipments would be stopped, either temporarily until the problem is remedied, or permanently if the problem cannot be fixed.

The Yucca Mountain Repository provides a design and management approach that isolates wastes from the public while allowing flexibility to preserve options for modifying emplacement and retrieving the waste. This design would maintain the ability to retrieve emplaced materials for at least 100 years and possibly more than 300 years after the end of waste emplacement in the event of a decision to retrieve the waste to protect the public health and safety or the environment or to recover resources from spent nuclear fuel. Because retrieval is not anticipated, DOE did not include it as part of the Proposed Action. However, the EIS evaluates retrieval as a contingency action and describes potential impacts if it were to occur (see Section 4.2).

8.7 (7061)
Comment - EIS001337 / 0018
Lincoln County and the City [Caliente] recommended that various options for rail spur be considered within the EIS. Operational alternatives affecting transportation safety which the County and City suggested for consideration included varying maintenance schedules and standards (i.e. for roadbed, track and trains); options for coordinating train movements with Air Force overflights; train speeds; options for provision of security against sabotage or acts of terrorism; alternative locations for train maintenance and crew change facilities; the potential for and implications of allowing shared-use of the rail spur by other government agencies (i.e. Air Force) and industrial users (i.e. mining and energy); and options for ownership and operational management of the rail spur. It was recommended that each of these options should be evaluated against their contribution to risk management and regional economic benefit. The DEIS does not consider operational alternatives affecting transportation safety including varying maintenance schedules and standards (i.e. for roadbed, track and trains); options for coordinating train movements with Air Force overflights; train speeds; alternatives for provision of security against sabotage or acts of terrorism; alternative locations for train maintenance and crew change facilities; the potential for and implications of allowing shared-use of the rail spur by other government agencies (i.e. Air Force) and industrial users (i.e. mining and energy); and options for ownership and operational management of the rail spur.

Response
Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict accurately which highway routes or rail lines DOE could use. Nor is possible to provide the detailed plans suggested by the commenter, however, these elements could be considered in the future.

At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations (see Section M.3.1 of the EIS). The contractor providing transportation services would be required to prepare a transportation plan that would discuss the various steps it would take to ensure the shipments are conducted in a safe and efficient manner. DOE's draft Request for Proposal requires the contractors selected to provide transportation services must demonstrate that they have had successful experience transporting hazardous materials. The transportation contractor would be required to prepare a transportation plan that would include protocols to implement the multitude of requirements promulgated in U.S. Department of Transportation and Nuclear Regulatory Commission regulations, including land use and ownership, maintenance, scheduling, risk management, security, safety, and communications, and require consultations with responsible agencies (see Section M.3).

DOE could decide to use a dedicated train that carries only the material to be shipped to Yucca Mountain, or could elect to move the spent nuclear fuel and high-level radioactive waste in general freight. DOE continues to evaluate the safety, cost, and schedule aspects of dedicated trains, however a decision on their use has not been made at this time. If the material was shipped as general freight, the position of the spent nuclear fuel or high-level radioactive waste car in the train is regulated by 49 CFR 174.85.

DOE identified the potential for shared use of a branch rail line in Section 8.4.2 of the EIS as a reasonably foreseeable future action. This section states "DOE would have to consider these impacts [of shared use] in any decision it made to allow shared use of the branch rail line." If the site is approved, then decisions regarding ownership and shared use would be made. Line ownership, however, would not affect potential environmental impacts.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

If the Yucca Mountain site was approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

8.7 (7176)

Comment - EIS001337 / 0070

Page 2-43 Section 2.1.3.2.2, 2nd paragraph. The text here should indicate whether there will be any pre-notification of shipments given to state and local authorities and whether escorts will be used with each shipment.

Response

DOE would comply with Nuclear Regulatory Commission regulations requiring notification to the governor or the governor's designee by mail or messenger [10 CFR 73.37(f)]. Governors would notify state and local safety officials, as appropriate, of the pending shipments. Tribes would receive notification also if the Commission amended the regulation to allow such notice. In response to comments, additional information on the notification process is included in Section M.3.2.5 of the EIS.

DOE believes that a shipment of spent nuclear fuel or high-level radioactive waste is an unlikely target in part due to the physical security measures imposed by the Nuclear Regulatory Commission regulations. Under certain conditions, armed escorts either follow or ride in the truck cab or an escort railcar. Requirements for escorts can be found in 10 CFR 73.37. Other security measures include devices that shut down or immobilize the transport vehicle in case of a sabotage attempt. DOE monitors its spent nuclear fuel and high-level radioactive waste shipments through a satellite-based tracking system (see Section M.7 and M.3.2.1.5 of the EIS for additional information).

8.7 (7445)

Comment - EIS001969 / 0005

We agree with the DOE that a major accident involving a shipment of this material is of low probability with a level of general uncertainty, and therefore, is not quantified to be zero. Moving 70,OOO metric tons of high- level nuclear waste, including 50 metric tons of weapons grade materials, from sites that are almost entirely east of the Mississippi River, over a 100 year period, almost ensures that an accident will occur, sometime, somewhere. Testing has shown that conditions exist under which shipping casks can be penetrated or ruptured (page 6-33 of the EIS). It is not clear in the draft whether a head-on truck or train collisions and train derailments will produce such conditions but it is important that the final EIS address DOE's plans to contain or control such events and their impacts.

Response

The shipping casks used to transport these spent nuclear fuel and high-level radioactive waste are massive and tough with design features that comply with strict regulatory requirements that ensure the casks perform their safety functions even when damaged. Numerous tests and extensive analyses have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents. In addition, since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

With regard to the containment or control of accident events, DOE would rely on a number of actions including the training of public safety officials and the implementation of safeguards and security plans. Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training public safety officials and appropriate units of local government and tribes through whose jurisdictions DOE shipments would pass. DOE anticipates financial and technical assistance to eligible jurisdictions to begin at least 4 years before the commencement of shipments to the repository.

Concerning safeguards and security plans, DOE would comply with all requirements of 10 CFR Part 73, including preshipment planning, communications, armed escorts and tamper-indicating devices on shipping casks. Regarding shipment routes, pursuant to U.S. Department of Transportation regulations, 49 CFR 397.101 and NRC (DIRS 154766-1980), added protection would be afforded by the selection of routes which exhibit certain criteria including the likelihood of swift law enforcement response, avoidance of tactically disadvantageous locations such as long tunnels or bridges spanning heavily populated areas, and flexibility to adjust schedules to accommodate unexpected situations.

8.7 (8404)
Comment - EIS001124 / 0001
For transportation by truck are the waste package weights within the allowable range for the freeway/bridge/overpass/underpass systems of the proposed travel routes.

Response
Section 6.1.1 of the EIS describes the weights and permitting of all forms of transportation being considered by DOE. The gross vehicle weight of the truck, trailer, transportation cask, and waste for legal-weight trucks would be less than approximately 36 metric tons (40 tons or 80,000 pounds). This is the weight allowed by all states for routine truck transportation. Therefore, the weights of shipments of spent nuclear fuel and high-level radioactive waste would be within the allowable range.

8.7 (8970)
Comment - EIS002127 / 0012
Transportation issues: Why has DOE failed to address impact associated with the type of transportation vehicle and failed to provide assurances that taxpayers will not be burdened with increases to repair damaged by the project? Why is there no mention of the increased cost to Clark County or to any other location along the transportation route should there be an accident with radioactivity released into the environment?

Response
DOE could use two types of vehicles to transport spent nuclear fuel and high-level radioactive waste through Nevada to Yucca Mountain – trucks and trains. Impacts from two types of trucks were considered in the EIS. Section 6.2.3 of the EIS describes the impacts of legal-weight trucks, which would meet requirements for travel without a special weight permit. The current limit in all states is approximately 36 metric tons (40 tons or 80,000 pounds). There are thousands of comparable-weight trucks on the highways every day; DOE cannot determine how much damage to roads and bridges the relatively few shipments of spent nuclear fuel would cause. However, fees and taxes are paid by every truck that uses national or state highways. These fees and taxes are, in part, to maintain these highways.

The other type of truck is the heavy-haul truck that can have a total weight of up to 500,000 pounds. These trucks require special permits and must be operated under special requirements. DOE would pay to upgrade roads to properly handle these trucks and would support maintenance of the roads. The tracks on which trains operate are the private property of the railroads; therefore, taxpayers have no responsibility for their maintenance or repair.

In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments (DIRS 154814-Sandquist et al. 1985), and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $9.4 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 included data compiled from case studies involving actual cleanup of radioactive materials contamination. The studies address consequences for releases of radioactive materials in communities.

Although the studies project high costs for cleanup following severe accidents, the accidents evaluated would be very unlikely and, as a consequence, DOE believes the economic risks of transportation accidents are very small. The shipping casks used to transport spent nuclear fuel and high-level radioactive waste are massive and tough with design features that comply with strict regulatory requirements that ensure the casks perform their safety functions even when damaged. Furthermore, the high-level radioactive waste would be in a solid form that would not be easily dispersed (ceramics, metals, or glasses).

Numerous tests and extensive analyses, using the most advanced analytical methods available, have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents. Since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

The economic costs of accidents where there was no release of radioactive material would not be expected to be substantial. The health and safety consequences of a maximum reasonably foreseeable transportation accident are discussed in Section 6.2.4.2 of the EIS. The EIS analysis did not include the restorative effects of postaccident recovery, remediation, or cleanup in estimating the health and safety impacts, and would therefore tend to overestimate, rather than underestimate, actual radiological impacts.

The Price-Anderson Act establishes a system of financial protection (compensation for personal injury and property damage, including loss of use of property) for the public in a nuclear accident, regardless of who causes the damage. See Section M.8 of the EIS for a discussion of the Price-Anderson Act. The Price-Anderson Act would indemnify any person held liable for damage including cleanup of released radioactive materials. Persons indemnified would include DOE contractors, subcontractors, suppliers, state, local or tribal governments, emergency response workers, health care workers, other workers, victims and other citizens who might be held liable.

8.7 (9033)
Comment - EIS001290 / 0003
The League of Women Voters of Ohio has adopted the position that hazardous materials should be handled in a responsible manner, in the following order of priority:

a. strict enforcement of container regulation;
b. mandatory reporting to state and local authorities of spills of reportable quantities, including those involving intra-state carriers;
c. strict enforcement of placarding, labeling, and documenting requirements;
d. permits for trucking companies carrying hazardous materials with ability to suspend or revoke such permits;
e. routing requirements for certain selected extremely hazardous materials, including:
    1) the specification and/or the disapproval of some routes for some shipments,
    2) requirements for an escort for some shipments, and
    3) prenotification for some shipments
f. state regulated training for drivers and loaders;
g. collection, coordination, and analysis of data.

Response
Transportation of hazardous materials in the United States is a very highly regulated activity, and transportation to a repository would be conducted under the umbrella of these regulations with oversight, as applicable, of various local, tribal, state, and Federal agencies. This would ensure that all shipments would be made safely (see Section M.2 of the EIS). Section 2.1.3.2 states that DOE would comply with all applicable regulations of the U.S. Department of Transportation and the Nuclear Regulatory Commission, as well as applicable state and local regulations.

Because of the public's interest in transportation in general, the Department has included a new Appendix M in this EIS. Appendix M provides general background information about transportation-related topics, such as transportation operations, cask testing requirements, and emergency response.

All of the items in the comment will be considered in the design of the transportation system. Specifically,

- The NWPA requires that DOE use casks certified by the Nuclear Regulatory Commission when transporting spent nuclear fuel and high-level radioactive waste to a repository. The Commission certifies that a cask meets the requirements of 10 CFR Part 71, which prescribes radiological performance standards for test conditions that represent the kinds of forces that a cask would encounter in a severe transportation accident (see Section M.4).

- DOE would comply with all Federal and applicable state, local, and tribal reporting requirements for incidents involving shipments of nuclear waste (see Section M.2).

- All U.S. Department of Transportation (49 CFR Part 172) and Nuclear Regulatory Commission requirements (10 CFR Part 71) for placarding, labeling, and documentation would be followed (see Section M.2.2).

- At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. Section M.3 contains more information on the operational procedures and protocols DOE would use if the Yucca Mountain site received approval. Section M.3.1 contains more detail on the proposed role of the Regional Servicing Contractor.

- U.S. Department of Transportation routing regulations (49 CFR Part 397), which require all of the items in the comment, would be followed by DOE with approval of routes by the Nuclear Regulatory Commission. DOE would comply with physical security regulation promulgated by the Commission in 10 CFR Part 73 (see Sections M.3.2.1.2 and M.7.

- Drivers and other crew would be trained in accordance with Federal requirements (49 CFR Part 172) (see Section M.2.2.6. However, it would not be possible to allow state regulation because of the interstate nature of the shipments.

- Data on all shipments would be collected and analyzed so that the experience could be used to improve shipping practices.

8.7 (9598)
Comment - EIS001888 / 0272
Waste Form and Waste Acceptance

There is no discussion of waste acceptance procedures and waste form and acceptance at the generator site. In previous discussions, the DOE made waste acceptance one of its critical system components, yet the DEIS does not address either the risks of generator-site waste handling or the procedures necessary to transfer waste from the DOE or generator to the waste carrier. Experience with DOE has made decontamination and decommissioning contractors wary of the DOE. It is likely that companies contracted to handle and manage the waste at the generator sites will be reluctant to do so without specific guarantees and careful compliance standards. Important questions are not addressed: Who is responsible for ensuring the waste is in the proper form? How will the waste be transferred to the RSC carrier for shipping? What are the handling procedures? Will there be similar handling procedures at each intermodal site? Are handling procedures going to be standardized? When? There are numerous important concerns with waste handling, none of them are addressed by the DEIS. The DEIS must address the issue of waste acceptance and waste form both at the generating site and at the acceptance site.

Response
Section 6.2.2 of the EIS addresses potential impacts from loading spent nuclear fuel and high-level radioactive waste in transportation casks and on to transportation vehicles at the 72 commercial and 5 DOE sites. Chapter 4 addresses impacts from unloading operations at the repository. Preparation of spent nuclear fuel at commercial sites is controlled by provisions of the Standard Contract that DOE has with each generator.

At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations (see Section M.3.1 of the EIS). The contractor providing transportation services would be required to prepare a transportation plan that would discuss the various steps it would take to ensure the shipments are conducted in a safe and efficient manner. The specific processes and protocols for accepting and transferring the spent nuclear fuel to transportation vehicles are the responsibility of the Regional Servicing Contractor. The contractor would develop specific conditions, schedules, and operations with generators and other responsible agencies prior to any shipping activities. These plans would be reviewed and approved by DOE. Similar and compatible processes and protocols would be specified for intermodal operations, if required, and at the repository acceptance facility.

8.7 (9770)
Comment - EIS001888 / 0356
[Clark County summary of comments it has received from the public.]

Commenters requested that the EIS justify the selection of the alternatives, and that the alternatives and options be sufficiently defined to comprehensively describe the affected environment, and to allow an equivalent analysis (between alternatives) of potential positive and negative impacts to human health and the environment (e.g., groundwater, air, socioeconomics) from routine operations and accidents during construction, operation, and closure. The types of detail identified include: (11) agency responsibilities for transportation and accident/emergency response.

Response
Section J.3 of the EIS describes the selection criteria for identifying route and modes for implementing alternatives for Nevada transportation. The various references in this section provide the data and information for making the selections. Specific references include:

- DIRS 104737-YMP 1997, *Location of Alternate Heavy-Haul Routes and Future Las Vegas Beltway*
- DIRS 104743-YMP 1998, *Nevada Routes for Legal-Weight Truck Shipments of SNF and HLW to Yucca Mountain*
- DIRS 104560-YMP 1998, *Potential Rail Alignments*
- DIRS 103718-DOT 1998, *Final Report, Identification of Factors for Selecting Modes and Routes for Shipping High-Level Radioactive Waste and Spent Nuclear Fuel*

Several other references of Section J.3 of the EIS describe engineering characteristics and environmental characteristics of alternative routes. Selected implementing alternatives are described in detail in Section J.3 for heavy-haul truck and rail implementing alternatives (those alternatives that would require new or modified corridors or alignments. Each candidate route is described by a dozen pertinent environmental characteristics including ground water, air, and socioeconomic impacts.

The U.S. Department of Transportation and the Nuclear Regulatory Commission share responsibilities for the regulation of the transportation of spent nuclear fuel and high-level radioactive waste. The shipper and the carrier have the responsibility to obey the regulations of the Department of Transportation and the Nuclear Regulatory Commission, including safety and physical security. The regulations governing transportation of radioactive materials implemented by these agencies are consistent with international transport safety standards.

The Hazardous Materials Transportation Act of 1975, as amended in 1994, directed the U.S. Department of Transportation to develop transportation safety standards for hazardous materials, including radioactive materials (see Title 49 of the Code of Federal Regulations). These regulations set the standards for packaging, transporting, and handling radioactive materials for all modes of transportation. Standards for labeling, shipping papers, placarding, loading, and unloading, allowable radiation levels, and limits for contamination of packages and vehicles, among other requirements, are included in the regulations. The regulations specify training needed for personnel who perform handling and transport of hazardous materials, liability insurance requirements for carriers, and safety requirements for vehicles and transport operations.

The Nuclear Regulatory Commission regulates the packaging and transportation related operations of its licensees, including commercial shippers of radioactive materials. It sets design and performance standards for packagings (shipping casks) that carry materials with higher levels of radioactivity. In addition, The Commission establishes safeguards and security regulations to minimize the possibility of theft, diversion, or attack on shipments of spent nuclear fuel and special nuclear materials. These requirements are detailed in Title 10 of the Code of Federal Regulations. As required by the NWPA [Section 180(c)], all shipments to Yucca Mountain would be made in Nuclear Regulatory Commission-certified packages and in accordance with Commission regulations regarding advanced notification of state governments.

The primary responsibility for emergency response lies with the local law enforcement agency of the jurisdiction in which the emergency occurs (see additional information on emergency response in Section M.5 of the EIS). DOE and its Regional Servicing Contractors would be available to provide assistance and technical information about the shipment (see additional information on procedures and protocols in Section M.3). DOE would have furnished technical and financial assistance in accordance with Section 180(c) of the NWPA for the training of public safety officials in procedures for safe routine transportation and for emergency response procedures (see additional information in Section M.6).

8.7 (9902)
Comment - EIS001888 / 0448
[Clark County summary of comments it has received from the public.]

Internet and hard copy annual reports to include identification of carriers, sources & destinations of each shipment, number and volume of shipments for, each substance, routes, incident/accidents and mitigative actions, evaluation of each ship shipment.

Response
As described in Section M.3.2.1.6 of the EIS, DOE Regional Servicing Contractors would provide reports with detailed information on each shipment. The information in the reports would be available to the public in a timely manner. The exact form and content of such reports have not been determined.

8.7 (10448)
Comment - EIS001567 / 0001
As you've heard tonight in the presentation, there are still a lot of questions; technical, legal, and political questions that have to be resolved and at this point in time it's not even a certainty that these movements will actually take place. The Commission's position on this is very simple. The Commission's believes that if these shipments are to be made at all, then it is critical that these shipments be made in the very safest manner possible to protect the citizens of Ohio.

Given the uncertain state of affairs, it's very difficult to get into a lot of detail and respond in detail. But there are a few general points that I think needs to be made. First of all the Commission is going to have three primary responsibilities with respect to this activity. The first of these is that we're going to be responsible for ensuring that these shipments are made in compliance with all the existing federal motor carrier safety regulations for motor carriers, the railroad safety regulations and also the hazardous material safety regulations that cover both modes of transportation.

As the agency that is responsible for supervising both of those modes of transportation that would be foreseeably used in this activity, we have experienced personnel and we have an active program that is involved in inspecting at roadside locations, track locations and other facilities of these carriers.

The second major component of our work is that we must ensure that the routes that are going to be used minimize the potential risk to the public and the environment. And we have begun on that task already. We, this fall, presented a grant to the Ohio State University to begin preliminary work as to how to attack the problem, how to analyze these possible routes, the factors to be looked at and other public policy considerations that should go into that. We intend to, eventually at the appropriate time, involve the local communities in this process. And, I would just comment in that regard as far as the routing itself, that the Commission is going to follow two principles in carrying out it's responsibilities.

The first is that we will insist on an involvement of all the local communities that are involved in a routing decision and we will not leave a community out in helping us to arrive at that decision. The kind of the flip side of that is, we will also not permit a route to be established merely to export the risk into a neighboring community and we will insist that whatever routes are finally designed, are those that minimize the total risk and exposure in the movement.

The final component of this is the fact that we intend to work with the local communities on emergency response. We have funding programs to help local communities to train their emergency responders. We work with the Cleveland State University in [its] HAZMAT [hazardous materials] program and we will continue to fund these efforts and ensure that all local communities have the necessary training for their response efforts.

The final point that I would make is, that it is our intention and our expectation that the DOE will not only provide adequate funding to assist us in this effort, but they will also complete their work and give us sufficient time to put that training in place and to ensure that these movements are made in a safe manner.

Response
DOE agrees with the objectives of the Ohio Public Utilities Commission and looks forward to the Commission's cooperation in assuring the safety of spent nuclear fuel and high-level radioactive waste shipments through Ohio. Based on the results of the impact analyses presented in Chapter 6 and Appendix J of the EIS, as well as the results published in numerous other studies and environmental impact analyses cited in the EIS, DOE is confident that spent nuclear fuel and high-level radioactive waste can be and would be safely transported to Yucca Mountain. DOE believes, as the EIS reports that the potential impacts of this transportation would be so low for individuals who live and work along the routes that these individual impacts would not be discernible even if the corresponding doses could be measured.

In Section 2.1.3.2 of the EIS, DOE states that the transportation of spent nuclear fuel and high-level radioactive waste to the proposed repository at Yucca Mountain would comply with applicable regulations of the U.S. Department of Transportation and the Nuclear Regulatory Commission, as well as applicable state and local regulations. Strict compliance with all applicable safety regulations is a fundamental element in ensuring the safety of the shipments. DOE would cooperate with the Commission in the enforcement of these regulations.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began. DOE would select highway routes in accordance with U.S. Department of Transportation regulations in 10 CFR 397.101. If the State of Ohio has designated alternate routes in accordance with 10 CFR 397.103, DOE would include these alternate routes in the selection process.

At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. The Department has issued a draft Request for Proposals requiring the Regional Servicing Contractor to prepare a transportation plan that describes the Contractor's operational strategy and delineates the steps it would implement to ensure compliance with all regulatory and other DOE requirements. This includes identification of proposed routes and associated routing considerations, coordination and communication with all participating organizations and agencies, including other Regional Servicing Contractor(s), DOE, state, tribal, and local governments, and interactions with appropriate Federal and state organizations (see Section M.3 of the EIS). The route and mode determinations would be interactive. If, during the course of the mode or route determinations, one of the previously determined factors changed, the site-specific mode and route analysis would be reevaluated to ensure consistency.

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using an up-front planning grant and based on availability of funds in annual Program budgets specified by Congress. The schedule in the proposed policy and procedures (63 *FR* 23753, April 30, 1998) for implementation of Section 180(c) of the NWPA is designed to provide adequate time for training of first responders in advance of the first shipments. Should a decision to proceed with the development of a repository at Yucca Mountain be made, Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. See Section M.6 of the EIS for a discussion of the DOE Section 180(c) Policy and Procedures.

8.7 (10904)
Comment - EIS000357 / 0023
What are the impacts of this increase of traffic on the tourism trade? Particularly, when would shipments be made? Would there be an effort for shipments to occur during low-season traffic times? Has the changing demographics of Snow Birds been taken into account? What are the attitudes of Snow Birds to this additional traffic? Would shipments be scheduled during low-traffic or high-traffic hours? Being moved at night or during the day?

Response
See Table J-1 of the EIS for estimated numbers of shipments for the various inventory and national transportation analysis combinations. In response to public comments, DOE has included maps of the representative highway routes and rail lines for the 45 states it used for analysis in the EIS (see Section J.4). Section J.4 includes potential health and safety impacts associated with shipments for each state through which shipments could pass. For the Proposed Action, the estimated number of truck shipments under the mostly legal-weight scenario would be 52,786, with 300 rail shipments, and under the mostly rail scenario there would be an estimated 9,646 rail shipments plus 1,079 legal-weight truck shipments. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

In response to these and other public comments, DOE has added information on proposed transportation activities to the EIS (see Appendix M). Appendix M includes additional information on the regulations that govern spent nuclear fuel and high-level radioactive waste transportation, the proposed process that DOE would use to acquire commercial transportation services, and the expected operational details and protocols DOE would follow if the Yucca Mountain site was approved (see Sections M.2 and M.3).

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Section 2.5.4 and Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. In addition, DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty

- Much of the uncertainty is irreducible, and

- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

8.7 (11192)
Comment - EIS001557 / 0003
The second item that we are going to being focusing on is the routes that are going to be used to make sure that those are the safest possible routes that minimize the potential risk to the public. That is, as a part of our role as the designated routing agency for the State of Ohio that would be involved with the local communities and to ensure that all voices are heard and all concerns are considered in this area in the fine tuning of how these shipments will be made.

We've taken some first initial step in that regard to start gathering the data and gathering the processes to logically follow in that area. This fall the [Public Utility] Commission [of Ohio] granted a -- issued a grant, I should say, to the Ohio State University to begin this process of examining potential routes and examining issues that need to be considered in making a proper evaluation. And at the appropriate time that can be used to involve the local communities and the local emergency planners.

Response
DOE supports the process being followed by the Ohio Public Utility Commission to evaluate potential routes for the shipment of nuclear waste. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict accurately which highway routes or rail lines DOE could use. Before such shipments began, state governments could designate alternate preferred highway shipping routes, and highways and rail lines could be built or modified.

At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. The Department has issued a draft Request for Proposals requiring the Regional Servicing Contractor to prepare a transportation plan that describes the Contractor's operational strategy and delineates the steps it would implement to ensure compliance with all regulatory and other DOE requirements. This includes identification of proposed routes and associated routing considerations, coordination and communication with all participating organizations and agencies, including other Regional Servicing Contractor(s), DOE, state, tribal, and local governments, and interactions with appropriate Federal and state organizations (see Section M.3.2.1.2 of the EIS). The route and mode determinations would be interactive. If, during the course of the mode or route determinations, one of the previously determined factors changed, the site-specific mode and route analysis would be reevaluated to ensure consistency.

8.7 (11504)
Comment - EIS002137 / 0005
DOE needs to address impact mitigation, environmental, socioeconomic, transportation. Transportation. We all know about transportation in all of our communities. Anybody that's looked at a Nevada map knows all the mountain ranges run north and south. There aren't a hell of a lot of routes left. This is where we're at. I think the DOE, the people involved ought to provide more moneys to the rural counties for oversight and impact studies.

Response
Section 6.3 of the EIS addresses transportation impacts in Nevada for the proposed action and. Section J.3 provides additional information on methods and data used. Section 9.3 lists potential management actions that could be implemented to mitigate transportation impacts.

DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

If the Yucca Mountain site was approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

8.7 (11909)

Comment - EIS000996 / 0004

If after this testimony and in due process of consideration, the Department of Energy decides to go ahead with the relocation process, my recommendation is to consider the safety issues associated with the transportation of radioactive materials. Create a road safety department, which evaluates and approves each shipment timetable and safety associated with road conditions, weather conditions, accounting for traffic congestion and vacation travel. Further, consideration should be made for the safest movement through the least populated areas.

However, wherever shipments going from point A to point B, they are more likely to fall within the Mississippi River drainage system and will most definitely affect billions of lives at some level of our living continuation.

Response

Although there are no plans to create a road safety department, all of the factors listed by the commenter will be considered and evaluated by DOE in planning for shipments to the proposed repository. At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. The Regional Servicing Contractor would be required to provide detailed written procedures for how it would respond to an incident and arrange for repair/replacement of equipment or recovery, as appropriate. In accordance with ANSI N14-27 (DIRS 156289-ANSI 1987), the carrier is expected to provide appropriate resources for dealing with the consequences of an accident, isolating and cleaning up contamination, and maintaining working contact with the responsible governmental authority until the latter has declared the incident to be satisfactorily resolved and closed. Section M.3 of the EIS contains more detail on the proposed role of the Regional Servicing Contractor.

The shipping casks used to transport these spent nuclear fuel and high-level radioactive waste are massive and tough with design features that comply with strict regulatory requirements that ensure the casks perform their safety functions even when damaged. Numerous tests and extensive analyses have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents. In addition, since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

8.7 (11977)

Comment - EIS001923 / 0005

Maybe if the insurance liabilities limits were removed and the power companies forced to carry insurance that would cover an accident like I projected, the power companies and the Congress people in support of this project wouldn't be so positive. We have seen how well in the past oil tankers have been operated to protect the environment. There is absolutely no assurance from this poorly written DEIS that the DOE can plausible show how a terrorist attack using state of the art weapons will not cause a major disaster in an area like the Inland Empire.

Response

Although DOE anticipates accidents would occur in transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain, it does not anticipate that an accident would lead to a release of radioactive materials from a shipping cask. Nonetheless, the Price-Anderson Act provides for indemnification of liability up to $9.43 billion to cover claims that might arise from an accident in which radioactive materials were released or one in which an authorized precautionary evacuation was made (see Section M.8 of the EIS for a more complete discussion of the Price-Anderson Act). If the damage from a nuclear incident appears likely to exceed that amount, the Price-Anderson Act contains a congressional commitment to thoroughly review the particular incident and take whatever action is determined necessary to provide full and prompt compensation to the public.

For the Final EIS, DOE reexamined, for both rail and truck casks, the consequences of an attack that results in a release of material (in other words, the cask's shield wall is penetrated)(see Section 6.2.4.2.3 of the EIS), and estimated consequences exceeded those presented in the Draft EIS. Differences in the consequences between the Draft EIS and the Final EIS are due to using "representative" spent nuclear fuel isotopics (verses "typical" in the Draft EIS) and an escalation of impacts to represent population growth to 2035. In addition, in the Draft EIS, the consequences of the sabotage event were bounded by those of the maximum reasonably foreseeable accident. However, the Final EIS analyses estimated that a sabotage event could cause 48 latent cancer fatalities if a legal-weight truck cask was penetrated and 9 latent cancer fatalities for a rail cask. DOE believes that a shipment of spent nuclear fuel or high-level radioactive waste is an unlikely target in part due to the physical security measures imposed by the Nuclear Regulatory Commission regulations. Under certain conditions, armed escorts either follow or ride in the truck cab or an escort railcar. DOE monitors its spent nuclear fuel and high-level radioactive waste shipments through a satellite-based tracking system.

8.7 (12137)
Comment - EIS001887 / 0439
The EIS did not assess the costs of severe accidents when assessing the transportation costs involved in the Yucca Mountain Project. In order to aid in the adequate preparation for potential accidents, an estimate of the true cost of remedying such an accident is essential. This assessment must include, but is not limited to, the following: emergency costs, surface cleanup costs, decontamination costs (of roadways, buildings, groundwater, surface water, etc.), hospital costs to injured parties, lost workdays due to building contamination, economic losses due to fear of contamination, loss of tourism (e.g., in the event of an accident in Las Vegas), evacuation costs, relocation costs, contaminated food embargo costs, insurance costs, legal costs, governmental costs, and so forth.

Response
In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments (DIRS 154814-Sandquist et al. 1985), and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $9.4 billion. Cost data used in the studies, reviewed in Section J.1.4.2.5, included data compiled from case studies involving actual cleanup of radioactive materials contamination. The studies address consequences for releases of radioactive materials in communities.

Although the studies project high costs for cleanup following severe accidents, the accidents evaluated would be very unlikely and, as a consequence, DOE believes the economic risks of transportation accidents are very small. The shipping casks used to transport spent nuclear fuel and high-level radioactive waste are massive and tough with design features that comply with strict regulatory requirements that ensure the casks perform their safety functions even when damaged. Furthermore, the high-level radioactive waste would be in a solid form that would not be easily dispersed (ceramics, metals, or glasses).

Numerous tests and extensive analyses, using the most advanced analytical methods available, have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents. Since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

The economic costs of accidents where there was no release of radioactive material would not be expected to be substantial. The health and safety consequences of a maximum reasonably foreseeable transportation accident are discussed in Section 6.2.4.2 of the EIS. The EIS analysis did not include the restorative effects of postaccident recovery, remediation, or cleanup in estimating the health and safety impacts, and would therefore tend to overestimate, rather than underestimate, actual radiological impacts.

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Section 2.5.4 and Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. In addition, DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty

- Much of the uncertainty is irreducible, and

- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

8.7 (12185)
Comment - EIS000707 / 0002
The truck transportation route involves a number of different states.

These trucks will be parked overnight at some motel, what provisions are being made to ensure that no one will be able to tamper with the trailers carrying the nuclear waste? Who is responsible for the cost of upgrades for these highways? Who will incur the cost of damage done to roads and bridges?

Response
Regulations of the Nuclear Regulatory Commission [10 CFR 73.37 (b)] require a physical protection system that, among other things, must provide at least one escort with visual surveillance of the shipment when the vehicle is stopped. In addition, shipment planning must avoid scheduled intermediate stops to the extent practicable. The trucks would have sleeper berths, so overnight parking at motels would not be necessary. In addition, any time a truck stopped for any reason, it would be under continuous visual surveillance.

At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. DOE would ensure that its contractors providing transportation services for the repository abide by all applicable regulations at the time of transport. The transportation contractor would be required to prepare a transportation plan that would include proposed routes and other information such as safe, en route emergency parking areas and other planned stops. DOE would make the plan available to states and tribes for comment before the shipments take place. The carrier would be able to communicate to its dispatch center and others through various means of communication, including the satellite-based tracking system. This would enable the carrier to communicate problems even in remote areas (see Section M.3).

With the exception of the heavy-haul truck scenario, the shipments would use vehicles (trucks, railcars, and barges) similar in weight, size, and operation to vehicles that transport other commodities. As a result, potential impacts on transportation infrastructure (infrastructure typically includes bridges, roadways, railroad track, switchyards, locks, navigation aids, etc.) of a vehicle used in transporting spent nuclear fuel and high-level radioactive waste across the United States would be similar to the impacts of other commercial vehicles that use the nation's transportation systems. Because there would be few vehicles transporting spent nuclear fuel and high-level radioactive waste in comparison to other vehicles using the transportation system, the impacts on transportation infrastructure of shipments to Yucca Mountain would not be discernible. In addition, because the annual number of shipments that would be made to Yucca Mountain is less than 0.001 percent of the more than 300 million annual shipments of hazardous materials in the United States, impacts on state, local, and Native American tribal law enforcement and emergency response resources would be small.

As discussed in Section 6.3.3 of the EIS, heavy-haul truck transport in Nevada could affect transportation on roads in the State. As discussed in that section, Nevada highways along a route, including roads, bridges and culverts, would be upgraded for heavy-haul truck use, if DOE selected heavy-haul truck transport. Upgrades would include reconstruction of some highway sections, especially in areas where spring and fall thaws and freezes make highways susceptible to damage by heavy vehicles. In addition, new turnout lanes at frequent intervals along two-lane highways would be constructed to allow other traffic to pass the slower heavy-haul vehicles. The location and frequency of turnouts would be determined in consultation with State and tribal jurisdictions s after a specific route was selected. Highway shoulders would be widened and road surfaces would be improved in many areas. Section 6.3.3.1 discusses impacts heavy-haul trucks would have on the flow of traffic on roads in Nevada.

8.7 (12465)
Comment - EIS000497 / 0022
In order to develop a safe and effective system for accepting commercial spent nuclear fuel and high-level radioactive waste (HLW), the federal government must expand its focus beyond siting, and develop, in coordination with the states and tribes, a logical and timely transportation program. This requires DOE policy commitments to:

a. fix the shipping origins and destination points as early as possible;

b. ensure the availability of rail and truck shipping casks;

c. conduct full-scale testing of casks to be used to transport spent nuclear fuel and high-level radioactive waste;

d. prepare a comprehensive transportation plan that includes the analysis of all needed transport-safety activities

e. develop responsible criteria for selecting shipping routes; and

f. develop a sound methodology for evaluating optional mixes of routes, and transportation modes.

Response
DOE agrees that detailed, comprehensive planning would be required prior to the start of shipments to a repository. The level of planning suggested by the commenter would be more appropriate once a repository site had been selected and approved.

At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. Sections M.2 and M.3 of the EIS contain more information on routing regulations and operational procedures and protocols DOE would use if the Yucca Mountain site received approval. Section M.3 also contains more detail on the proposed role of the Regional Servicing Contractor. Operational protocols for transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain are presented in the Draft Request for Proposal for the *Acquisition of Waste Acceptance and Transportation Services for the Office of Civilian Radioactive Waste Management* (DIRS 153487-DOE 1998). These protocols were adopted from the *Waste Isolation Pilot Plant Transportation Safety Program Implementation Guide* (DIRS 156384-WGA 1995). The Department expects to interact with all affected stakeholders on routing and related local issues as transportation plans develop.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this point in time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway routes or rail lines could be used. In the interim, state or trbal governments may designate alternate preferred highway routes, and highways and rail lines could be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate) that reduce time in transit. DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for the shipment of radioactive materials.

The NWPA requires DOE to use casks certified by the Nuclear Regulatory Commission when transporting spent nuclear fuel and high-level radioactive waste to a repository. The Commission's certification regulations indicate that cask testing must represent the kinds of forces that a cask would encounter in a severe transportation accident. A cask's ability to survive the tests prescribed by the regulations (10 CFR Part 71) can be demonstrated either through component analysis or through scale-model and full-scale testing to demonstrate and confirm the performance of the casks. The Nuclear Regulatory Commission would decide which level of physical testing or analysis was appropriate for each cask design submitted. Section M.4 of the EIS contains additional information of cask safety and testing.

DOE submitted a plan to the House Committee on Appropriation on the Energy and Water Development Act, 2001 entitled *Plan for Transportation Cask Fabrication and the Deployment of Waste Acceptance* Capabilities (DIRS 156802-DOE 2001). The plan provides, in part, the DOE strategy for the timely fabrication of transportation casks. In this report, DOE concluded that current industry performance has shown that manufacturing capacity is available to meet present and future cask fabrication needs.

DOE believes that the mostly rail scenario, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. In reaching this conclusion, DOE considered the capabilities of the sites to handle larger (rail) casks, the distances to suitable railheads, and historic experience in actual shipments of nuclear fuel, waste or other large reactor-related components. DOE also considered relevant information published by sources such as the Nuclear Energy Institute and the State of Nevada. In addition, DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

Nonetheless, in response to comments, DOE has analyzed the effects of different mixes of rail and truck shipments (see Section J.1.2.1.4 of the EIS). The results of this analysis confirm DOE's estimate that the mostly rail and mostly legal-weight truck scenarios represent a reasonable range (lower and upper bound) of potential environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste.

8.7 (12658)
Comment - EIS002250 / 0004
If the nuclear energy is so safe, why did Congress place limits on liability for the nuclear industry? So, therefore, they could not be sued to a higher level for damages.

Maybe if the insurance liability limits are removed and the power companies are forced to carry insurance that would cover an accident like I projected, that power companies and Congress people support, other projects wouldn't be so positive.

We have seen how well in the past oil tankers have been operated to protect the environment. There is absolutely no assurance from this poorly written EIS that the DOE can plausibly show how a terrorist attack will not cause a major disaster in an area like the Inland Empire.

Response
Although DOE anticipates accidents would occur in transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain, it does not anticipate that an accident would lead to a release of radioactive materials from a shipping cask. Nonetheless, the Price-Anderson Act provides for indemnification of liability up to $9.43 billion to cover claims that might arise from an accident in which radioactive materials were released or one in which an authorized precautionary evacuation was made (see Section M.8 of the EIS for a more complete discussion of the Price-Anderson Act). If the damage from a nuclear incident appears likely to exceed that amount, the Price-Anderson Act contains a congressional commitment to thoroughly review the particular incident and take whatever action is determined necessary to provide full and prompt compensation to the public.

Nuclear Regulatory Commission (10 CFR Part 73) and U.S. Department of Transportation (49 CFR Part 173) regulations both include requirements to ensure the physical security and protection of shipments from diversion and attack. For the Final EIS, DOE reexamined, for both rail and truck casks, the consequences of an attack that results in a release of material (in other words, the cask's shield wall is penetrated)(see Section 6.2.4.2.3 of the EIS), and estimated consequences exceeded those presented in the Draft EIS. Differences in the consequences between the Draft EIS and the Final EIS are due to using "representative" spent nuclear fuel isotopics (verses "typical" in the Draft EIS) and an escalation of impacts to represent population growth to 2035. In addition, in the Draft EIS, the consequences of the sabotage event were bounded by those of the maximum reasonably foreseeable accident.

In the Final EIS, DOE estimated that the greatest consequences would occur if the sabotage event occurred in the center of a highly populated metropolitan area. The dose from such an event to a maximally exposed individual (about 110 rem over the person's lifetime) would increase his or her lifetime risk of a fatal cancer from about 23 percent to about 28 percent. However, doses to most affected individuals would be much lower than that to the maximally exposed individual; these individuals' increased risk of a latent fatal cancer would also be lower. It was not predicted that there would be any prompt fatalities from very high levels of exposure, and immediate health consequences from radiation exposure would be unlikely, but by combining the large number of small individual risks in the population of a metropolitan area, DOE estimated that a sabotage event could lead to as many as 48 latent fatal cancers. Although not estimated in the analysis, injuries and deaths from blast effects of a device that might be used would be expected for individuals who would be as close to the event as the hypothesized maximally exposed individual. However, exposure to radioactive materials sufficient to lead to an individual lifetime dose of 110 rem could result in a need for medical attention. DOE designed the analyses to identify the maximum consequences that a severe accident that could reasonably be expected to produce (reasonably expected is defined as a likelihood greater than, but on the order of, 1 in 10 million in a year), but the analysis here did not make extreme assumptions that would identify the worst possible consequences that could be imagined.

DOE believes that a shipment of spent nuclear fuel or high-level radioactive waste would be an unlikely target in part due to the physical security measures imposed by the Nuclear Regulatory Commission regulations. Under certain conditions, armed escorts would either follow or ride in the truck cab or an escort railcar. DOE would monitor its spent nuclear fuel and high-level radioactive waste shipments through a satellite-based tracking system. Additional information on the physical protection of spent nuclear fuel and high-level radioactive waste during transportation can be found in Section M.7 of the EIS.

8.8 Transportation Analyses

8.8 (4383)
Comment - EIS001523 / 0002
The Yucca Mountain Repository Site should not be approved since a safe method for transportation of nuclear waste materials to the site has not been determined. In the Environmental Impact Statement (EIS), the DOE has not accurately assessed the potential risk of the proposed transportation methods of either rail or highway. Several factors that must be reconsidered and reevaluated are the frequency and severity of accidents, proposed population growth in the areas near the transportation routes, and a recent increase in traffic speeds. The potential environmental impact resulting from the transportation of waste to the site have also been underestimated in this statement due to incomplete and outdated data. The DOE needs to conduct more accurate and complete studies in order to formulate a more complete assessment of the potential risks.

Response
The Nuclear Regulatory Commission has determined that the transportation of radioactive materials is safe if the shippers follow Commission and U.S. Department of Transportation requirements. The history of radioactive material transport in this country has proven this to be correct. Future shipments would occur under the same regulations that have contributed to the safe transport of more than 2,700 shipments in this country over the last 30 years. The accident analysis includes estimates of the number of accidents that could occur during shipments, estimates of the radiological risk of transportation accidents for populations along transportation routes, and a description of the consequences of maximum reasonably foreseeable transportation accidents. The maximum reasonably foreseeable accidents have an estimated frequency of occurrence of about 2.8 per 10 million years for rail shipments under the mostly rail scenario analyzed in the EIS and 2.4 per 10 million years for the mostly

legal-weight truck scenario. DOE based its estimates of accident risks and consequences of maximum reasonably foreseeable accidents on data presented in a report issued by the U.S. Nuclear Regulatory Commission (Sprung, et al., 2000). The accident analysis in the EIS addresses accidents from all sources including long duration fires, high-speed impacts, airplane crashes, and mountain rollovers. Appendix J of the EIS provides additional detailed descriptions of the analyses. The analysis used the latest reasonably available data and methods as well as cautious but realistic assumptions. For example, DOE used forecasts of population growth to estimate populations along routes. For purposes of analysis, DOE used populations forecasted to 2035 in estimating impacts. In addition, in response to public comments, DOE has added information to, and improved the clarity of transportation sections in Chapter 6 and Appendix J. The additional information includes more specific data on along-route populations as well as additional information used in analyzing potential impacts on biological resources, land use, soils, aesthetics, cultural resources, noise, ground vibration, flood plains, wetlands, air quality, environmental justice, waste management, and socioeconomics.

8.8 (4833)
Comment - EIS001226 / 0007
Locally, Illinois is expected to receive the third largest number of shipments as many as 13,000 over the next 30 years, or an average of 8 per week, every week, for 30 years, all requiring costly escort services.

Response
As presented in Section J.4 of the EIS, the number of legal-weight truck shipments through Illinois used by DOE to estimate impacts is about 38,500. About 5,300 would originate in the State. Illinois presently charges a fee of $2,500 per cask for truck shipments and a fee of $4,500 for the first cask and $3,000 for each additional cask for train shipments. Presumably, these fees adequately cover the costs of the current Illinois inspection and escort program. Should the repository transportation program go forward, DOE would consult with affected states on activities and fees appropriate at the time.

8.8 (12091)
Comment - EIS002307 / 0005
Section 6 of the DEIS is incorrect in its analysis of transportation safety because the DEIS users average weather conditions rather than conditions that would produce the greatest effects.

Response
The objective of the analyses in the EIS is to produce realistic yet conservative estimates of risks, not the largest possible estimates of risks as suggested by the commenter. The analysis provided in Section 6.2.4 of the EIS uses cautious assumptions and the latest reasonably available methods and data to provide conservative estimates of the potential radiological consequences of severe accidents and successful sabotage attacks on spent nuclear fuel shipments. The details of the calculations are provided in Section J.1.4.2. There could be specific locations along the transportation corridors in Nevada leading to the Yucca Mountain Repository that appear to be more vulnerable to an accidental release of radioactive material from a shipping cask. However, the computer models and data used in the accident consequence assessments result in estimates that consider the associated range of any location-specific conditions. Examples include the assumption that maximum reasonably foreseeable accidents would occur in the center of highly populated urban areas; evaluation of dose received by maximally exposed individuals (which addresses close proximity of the highway to hotels, casinos, retail businesses, schools, churches and residences); use of low-probability weather conditions that lead to the greatest consequences for maximum reasonably foreseeable accidents; and the assumption that no medical or other interdiction would occur to reduce concentrations of radionuclides absorbed or deposited in human tissues after a potential accident.

8.8.1 GENERAL

8.8.1 (172)
Comment - 11 comments summarized
Commenters said that DOE's analysis of transportation impacts is unrealistic because it is overly conservative. By considering almost every possible accident scenario during spent nuclear fuel and high-level radioactive waste transport, DOE has given credence to the virtually impossible and has, therefore, overestimated the impacts of transporting to Yucca Mountain. For example, the "maximum reasonably foreseeable accident" scenario modeled in the EIS has a likelihood of occurrence of about 1.4 in 10 million years. Considering that spent nuclear fuel and

high-level radioactive waste would be transported for only about 24 years, the chances that such a “worst case accident” could occur are essentially zero–less than the chances of a loss of life due to a meteor impact which has a probability of occurrence of 1 in 100,000 years (DIRS 107795-NRC 1975). These commenters cited the safety record of the commercial nuclear power industry during the past 35 years, during which time about 3,000 shipments of spent fuel have been transported across U.S. highways and railroads with no injuries, fatalities, or environmental damage. The EIS should take into account this enviable safety record, rather than using an ultraconservative accident scenario–one that is likely to occur 1.4 times in 10 million years.

Response
DOE believes that the EIS is consistent with National Environmental Policy Act and NWPA requirements. The level of information and analyses, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions to address incomplete or unavailable information or uncertainties, provide a meaningful assessment of environmental impacts consistent with the applicable requirements. DOE agrees with the comment that maximum reasonably foreseeable accidents analyzed in the EIS are extremely unlikely. Analyzing such accidents, nevertheless, provides useful information for decisionmakers and the public, and demonstrates that DOE took a hard look at the potential risks.

In March 2000, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung 2000). The purpose of the study was to reexamine the risks associated with the transport of spent nuclear fuel by truck and rail and compare the results to those published in *Final Environmental Impact Statement on the Transportation of Radioactive Material by Air and Other Modes* (DIRS 101892-NRC 1977) and *Shipping Container Response to Severe Highway and Railway Accident Conditions* (DIRS 101828-Fischer et al. 1987). The Draft EIS used techniques and assumptions based on Fischer et al. (1987). The new Nuclear Regulatory Commission study concluded that both NRC (1977) and Fischer et al. (1987) made a number of very conservative assumptions about spent nuclear fuel and cask response to accident conditions, which caused their estimates of accident source terms, accident frequencies, and accident consequences to be very conservative. The new study concluded:

“Based on this more detailed analysis, cask leakage is found to be even less likely than the estimates of the Modal Study, and retention of particles and condensable vapors by deposition onto cask interior surfaces is found to be substantial. Accordingly, both source term probabilities and magnitudes decrease further, and consequently accident population dose risks are reduced further by factors of 10 to 100.” (DIRS 152476-Sprung et al. 2000)

In response to comments, DOE has updated the EIS transportation impact analysis to incorporate some of the findings of the updated Nuclear Regulatory Commission analysis. Sections 6.2.4 and J.1.4 of the EIS concerning analyses of transportation accidents have been revised to incorporate data from that analysis (DIRS 152476-Sprung et al. 2000). The EIS no longer relies on the data from the Modal Study, with the exception of the data used in Sprung et al. (2000). This report contains revised estimates of probable releases from spent nuclear fuel casks during severe transportation accidents that involve long duration fires accompanied by high impact forces.

The Nuclear Regulatory Commission is considering including an assessment of the importance of human factors in cask design, manufacturing, and use in its planned Package Performance Study. The planned study, which is scheduled for completion in 2004, will provide an updated evaluation of the level of safety provided by spent nuclear fuel transport packages under a variety of railway and highway accident conditions.

8.8.1 (187)
Comment - 5 comments summarized
Commenters were critical of the RADTRAN model used to analyze transportation risks, stating that it does not adequately evaluate radiological impacts to populations along transportation routes. Commenters were unconvinced that the outputs of the model truly represent the impacts of spent nuclear fuel and high-level radioactive waste transportation because the model uses little site-specific information. Some said that the EIS should describe the underlying assumptions and shortcomings inherent in the RADTRAN 4 model and justify its use in the EIS, including if and how the model is applicable to undeveloped routes where spent nuclear fuel and high-level radioactive waste transport vehicles would pass slowly along narrow roadways through populated areas close to businesses and residences. Some said that because no database exists for such a large and long-lived shipping

campaign, the risk numbers generated by RADTRAN might be fundamentally flawed, and there is no scientific basis for proving whether the estimated risks are too low or too high.

Commenters identified specific flaws in the RADTRAN 4 model, stating that it is (1) outdated compared to even the most rudimentary desktop Geographic Information Systems, (2) not able to verify the worst possible threats, and (3) not sufficiently sensitive to local conditions such as the actual location of population centers and system operating characteristics such as average speeds and stop times of heavy-haul trucks in local communities. Commenters said that individuals who reside, work, or attend school at certain locations within 6 to 40 meters (20 to 130 feet) of a spent nuclear fuel and high-level radioactive waste route could receive exposures in excess of the average annual dose of background radiation. DOE has failed to investigate whether such conditions exist near school zones and pedestrian crossings, left turn lanes and at traffic signals, congested intersections, and uphill grades.

Others requested site-specific analyses, including a recalculation of the annual and cumulative collective dose and maximum individual dose to people in Tonopah and Goldfield assuming that each heavy-haul truck would travel at an average speed of 8 kilometers (5 miles) per hour and would stop at certain intersections for 2 to 5 minutes. The analysis must consider the actual location of all occupied buildings and people within 400 meters (0.25 mile) of the route, including children in schools and nonresidents in hotels and commercial establishments.

Response

In this EIS, DOE has used computer models it has used in previous EISs and other studies. These models are widely accepted by the national and international scientific and regulatory communities. For instance, DOE selected the RADTRAN 5 computer program to estimate radiological impacts to populations from incident-free transportation and from accidents. RADTRAN, which was originally developed by Sandia National Laboratories in the late 1970s, has been used in many DOE EISs, and it has undergone periodic review and revision. In 1995, an independent review of RADTRAN 4 (immediate predecessor to RADTRAN 5) demonstrated that it yielded acceptable results when compared to "hand" calculations. More recently, an independent review found that RADTRAN 5 overestimates the measured radiation dose to an individual from moving radiation sources. The RADTRAN 5 analyses included the inhalation, external exposure, resuspension, and ingestion pathways.

To manage the large amounts of transportation data used in the EIS, DOE chose to use database software, not a geographic information system. However, a geographic information system was used to generate the maps presented in Appendix J of the EIS and to estimate populations along routes in Nevada.

Substantial amounts of site-specific data were used in the RADTRAN 5 analyses. For example, *Road Upgrades for Heavy Haul Truck Routes - Design Analysis* (DIRS 154448-CRWMS M&O 1998) includes tables of the speeds and times used for every section of highway for heavy-haul trucks for the entire route from the intermodal facility to the repository. It shows that travel speeds at intersections and in towns such as Tonopah and Goldfield, are as low as 8 kilometers (5 miles) per hour. However, DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties, offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

In response to comments, additional information on potential state-specific routes and local and regional impacts are provided in Section J.4 of the EIS. The EIS includes estimated public health impacts along transportation routes. This analysis accounts for factors such as the locations of commercial establishments and residences.

DOE believes that the mostly rail case, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. In reaching this conclusion, DOE has assessed the capabilities of the sites to handle larger (rail) casks, the distances to suitable railheads, and historic experience in actual shipments of nuclear fuel, waste, or other large reactor-related components. In addition, DOE considered relevant information published by sources such as the Nuclear Energy Institute and the State of Nevada.

Nevertheless, in response to comments, DOE has analyzed the effects of different mixes of rail and truck shipments. The results of this analysis confirm the Department's estimate that the mostly rail and mostly legal-weight truck scenarios represent a reasonable range (lower and upper bound) of potential environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste.

8.8.1 (189)

Comment - 5 comments summarized

Several commenters stated that the EIS was inadequate because it presented health impacts only in terms of deaths. There was no assessment of quality of life, traffic-related injuries, genetic effects, or other potential negative health, environmental, and economic impacts.

Response

As discussed in Section F.1.1.5 of the EIS, cancer is the principal potential risk to human health from exposure to low or chronic levels of radiation. It is well accepted within the risk assessment and health physics community to use latent cancer fatalities as the measure of impact from radiation exposure. However, other health effects such as nonfatal cancers and genetic effects can occur as a result of chronic exposure to radiation. These are discussed in Section F.1.1.5.

The transportation analyses in the EIS present the total impact of the Proposed Action and the No-Action Alternative. Fatalities were used as the measure of the total impact because non-radiation-related traffic fatalities can be combined with radiation-related latent cancer fatalities to yield an estimate of the total number of fatalities for the Proposed Action and the No-Action Alternative. In contrast, combining non-radiation-related measures of impact such as traffic-related injuries, illnesses, and other environmental impacts with radiation-related latent cancer fatalities would not yield an easily understandable estimate of total impacts. For the same reason, genetic effects, nonfatal cancers, and other radiation effects were not included in the estimates of the total impact.

Based on comments, a discussion of the economic impacts of severe transportation accidents has been added to Section J.1.4.2.5 of the EIS.

DOE believes that the EIS adequately analyzes transportation-related impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site was recommended and approved. See the introduction to Chapter 8 of this Comment-Response Document for more information.

8.8.1 (192)

Comment - 5 comments summarized

Several commenters objected to the comparisons made of the impacts of transporting spent nuclear fuel and high-level radioactive waste to the proposed repository with the cumulative transportation impacts in Section 8.4.1 and with cancer statistics in Section 6.2.4.2.1. Another commenter stated that the conclusion of "no significant impacts" was based on averaging transportation impacts across the entire U.S. population. Another commenter stated that the comparisons of Modules 1 and 2 with the Proposed Action are invalid because there are 600 percent more shipments and only 17 percent additional impacts. Several commenters stated that comparing transportation impacts to national cancer statistics is invalid. Another commenter stated that 1943 is an arbitrary date and inappropriate for beginning the calculation of the cumulative impacts of transporting radioactive materials. The commenter also stated that dividing the total cancer fatalities by 100 years is misleading. Commenters stated that these comparisons caused the skepticism that the public has about DOE and the project and that the use of statistics and comparisons in this manner is deceitful, deceptive, scandalous, and a twist on the truth.

Response

DOE believes that comparing the transportation impacts calculated in the EIS with national cancer incidence statistics is valid and properly places any transportation-related increased risk of contracting a fatal cancer in perspective to the cancer risks inherent in everyday life. Section 8.4 of the EIS provides the results of cumulative impact analyses conducted to ensure that the environmental impacts of the Proposed Action (or alternative actions) and other actions that involve the same regions or resources are provided to decisionmakers. The information is used to minimize or avoid adverse consequences and to develop an appropriate mitigation strategy and monitor its effectiveness. In developing these comparisons and cumulative impacts, attempts were made to ensure that the comparisons were on a consistent basis.

The transportation impacts in the EIS were not averaged over the entire population of the United States. In addition, the exposed population was not 50 million people. Rather, the transportation impacts were integrated over the exposed population along the transportation routes analyzed in the EIS. As discussed in Sections 6.2.3.1 and 6.2.3.2 of the EIS, these exposed populations ranged from 10 million for truck shipments to 16 million for rail shipments. For perspective, the population of the United States was about 250 million in 1990 and 280 million in 2000. In addition, the cumulative impacts in Section 8.4.2.1 were not divided by 100 years, as suggested by one commenter. All of the impacts presented in this section are estimates of the sums of impacts from past, present, and reasonably foreseeable actions, and no attempt was made to divide them by 100 years.

With regard to the comment on Module 1 and 2 impacts, the commenter is incorrect in the interpretation that the impacts only increase 17 percent while the numbers of shipments increase by 600 percent (The actual increases in the number of shipments for Modules 1 or 2 are approximately 200 percent, as listed in Table J-1 of the EIS). As listed in Table 8-58, for example, the collective worker dose for the mostly legal-weight truck scenario would be 14,000 person-rem for the Proposed Action and 28,000 person-rem for Module 1 or 2. This represents about 100-percent higher impacts for Module 1 or 2. The number of shipments would increase by about the same amount, as listed in Table J-1. Smaller percentage increases, noted by the commenter, are observed only when cumulative doses from past transportation activities are added to the impacts of the Proposed Action and Modules 1 or 2. This is because the impacts of general radioactive material transportation not related to a particular action (310,000 person-rem are estimated in Table 8-58) are much larger than the Proposed Action and Modules 1 or 2.

DOE used 1943 as a starting point for the cumulative impacts analysis because this corresponds to the time when spent nuclear fuel shipments between nuclear facilities started.

8.8.1 (196)
Comment - 15 comments summarized
Several commenters stated that the EIS significantly, woefully, and systematically underestimates transportation risk. The program involves an unprecedented number of trucks and trains. One commenter stated that use of old, cool spent fuel misrepresents the true risk. A commenter stated that detailed studies of routes should be included. The Nation should wait for 50 years to allow the spent fuel to decay to less radioactive levels. Commenters stated that the generic analyses do not account for potentially long stop times, slow speeds, intersections, traffic lights or unique highway characteristics, and community characteristics, such as locations of hotels, schools, and churches. In addition, the corridor widths are too narrow for radiological impact analyses. Another commenter stated that the 400-meter (0.5-mile) corridor used in the incident-free risk assessment underestimates risks. Another expressed concern with large amounts of long-lived radioactive materials in spent nuclear fuel and potential exposures to unshielded fuel elements.

Response
DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties, offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

In this EIS, DOE has used computer models it has used in previous EISs and other studies. These models are widely accepted by the national and international scientific and regulatory communities. For instance, DOE selected the RADTRAN 5 computer program to estimate radiological impacts to populations from incident-free transportation and from accidents. RADTRAN, which was originally developed by Sandia National Laboratories in the late 1970s, has been used in many DOE EISs, and it has undergone periodic review and revision. In 1995, an independent review of RADTRAN 4 (immediate predecessor to RADTRAN 5) demonstrated that it yielded acceptable results when compared to “hand” calculations. More recently, an independent review found that RADTRAN 5 overestimates the measured radiation dose to an individual from moving radiation sources.

To ensure that the EIS analyses reflect the latest reasonably available information, DOE has either incorporated information that has become available since the publication of the Draft EIS or modified existing information to accommodate conditions likely to be encountered over the life of the Proposed Action. For example, the analysis in the Draft EIS relied on population information from the 1990 Census. In this Final EIS, DOE has scaled impacts upward to reflect the relative state-by-state population growth to 2035, using 2000 Census data.

Although the EIS analyses are based on the latest reasonably available information and state-of-the-art analytical tools, not all aspects of incident-free transportation or accident conditions can be known with absolute certainty. In such instances, DOE has relied on conservative assumptions that tend to overestimate impacts. For instance, DOE assumed that the radiation dose external to each vehicle carrying a cask during routine transportation would be the maximum allowed by U.S. Department of Transportation regulations. Similarly, DOE assumed that an individual, the “maximally exposed individual,” would be a resident living 30 meters (100 feet) from a point where all truck shipments would pass. Under these circumstances, the maximally exposed individual would receive a dose of about 6 millirem from exposure to all truck shipments (6 millirem represents an increased probability of contracting a fatal cancer of 3 in 1 million). Although it can be argued that individuals could live closer to these shipments, it is highly unlikely that an individual would be exposed to all shipments over the 24-year period of shipments to the repository, even though DOE incorporated this highly conservative assumption in the analysis.

However, in response to comments, DOE has considered locations at which individuals could reside nearer the candidate rail corridors and heavy-haul truck routes in Nevada as a way of representing conditions that could exist anywhere in potentially affected communities. For example, DOE assumed that a maximally exposed individual could reside as close as 4.9 meters (16 feet) to a candidate heavy-haul truck route. During the 24-year period of repository operations this maximally exposed individual would receive an estimated dose of about 29 millirem, resulting in an increased fatal cancer probability of 2 in 100,000.

These exposures would be well below those received from natural background radiation, would not be discernible even if corresponding doses could be measured, and would not add measurably to other impacts that an individual could incur. For comparison, the lifetime likelihood of an individual incurring a fatal cancer from all other causes is about 1 in 4.

Based on public comments, DOE has revised the spent nuclear fuel used in the transportation analysis to use spent nuclear fuel with less cooling time (15 years versus 26 years and fuel with higher activity (50,000 megawatt-days per MTHM rather than 40,000 megawatt-days per MTHM). The radionuclide inventory contained in spent nuclear fuel is presented in Appendix A of the EIS. The typical rail cask would contain 4.5 million curies of radioactive material and the typical truck cask would contain 800,000 curies. While it is true that spent nuclear fuel would be less radioactive in 50 years, the impacts from transporting spent nuclear fuel are already very low, so waiting 50 years would not provide a practical reduction in the already very low risks.

Unshielded spent nuclear fuel is hazardous and, for this reason, would be shipped in heavily shielded casks. The maximum radiation dose rate from a spent nuclear fuel cask would be about 10 millirem per hour at 2 meters (6 feet) from the transport vehicle. For perspective, the radiation dose from a single chest X-ray is about 8 millirem. Therefore, the radiation dose from a spent nuclear fuel cask is equivalent to a little more than one chest X-ray per hour and is much lower than a lethal radiation dose.

The 800-meter (0.5-mile) distance was used only for estimating the incident-free transportation impacts. Because radiation levels fall off rapidly with distance from the source, this distance is adequate for estimating exposures from incident-free transportation. Consistent with accident analyses conducted at nuclear powerplants, the EIS analyzes the impacts from transportation accidents out to 80 kilometers (50 miles).

DOE believes that the EIS adequately analyzes transportation-related impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site was recommended and approved. See the introduction to Chapter 8 of the Comment Response Document for more information.

8.8.1 (198)
Comment - 3 comments summarized
Commenters stated that DOE has underestimated the environmental damage that would result from routine transportation and spills of hazardous waste. The EIS used incomplete and outdated data and underestimated the

effects on groundwater and surface water, community water supplies, land use, and disruption of wild game habitat. DOE must examine the entire study area rather than limit the impact assessment to the area within the right-of-way. Another commenter requested information on environmental contamination outside the rail corridors, the dose rate to people living outside the corridors, and the long-term effects on animals, waterways, and wetlands.

Response

Section 6.2 of the EIS describes impacts of preparing to transport and transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain. The impacts are those that could occur to people and environmental media, including groundwater and surface water, land use, wetlands, biological resources, cultural resources, and effects on domestic and wild animals. DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties, offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

In this EIS, DOE has used computer models it has used in previous EISs and other studies. These models are widely accepted by the national and international scientific and regulatory communities. For instance, DOE selected the RADTRAN 5 computer program to estimate radiological impacts to populations from incident-free transportation and from accidents. RADTRAN, which was originally developed by Sandia National Laboratories in the late 1970s, has been used in many DOE EISs, and it has undergone periodic review and revision. In 1995, an independent review of RADTRAN 4 (immediate predecessor to RADTRAN 5) demonstrated that it yielded acceptable results when compared to “hand” calculations. More recently, an independent review found that RADTRAN 5 overestimates the measured radiation dose to an individual from moving radiation sources.

To ensure that the EIS analyses reflect the latest reasonably available information, DOE has incorporated information that has become available since the publication of the Draft EIS or modified existing information to accommodate conditions likely to be encountered over the life of the Proposed Action. For example, the analysis in the Draft EIS relied on population information from the 1990 Census. In this Final EIS, DOE has scaled impacts upward to reflect the relative state-by-state population growth to 2035, using 2000 Census data.

The analysis of national transportation of spent nuclear fuel and high-level radioactive waste evaluated impacts to populations along routes shipments could use.). DOE concluded that the impacts in these resource areas from nationwide transportation (outside Nevada) would not be discernible because shipments would use existing highways and railroads and would contribute only minimally to the volume of national transportation (0.007 percent of railcar kilometers and 0.008 percent of truck kilometers).

In Nevada, where a new branch rail line could be constructed or roads could be upgraded for use by heavy-haul trucks and an intermodal transfer station could be built and operated, the analysis addressed impacts on land use and ownership; air quality; hydrology; biological resources (including wild game habitat) and soils; public health and safety; socioeconomics; noise; cultural resources; aesthetics; utilities, energy, and materials; waste management, and environmental justice (Sections 6.3.2 and 6.3.3 of the EIS). In general, the impacts were assessed for regions of influence that extend beyond the area that would be within a rail corridor or highway right-of-way or site area of an intermodal transfer station (Sections 6.3 and J.1 discuss regions of influence used in the analyses). For example, human health effects from accidents were evaluated for populations living within 80 kilometers (50 miles) of a route (see Section 6.3.1.3.2).

As discussed in Section J.1.4.2.1 of the EIS, there would be no environmental contamination unless a severe accident resulted in a breach of containment of the shipping cask. Under incident-free conditions, there would be no environmental contamination because the spent nuclear fuel and high-level radioactive waste would not be released from shipping casks. In addition, the radiation emitted from shipping casks under incident-free conditions would have no discernible impacts on any ecological attribute (for example, groundwater and surface water, air quality, and wildlife habitat).

Plants and animals are no more sensitive to the effects of radiation than humans. Acute and chronic radiation doses that do not adversely affect humans are not known to affect terrestrial species of plants and animals. The International Atomic Energy Agency reports that there is no convincing evidence that indicates that the current radiological dose standards for humans would harm animal or plant populations (DIRS 103277-IAEA 1992). In other words, if humans are adequately protected, plants and animals are likely to be adequately protected.

The EIS does not specifically analyze a transportation accident involving contamination of surface water or groundwater. Analyses performed in previous EISs (see Section 1.5.3 and Table 1-1 of this EIS) have consistently shown that the airborne pathway has the greatest potential for exposing large numbers of people to radioactive material in the event of a release of radioactive materials during a severe transportation accident. An analysis of the potential importance of water pathway contamination for spent nuclear fuel transportation accident risk using a worst-case water contamination scenario (DIRS 157052-Ostmeyer 1986) showed that the impacts of the water contamination scenario were about one-fiftieth of the impacts of a comparable accident in an urban area.

The shipping casks used to transport spent nuclear fuel and high-level radioactive waste would be massive and tough with design features that complied with strict regulatory requirements that would ensure the casks performed their safety functions even when damaged. The casks would be designed to be watertight even after a severe accident. Furthermore, the high-level radioactive waste would be in a solid form (ceramics, metals, or glasses) that would not be easily dispersed.

Numerous tests and extensive analyses, using the most advanced analytical methods available, have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents. Since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

8.8.1 (918)
Comment - EIS000124 / 0012
I also think that the transportation issues need to be addressed much more widely. I agree with the former speakers that Pahrump needs a new opportunity to address this.

Response
DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada if the site was approved. However, follow-on implementing decisions, such as the selection of a specific rail alignment in a corridor, or the specific location of an intermodal transfer station in Nevada or the need to upgrade heavy-haul truck routes, would require additional field surveys, State and local government, and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

8.8.1 (1007)
Comment - EIS000262 / 0003
The EIS needs to include a risk analysis comparing, at a national level, all probable primary and secondary shipment routes coming into Yucca Mountain. Again, absent information on the range of impacts expected to accrue to the project, we, as citizens, and the Federal and State decision makers expected to use the EIS, are left without the tools to weigh risks, evaluate alternatives, or recognize what constitutes an unavoidable transportation impact.

Route choice will affect the safety, cost and timing of transport operations. DOE needs to engage in a comprehensive study of this issue in order to develop a scientifically defensible, least-risk-based determination of routes. Private carriers should not be burdened with the responsibility to evaluate and choose routes. The preferred corridors should be mapped by DOE and the required roadway and emergency response improvements identified. In this way, the total impact and cost of the project can be laid out for public review.

Response
Section 2.1.3.2 of the EIS describes the national transportation shipping scenarios. Section 6.2.3 analyzes the impacts of transporting spent nuclear fuel and high-level radioactive waste using two scenarios: mostly legal-weight truck and mostly rail. The routes selected for the analyses met U.S. Department of Transportation regulations (49 CFR 397.101) and conformed to railroad routing practices. While these might not be the routes used in the future because of infrastructure changes or other variables, they are representative and therefore the analyses provide sufficient information on which to make decisions. Appendix J provides state-by-state maps of routes used in the analysis. The maps include tables of numbers of shipments originating in and passing through the state and the impacts of incident-free and potential accidents from these shipments. State or tribal designated alternate routes meeting Federal regulations were considered in the analysis. Section 2.1.5 provides information on the cost of the Proposed Action including costs of waste acceptance, storage, and transportation (nationally, $4.5 billion, and within Nevada, $0.8 billion). These costs are based on the mostly rail implementing alternative. Detailed costs of specific routes and modes cannot be estimated until the modes and routes are identified and approved.

Chapter 6 and Appendix J of the EIS provide the impacts and methods used to derive the impacts of the various mode and route alternatives for the life of the project. Impacts and risks for individuals, populations, and a variety of situations and accident conditions are addressed.

Route selection would not be left to the carriers alone. The current concept is that the shipping contractors would select routes and submit them to DOE for approval prior to their submittal to the Nuclear Regulatory Commission. The route selection process is discussed in greater detail in Section M.3.2.1.2 of the EIS. Requirements and protocols to be followed by the contractors in developing and implementing emergency response plans are described in Sections M.3.2.2.5 and M.5. DOE is required by Section 180(c) of the NWPA to provide technical and financial assistance to states and Native American tribes to support training for emergency responders. Part of this support is the determination of needed training that is based on plans developed by responsible jurisdictions. DOE anticipates that training would cover procedures required for safe routine transportation of spent nuclear fuel and high-level radioactive waste, as well as procedures for dealing with emergency response situations. Training would be instituted before beginning shipments to the repository. Additional information of Section 180(c) requirements and other emergency response capabilities and responsibilities are provided in Sections M.5 and M.6.

8.8.1 (1259)
Comment - EIS000228 / 0003
The DEIS transportation section fails to address the "range of alternatives" as required by the Council on Environmental Quality (CEQ) (Council on Environmental Quality. "Forty Most Asked Questions Concerning CEQ's NEPA Regulations." Wash D.C.). The DEIS does not address bounding scenarios in assessing the transportation risk. Among the ranges of alternatives that should be included in the analysis are:

- the use of dedicated versus general rail freight,
- consolidated shipping that would remove all of the SNF [spent nuclear fuel] from one region of the country versus a diffuse shipping program that leaves most of the country affected for long periods of time (advocated by the DOE),
- the use of uniform cask types versus a mix of cask types (proposed by DOE),
- analysis of the health effects of the "shortest path" from the reactors versus the health effects of routes that avoid highly populated urban areas,
- the shipment of ten versus twenty-five year old spent fuel.

Response
Section J.2.3 of the EIS discusses these two options, and Table J-25 provides a comparison of dedicated and general freight shipment by rail. The analysis for Chapter 6 did not consider the type of train service that could be used to deliver shipments to Nevada, because the available data for rail accident and fatality rates from the U.S. Department of Transportation is insufficient for this purpose and because other information is not sufficient to address differences in the impacts that might arise from differences between the two types of service. The Department of Transportation data do not present accident information for different kinds of rail service. A qualitative comparison

of attributes of general rail freight to dedicated train service in Table J-25 and in Section J.2.3, which is based in part on results of a recent Department of Transportation study, does not indicate a clear advantage for the use of either type of rail service. Thus, impacts discussed in the EIS are estimated based on typical railroad operations. In these operations, railroads transport freight cars, including cars carrying hazardous materials, along with other freight in trains that average 67 cars in length. The Department believes the analysis presented in the EIS supports use of either general rail freight or dedicated train service.

As discussed in Section M.3 of the EIS, the Department has determined that contractors could be directed to use dedicated train service where it can be demonstrated to enhance operations efficiency and cost-effectiveness.

There are several factors that make “consolidated shipping” a nonviable alternative. DOE is required by the terms of the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (10 CFR Part 961) to assign priority to those waste generator sites whose fuel was discharged earliest. This is usually called the “Oldest Fuel First” priority. DOE must pick up fuel from sites designated by those waste generators with the oldest fuel regardless of the location. In addition, spent nuclear fuel would continue to be generated for many years after the repository begins operation; even if one region were cleared out early, additional shipments would have to be made as more spent nuclear fuel is generated.

All casks that would be used would be designed to meet Nuclear Regulatory Commission and U.S. Department of Transportation regulations, and approved by the Commission prior to use. DOE would rely on private industry to design, license, and fabricate the casks to be used to transport commercial spent nuclear fuel to the proposed repository at Yucca Mountain. Many of these casks have already been designed and some have been fabricated. Although these casks are not of a uniform design, the major handling and shipping parameters such as weight and size are essentially the same. DOE sees no benefit in attempting to impose a common design on all casks.

Highway routes would be selected in accordance with U.S. Department of Transportation regulations in 49 CFR 397.101 and as approved by the Nuclear Regulatory Commission following regulations in 10 CFR Part 73. Among other things, these regulations require the routes to be selected to reduce time in transit. Department of Transportation regulations require highway shipments to use Interstate System beltways and bypasses around cities although this might not be the “shortest path.” Rail shipments would be routed over the best available track, to minimize the number of interchanges between railroads, and to minimize time in transit. This routing might or might not result in the “shortest path.”

Based on comments received and DOE’s additional review of technical documents and conduct of hazard analyses, the basis for the transportation impact analysis has been revised to consider commercial spent nuclear fuel that has median hazard. Spent nuclear fuel having median hazard would be discharged from a reactor approximately 14 years before shipment to Yucca Mountain. The radionuclide inventories of the representative spent nuclear fuel used in the analysis are presented in Tables A-9 and A-10 of the EIS. Five- or 10-year-old spent nuclear fuel shipped to the repository would be a small fraction of the total shipments. This is an example in which “average” data are used in the EIS as opposed to bounding assumptions. Consistent with Council on Environmental Quality regulations (40 CFR 1502.22), DOE is attempting to avoid compounding conservatisms, yielding unrealistic results, in analyzing accident scenarios. Other elements of the impact analyses (for example, radiation dose rates, atmospheric dispersion modeling, release fractions) are such that the transportation impact results presented in the EIS are representative, yet not so conservative that the true differences among alternatives are masked.

8.8.1 (1264)

Comment - EIS000228 / 0007

In 1995, the DOE indicated in a report Cited as a DEIS reference (OCRWM. “Nevada Potential Repository Preliminary Transportation Strategy Study 1.” April 1995 P 10), that input from the affected counties would be a consideration in selecting a route through Nevada to Yucca Mountain. Clark County believes none of the implementing alternatives proposed in the DEIS are acceptable without further study. Clark County contends that without a detailed description of the packaging, handling, transportation, and mitigation systems necessary to implement the Yucca Mountain program it is impossible to assess the impacts of this program.

Response
DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada if the site was approved. However, follow-on implementing decisions, such as the selection of a specific rail alignment in a corridor, or the specific location of an intermodal transfer station in Nevada or the need to upgrade heavy-haul truck routes, would require additional field surveys, State and local government, and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

8.8.1 (1320)
Comment - EIS000340 / 0003
Many aspects of the Yucca Mountain Project don't seem to make much sense. For instance, the transportation of nuclear waste through residential streets greatly increases the risk of radiation to civilians.

Response
Highway routes would be selected in the future in accordance with the U.S. Department of Transportation regulations in 49 CFR 397.101. In addition, the routes would be submitted to the Nuclear Regulatory Commission for approval. The Department of Transportation regulations in 49 CFR 397.101 require that highway shipments use preferred routes, which are defined as Interstate System highways and beltways or bypasses around cities and alternative preferred routes designated by state or tribal routing agencies. A shipment could deviate from a preferred route only to pick up or deliver the shipment, or for required food, rest, or refueling stops, to make repairs, or in emergencies in which the preferred route is unavailable or unsafe.

8.8.1 (1546)
Comment - EIS000357 / 0005
Risk assessment of the waste isolation pilot project. Can the experience of transport of low-level nuclear waste and impacts be used as a model for the Yucca Mountain repository? Can this be used to assess community impacts and transport accident rates?

Response
Some experience gained from low-level waste transportation would be applicable to the transportation of spent nuclear fuel to the proposed repository. For example, estimated accident rates should not be significantly different, because both spent nuclear fuel and low-level waste transportation accident rates should not differ much from the general commerce truck and general freight rail accident rates used in the EIS. Other areas would not be applicable, such as the level of hazard of spent nuclear fuel compared to that of low-level waste, packaging and handling operations, types of shipping containers, security, escorts, and routing.

DOE experience with shipping transuranic waste to the Waste Isolation Pilot Plant is more like shipping spent nuclear fuel than would be experience in shipping low-level radioactive waste. Spent nuclear fuel transportation shares more fundamental features with the Waste Isolation Pilot Plant transportation program than with a low-level waste shipping program. For example, DOE ships transuranic waste in accident-resistant packages, uses the TRANSCOM shipment tracking and communication system, follows similar routing guidelines and transportation protocols (see Appendix M of the EIS), just as it would for spent nuclear fuel shipments. However, not every aspect of the transuranic waste shipping program is identical to the proposed spent nuclear fuel shipping program, such as remote handling requirements, the possibility of rail transport of spent nuclear fuel, internal packaging used, approval of routes by the U.S. Nuclear Regulatory Commission, and waste form characteristics (such as ignitability, gas generation, fissile material concentrations).

8.8.1 (2355)
Comment - EIS000645 / 0001
Although everybody here in Crescent Valley has addressed this because of the spur, first fire alarm that goes off in my head and heart is that existing rail line that is going to feed that spur goes through all four major cities in my

county. Ninety percent of our population is based on that cargo, that is Wendover, Wells, Elko, and Carlin. So right there and then I know that is something that we have to be concerned about.

Second point is that the main stopover for our area for crew changes, if that is the case that these trains would require crew changes, is in Elko. That is where all the major trains stop and all the crews stay. If they are allowed to have 48-hour stopover there, that means that these trains with hot loads will be sitting right there in the heart of the downtown area. I can empathize with people having homes up close to these rail lines. But I have an entire 35,000 people right there. And that's a very big concern to us.

Lastly, because of these range fires that we have had, we have had a lot of right-of-way fences destroyed. Now our commission has begged three different letters to have railroads to please replace your right-of-way fencing. They haven't responded to us once. I can imagine what would happen later on here if we had something like this and some right-of-way fencing was destroyed. It would take us forever to get this fencing back up, and God knows what would happen at that point.

We have had people killed on our rail lines here in Elko County. And I know there is many unexpected crossings we have. It goes through some very stiff terrain, over the Pequots and so on. High elevations, cold weather.

And if something happens, whether it is flash flooding, snow, or something, and these trains are backed up, where do they back up? Are they just going to stop at each one of our main cities and then we're going to have one of these trains sitting at each one of our towns?

Response
The EIS assessment of maximally exposed individuals considered stopovers at railyards (see Section J.1.3.2.2 and Table 6-9). The radiation dose to a resident 200 meters (660 feet) from a railyard and exposed for 20 hours to every shipment that passed would received as much as 0.31 rem over 24 years. This is a small radiation dose; approximately equal to the annual radiation dose this hypothetical individual would receive from natural background radiation in 1 year. It is conservative, in that this person would be unlikely to be present in an unshielded location for every passing shipment. DOE anticipates that potentially long stopovers to wait for adverse weather conditions would be rare.

Maintenance of existing rail rights-of-way, such as rebuilding damaged or destroyed fences, is the responsibility of the railroad. If DOE decided to build and operate its own branch rail line to connect the existing railroad with the proposed repository, it would be DOE's responsibility to maintain the right-of-way.

8.8.1 (2403)
Comment - EIS000674 / 0006
At the best, I think use of that route through Esmeralda and Nye County is going to cause a lot of people to get an extra 10 to 50 millirem per year just from heavy-haul trucks.

That's like two to five extra chest x-rays a year, assuming you've got a properly calibrated machine. That's a low enough exposure that no one can really see what the cancer impacts or the genetic impacts are. But it is a measurable dose to the general population that is like saying, "Let's increase your natural radiation from all sources by ten percent or more." That's something that the DEIS has to look at using different tools and different analytical techniques.

Use of a RADTRAN model is crude. It doesn't give you the kind of analysis you need.

Response
In responding to public comments regarding individuals in Nevada who live close to candidate transportation routes, DOE used information from a recent report prepared for the City of North Las Vegas (DIRS 155112-Berger Group 2000). This report presents suggested assumptions for a hypothetical maximally exposed individual who lived 15 meters (49 feet) from a roadway used by heavy-haul trucks and who would be present and stay at that location, when, over the 24 years, each shipment stopped for 1 minute. DOE believes that such an exposure scenario is highly unlikely and therefore unrealistic. Nonetheless, DOE estimated the maximum cumulative radiation dose to this hypothetical individual would be about 520 millirem over 24 years of the Proposed Action (see Section

J.1.3.2.2.1 of the EIS). This dose would lead to an estimated increase in risk of cancer of 1 in 4,000, over the individual's lifetime. The analysis in the EIS considered other maximally exposed individuals who could live along routes in Nevada. These included:

- A person in Alamo living in a residence approximately 5 meters (15 feet) from U.S. 93 where heavy-haul trucks could pass who could receive a dose of 25 millirem over 24 years

- A person who could be in the courthouse or fire station in Goldfield, Nevada approximately 5 meters (15 feet) from U.S. 95 where heavy-haul trucks could pass, who could receive a dose of 56 millirem over 24 years.

For perspective, cancer from all other causes is fatal to about 1 in 4 persons. DOE believes this increase in radiation exposure poses no undue risk to the population surrounding the proposed routes for heavy-haul trucks.

In this EIS, DOE has used computer models it has used in previous EISs and other studies (see Sections 6.2.1 and J.1.1). These models are widely accepted by the national and international scientific and regulatory communities. For instance, DOE selected the RADTRAN 5 computer program to estimate radiological impacts to populations from incident-free transportation and from accidents. RADTRAN, which was originally developed by Sandia National Laboratories in the late 1970s, has been used in many other previous DOE EISs, and it has undergone periodic review and revision. In 1995, an independent review of RADTRAN 4 (immediate predecessor to RADTRAN 5) demonstrated that it yielded acceptable results when compared to "hand" calculations (DIRS 101845-Maheras and Pippen 1995). More recently, an independent review found that RADTRAN 5 overestimates the measured radiation dose to an individual from moving radiation sources.

8.8.1 (2404)
Comment - EIS000653 / 0001
A thorough assessment of the impacts of the proposed action is necessary. We believe the Draft Environmental Impact Statement falls far short of this goal.

Section 1502.22 of the National Environmental Policy Act calls for agencies to disclose the unavailability of information in evaluating reasonably foreseeable significant adverse effects on the human environment. The absence of operational safety performance data for any component of the transportation system needed to move waste from generator sites to Yucca Mountain is a major gap in available information and should have been cited and discussed in the DEIS.

The DEIS describes some areas in which gaps in information exist, but it does not make those gaps clear. Sections of the DEIS where the gaps in information should be highlighted and implications of these gaps and the validity of conclusions of the DEIS should be thoroughly discussed.

In 1995, the DOE indicated in a report cited as a DEIS reference -- the report title is Nevada Potential Repository Preliminary Transportation Study 1. It indicated that input from the affected counties would be a consideration in selecting a route through Nevada to Yucca Mountain. Based on the concerns I've described above, Clark County believes that none of the implementing alternatives proposed in the DEIS are acceptable without further study.

Clark County contends that without detailed description of the packaging, handling, transportation and mitigation systems necessary to implement the Yucca Mountain transportation program, it's impossible to assess the impacts of this program.

Response
In this EIS, DOE has used computer models it has used in previous EISs and other studies. These models are widely accepted by the national and international scientific and regulatory communities. For instance, DOE selected the RADTRAN 5 computer program to estimate radiological impacts to populations from incident-free transportation and from accidents. RADTRAN, which was originally developed by Sandia National Laboratories in the late 1970s, has been used in many other previous DOE EISs, and it has undergone periodic review and revision. In 1995, an independent review of RADTRAN 4 (immediate predecessor to RADTRAN 5) demonstrated that it yielded acceptable results when compared to "hand" calculations. More recently, an independent review found that RADTRAN 5 overestimates the measured radiation dose to an individual from moving radiation sources.

To ensure that the EIS analyses reflect the latest reasonably available information, DOE has either incorporated information that has become available since the publication of the Draft EIS or modified existing information to accommodate conditions likely to be encountered over the life of the Proposed Action. For example, the analysis in the Draft EIS relies on population information from the 1990 Census. In this Final EIS, DOE has scaled impacts upward to reflect the relative state-by-state population growth to 2035, using 2000 Census data. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties, offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

DOE could ship spent nuclear fuel and high-level radioactive waste in several configurations, all of which would require a shipping cask designed to standards established by the Nuclear Regulatory Commission. There is substantial empirical data on the performance of shipping casks designed for the safe transport of spent nuclear fuel and high-level radioactive waste. In tests, casks have been rammed by high-speed trains, smashed into solid concrete structures, immersed in high-temperature fires, and submerged underwater. The results of these tests have confirmed that Type B casks can sustain severe transportation accidents while maintaining their safety functions. An analysis of the cask response to accident forces, referred to in the EIS as *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000), estimates that less than 0.01-percent of all accidents would generate forces that could lead to a release of radioactive material from a Type B shipping cask. Based on the evaluation in the EIS, no radiological impacts are projected for either the mostly legal-weight truck or mostly rail scenarios.

There were 60 accidents involving Type B packages between 1971 and 1997 (DIRS 102172-McClure and Fagan 1998). Of these, seven involved spent nuclear fuel. In each of these accidents the structural integrity of the cask remained intact and there was no release of radioactive contents. DOE would use legal-weight or heavy-haul trucks that met U.S. Department of Transportation requirements (49 CFR Parts 171 through 180).

DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada if the site was approved. However, follow-on implementing decisions, such as the selection of a specific rail alignment in a corridor, or the specific location of an intermodal transfer station in Nevada or the need to upgrade heavy-haul truck routes, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and the appropriate National Environmental Policy Act reviews.

8.8.1 (3114)
Comment - EIS000726 / 0008
The entire issue of calculated risk is a major concern. There is no mention of the degree of uncertainty associated with any of your calculated risk assessments. With no data to the contrary, I can only assume that the degrees of uncertainty are high.

The calculated risk must use accurate data and better estimates. It must include all risk factors, and must consider all known impacts to quality of life, the health of people and of the environment, and economic activity in the region.

Response
DOE is aware that there are uncertainties associated with the transportation impact results presented in the EIS. There are uncertainties associated with route characteristics, demographics, weather, atmospheric dispersion models, waste characteristics, accident rates, release fractions, and many other elements of the risk assessments. Because one of DOE's goals is to choose between alternatives, the consistent consideration of uncertainty among alternatives means that the relative differences in impact estimates among alternatives should not be affected. To account for uncertainties in the data, conservative assumptions were made so the impacts reported in the EIS would tend to overestimate the potential impacts. Examples of conservative assumptions include: accident release fractions which were selected from the high end of the distribution of experimental results, regulatory maximum radiation dose rates

were assumed for all shipments, even though the actual dose rates would be significantly lower for most shipments, consequences of severe accidents to maximally exposed individuals were presented for 50 percent and 95 percent (that is, consequences exceeded only 5 percent of the time) meteorological conditions, and evacuation and sheltering, which could reduce radiological exposures, were not included in the accident risk calculations. Although DOE has chosen to use conservative assumptions, the assumptions are not unrealistic to ensure that estimated impacts are as realistic as possible. Consistent with Council on Environmental Quality regulations (40 CFR 1502.22), DOE is attempting to avoid compounding conservatisms, yielding unrealistic results, in analyzing environmental impacts. Such practices mask the real differences and would not produce suitable results to support choices among the alternatives.

8.8.1 (3170)
Comment - EIS001194 / 0001
As an engineer, I was deeply troubled not so much by what was revealed in the fact sheets and policy briefs concerning the proposed transit route for commercial nuclear waste, but by what they surreptitiously attempted to obscure. Combing through this public relations hype, I was given over to the impression that legal jargon had been substituted for much more precise scientific notation. An example would be the suffix "person-rems," which appears in this literature. Were this term intended to indicate the approximate quantity of rems per total number of individuals within a contaminated perimeter, it would - when applied to a population center with a concentration as dense as that of Cleveland - denote a radiation hazard many times in excess of that which Hiroshima suffered in August of 1945. If instead the term is more properly interpreted as the average rem dosage to which any individual within a certain proximity might be exposed, the figure, while remaining unacceptably high, becomes indicative of a contamination level significantly less catastrophic than the aforementioned. I have a suspicion, however, that the term was coined to designate not quite one nor exactly the other.

Response
The radiological impact evaluation terms and techniques used in the EIS are consistent with the typical practices of the Environmental Protection Agency, the Nuclear Regulatory Commission, and DOE. These terms are explained in more detail in Section 3.1.8.1 of the EIS. The terms and their usage are also consistent with the practices set forth by the United States and international radiation protection organizations.

The term person-rem is used to convey the total collective radiation doses received by a population exposed to radioactive material. For example, the Latent Cancer Fatalities textbox in Section S.4.1.8 of the EIS Summary states, "…if each individual in a population of 100,000 received a total dose of 0.001 rem, the collective dose would be 100 person-rem…"

The 100 person-rem collective dose value is the product of the 100,000 persons and 0.001 rem received by each person. Alternatively, it can be viewed as the sum of the doses received by each person of a given population exposed to radiation.

8.8.1 (3253)
Comment - EIS000981 / 0001
Has the DOE conducted the necessary HAZARD ANALYSIS, VULNERABILITY ANALYSIS and RISK ASSESSMENT in the City of St. Louis for the rail and highway routes identified in the newspaper article? If so, can we obtain a copy of that assessment. If not, will the assessment be conducted and will the City of St. Louis receive a copy of the assessment and/or be a part of the assessment team?

Response
Although the EIS contains an assessment of national transportation impacts for shipping spent nuclear fuel and high-level radioactive waste to the proposed repository, location-specific assessments have not yet been performed. Highway routes would be selected in the future in accordance with the U.S. Department of Transportation regulations in 49 CFR Part 397. Rail routes would be selected to reduce time in transit, minimize number of railroad to railroad interchanges, and use high quality mainline track. Use of routes would be subject to review by the Nuclear Regulatory Commission under regulations in 10 CFR Part 73. However, it is premature at this time to analyze the hazards, vulnerabilities, and risks of specific routes and locations to identify preferred routes. The highway routes presented in the EIS are used for illustration purposes and to provide technically defensible route characteristics data to support the calculation of transportation impacts. In DOE's judgment, the routes used in the

EIS represent reasonable information available at this time and the use of other routes would not change the results of the transportation impact calculations substantially.

Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. See Section M.6 of the EIS for a discussion of the DOE Section 180(c) Policy and Procedures.

8.8.1 (3337)
Comment - EIS001121 / 0003
Putting aside the obvious dangers (accident, terrorists, etc.) I am disturbed by your prediction of 18 latent cancer fatalities by truck, and 5 latent fatalities by rail. I would like to know how you came up with these figures, without any of these CASKS having been built? I know that you test by scale but I can't believe that this would apply in this situation.

With these predictions in mind it tells me that you are anticipating a leakage in these CASKS. I would like to know who are these predicted fatalities? What is the risk to the drivers of these trucks?

Response
Section 6 and Appendix J of the EIS provide comprehensive information on the techniques and assumptions used in the analysis of worker and public health safety risks. Transportation of spent nuclear fuel and high-level radioactive waste is an integral part of the ultimate disposition of these wastes in a geologic repository and the EIS addresses the potential impacts associated with a transportation campaign (see Chapter 6 and Appendix J). In determining whether to recommend the Yucca Mountain site to the President, the Secretary of Energy will take transportation impacts into account. Section 6.2.3.1 indicates that there would be 2.5 latent cancer fatalities among members of the general public along routes from legal-weight truck transport of spent nuclear fuel and high-level radioactive waste for the 24-years of operation. DOE recognizes the potential for transportation accidents and analyzed impacts resulting from transportation accidents in Section 6.2.4. Although, given the number of shipments, traffic accidents would be probable, DOE does not believe that any accident would result in the release of radioactive material, primarily because of the structural integrity of the casks in which the material would be transported. In the more than 2,700 shipments involving spent nuclear fuel over the past 3 decades, there have been seven accidents, with no release of radioactive materials to the environment. Though an accident resulting in release of radioactive material is not expected to occur, the Department analyzed the maximum reasonably foreseeable accident would involve the release of material from a transportation cask. This would be an extremely unlikely event (an annual probability of 2.8 [rail] to 2.4 [truck] in 10 million). The leaking of a transportation cask could only occur if mechanical forces (impact) and heat (fire) exceeded the design limits of the transportation cask structures and materials. The EIS states that an accident involving the leaking of a transportation cask could result in approximately 5 latent cancer fatalities in an urban area under stable (slowly dispersing) atmospheric conditions. The air pathway is the most likely mode of exposure to radioactive materials though other pathways, including water and contaminated food sources are included. A severe accident in another population zone (for example, rural) or in other atmospheric conditions would have lower consequences.

Section M.4 of the EIS provides additional information on shipping cask design, safety, and testing. Shipping casks of various designs have been built and used for the shipment of spent nuclear fuel in the United States and worldwide. The Nuclear Regulatory Commission has certified several new cask designs in recent years and other designs are in the review process. These designs and current regulatory requirements are sufficient to provide the cask-related input parameters that DOE used to calculate incident-free radiation exposures. These include the external dose rate emitted from the shipping cask, which DOE assumed at the maximum limit allowed by U.S. Department of Transportation and Nuclear Regulatory Commission regulations, and the cargo capacity of the shipping casks that would determine the number of shipments required to transport spent nuclear fuel and high-level radioactive waste to the repository. With regard to the maximum allowable external radiation dose rate, actual shipments would be likely to emit lower dose rates, but could not emit a higher dose rate. DOE based shipping cask capacities on the certified casks and those in Nuclear Regulatory Commission review.

8.8.1 (3621)
Comment - EIS001101 / 0002
The DEIS is incomplete in that there is no description and analysis of the affected environment for each Nevada transportation route. National transportation routes for rail and highway shipments are not identified and analyzed. The EIS should include analyses of potential impacts and hazards of all alternatives in order to support a selection from among the alternatives.

Response
Complete descriptions of the affected environment can be found in Sections 3.2.2, 6.3.2, and 6.3.3 of the EIS for the heavy-haul truck and rail implementing scenarios, including descriptions and analyses of the impacts of highway and rail improvements, as well as construction and operation of intermodal transfer stations. Section J.3 provides descriptions of potential legal-weight truck, heavy-haul truck, and rail routes in Nevada. National transportation routes and associated environmental impacts are addressed in Section 6.2. In response to comments on the Draft EIS, DOE revised Appendix J to include state-by-state route maps, the numbers of shipments in each state, and state-specific health and safety impact estimates (see Section J.4). This is in addition to the route maps that were already included in the Draft EIS (see Section 2.1.3.2 for national routes and Section 2.1.3.3 for Nevada maps).

With respect to alternatives, in the Draft EIS and the Supplement to the Draft EIS, DOE analyzed a variety of scenarios that offer a range of options in which to implement the Proposed Action to construct, operate (including transportation) and monitor, and eventually close a repository at Yucca Mountain. These scenarios, which reflect potential repository design and operating modes, waste packaging approaches, and transportation options for shipping spent nuclear fuel and high-level radioactive waste to the Yucca Mountain site, bounded the environmental impacts likely to result from the Proposed Action. DOE conducted hearings to obtain public input on the scope of this EIS and has reviewed previous public comments on repository-related transportation alternatives (for example, comments on the Draft Environmental Assessments). As stated in Section J.3.1.2 of the EIS, one of the rail corridor alternatives analyzed in the EIS was identified on the basis of public comments submitted during scoping hearings.

DOE evaluated the potential environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste from 5 DOE and 72 commercial sites to a repository at Yucca Mountain. At this time, many years before shipments to a repository could begin, it is impossible to predict the exact number of shipments that would be made by either truck or rail. For this reason, in the Draft EIS, DOE evaluated two scenarios for moving the materials to Nevada:

- Transport using mostly legal-weight trucks
- Transport using mostly rail

In DOE's judgment, the EIS considers a reasonable range of scenarios that cover the full spectrum of transportation system alternatives, and bounds the potential environmental impacts associated with the transportation of spent nuclear fuel and high-level radioactive waste.

8.8.1 (3896)
Comment - EIS001286 / 0006
A recent study from the Texas Transportation Institute of traffic in Greater Cleveland and 67 other metropolitan areas found that traffic jams are getting more frequent and severe. In 1997, 50% of traffic was congested. Freeways are also more crowded. The number of miles traveled daily on freeways rose 66.5% from 1982 to 1997 (clipping enclosed). DOE must account for non-accident exposures that will become routine when casks are trapped in heavy traffic with other vehicles for long time periods.

Response
The estimated exposure of a person stuck in a traffic jam for 1 hour sitting 1.2 meters (4 feet) from a spent nuclear fuel cask is given in Section 6.2.3 of the EIS. Additional information on the potential transportation impacts is presented in Appendix J.

8.8.1 (4063)
Comment - EIS001181 / 0001
The potential environmental risk based on every aspect, from shipping loads cross country to unstable recommendations for radiation levels, are cause for reevaluation. I-15 in California, just one of many proposed routes, is one of California's most dangerous sections of highway, near the proposed site. Also the EPA [Environmental Protection Agency] has challenged the proposed limits for radiation exposure posed by the DOE.

Response
The highway routes for shipment of waste to the proposed repository at Yucca Mountain would be selected in accordance with U.S. Department of Transportation regulations in 49 CFR 397.101. Interstate-15 in California could be used because it is an Interstate System highway that could be part of one or more preferred routes that would reduce time in transit for shipments, and if so would meet requirements listed in the regulation. Radiation exposure limits during transportation are set by the Department of Transportation regulations in 49 CFR 173.441 and by the Nuclear Regulatory Commission in 10 CFR 71.47; they are not posed by DOE. The Environmental Protection Agency has not challenged these limits.

8.8.1 (4130)
Comment - EIS001473 / 0001
It is apparent that if Yucca Mountain is realized, and that's still a problem that has to be addressed, has to be technically established, the transportation will be a profound impact on the state of Utah.

Response
In response to public comments, DOE has included in Section J.4 of the EIS maps of the highway routes and rail lines it used for analysis. It also included potential health and safety impacts associated with shipments for each state through which shipments could pass.

8.8.1 (4205)
Comment - EIS001160 / 0027
The DEIS does not adequately address issues raised and substantiated by White Pine County during the scoping process. For example:

The analysis should evaluate the risk management benefits of time-of-day travel restrictions (i.e. to avoid transport past the White Pine County High School during school hours). The DEIS does not consider time-of-day travel restrictions as a risk management option.

Response
Section M.3 of the EIS describes DOE's acquisition process for Waste Acceptance and Transportation Services Contractors. This section also describes the protocols that would be used by DOE and the Regional Servicing Contractors for highway route determination for transporting spent nuclear fuel and high-level radioactive waste to the proposed repository. In addition to the requirements of the U.S. Department of Transportation for highway routing of highway route controlled quantities of radioactive materials, which would include spent nuclear fuel and high-level radioactive waste (49 CFR 397.101), the Regional Servicing Contractors should consider, among other things, preferred time of day travel through urban areas. However, alternate routes may be designated by the State of Nevada.

8.8.1 (4207)
Comment - EIS001160 / 0028
The DEIS does not adequately address issues raised and substantiated by White Pine County during the scoping process. For example:

The EIS should assess the regional economic benefits of using of local versus non-local trucking firms. The DEIS does not provide a comparative assessment of the regional economic benefits of using local v. non-local trucking concerns.

Response
DOE has developed a draft Request for Proposal for waste acceptance and transportation services (DIRS 153487-DOE 1998), as discussed in Section M.3 of the EIS. As outlined in this draft, each successful responder to the final request, called a Regional Servicing Contractor, would be responsible for all shipping arrangements and transportation services in its servicing region(s). DOE anticipates that it would invite national, regional, and local transportation companies to participate in the selection process for the contractor and potential subcontractors to provide specific services. DOE believes that it should defer an evaluation of the use of local versus nonlocal trucking firms to provide heavy-haul truck services to the contractor selection process or the selected contractors. Such an evaluation would not affect the comparison of alternatives or decisions DOE would make using the results presented in the EIS.

8.8.1 (4208)
Comment - EIS001160 / 0029
The DEIS does not adequately address issues raised and substantiated by White Pine County during the scoping process. For example:

The impacts of alternative vehicle payloads upon highway infrastructure, maintenance costs and traffic safety should also be addressed within the EIS. The DEIS does not appear to assess added maintenance costs or the change in crash rates per vehicle miles traveled as a result of slow-moving vehicles (i.e. heavy-haul trucks).

Response
The estimated costs shown in Section 6.3.3.2.1 of the EIS are based on detailed engineering estimates, which include lane widening, truck lane and turnout construction, pavement upgrades, intersection upgrades, and shoulder upgrades. The cost estimates developed for highway upgrades associated with candidate heavy-haul truck transport implementing alternatives include costs for annual maintenance of the roads that would be used. The impact estimates were based on engineering and cost studies documented in *Cost Estimate for Heavy Haul Truck Transportation* (DIRS 154675-Ahmer 1998), including detailed cost estimate for the design, construction, and management of the initial road upgrades for public roads for each of the five candidate heavy-haul truck transport routes.

As described in Section J.1.1.4.2 of the EIS, crash rates and accident severities used in the EIS accident analyses were not adjusted for lower speeds of heavy-haul trucks.

8.8.1 (4212)
Comment - EIS001160 / 0026
The DEIS does not adequately address issues raised and substantiated by White Pine County during the scoping process. For example:

Legal weight truck operational alternatives, which should be considered within the EIS, include escorted versus unescorted shipments. The DEIS does not consider the risk benefit/cost implications of escorted vs. unescorted shipments.

Response
In Section 2.1.3.2 of the EIS, DOE states that the transportation of spent nuclear fuel and high-level radioactive waste would be in accordance with U.S. Department of Transportation and Nuclear Regulatory Commission requirements and that all shipments would be monitored. Commission regulations for in-transit physical protection (10 CFR 73.37) require escorts for all spent nuclear fuel shipments. Within highly populated areas, the vehicle must be occupied by two individuals, one of whom serves as an escort. In addition, the vehicle must be escorted by an armed member of the local law enforcement agency in a separate vehicle. Another option is for the transport vehicle to be led and trailed by vehicles each occupied by at least one armed escort. A transport vehicle travelling through an area not considered highly populated must have as a minimum a driver and another individual who acts as an escort. Another option is for the vehicle to be occupied by a driver and escorted by a separate vehicle occupied by at least two escorts. Given these Commission requirements, unescorted shipments are not an alternative. Additional information on physical protection of spent nuclear fuel shipments is provided in Section M.7.

8.8.1 (4215)
Comment - EIS001160 / 0032
The DEIS does not adequately address issues raised and substantiated by White Pine County during the scoping process. For example:

The DEIS should consider those environmental features which may affect safe transport of radioactive materials. Examples include weather conditions, wildlife conflicts with vehicles, and flood prone areas, among other possibilities. The DEIS only considers these environmental features as such may be impacted by construction and operation of the transportation system. The extent to which these environmental characteristics may impact upon safe transportation is not addressed within the characteristics DEIS.

Response
While the EIS does not specifically evaluate scenarios such as those mentioned in this comment, the transportation accident statistics used in the assessment of nonradiological impacts include accidents where the environmental features described by the commenter are included. Adverse weather conditions and impacts with wildlife are frequently cited as causes or contributors to vehicular accidents. DOE would use a satellite tracking and communications system, such as the TRANSCOM system, for spent nuclear fuel and high-level radioactive waste shipments to provide truck crews and escorts with warnings of upcoming poor weather conditions, allowing the shipment to take an alternate route or proceed to a designated safe in-transit parking area to await better conditions. In addition, routine en route communications would provide warnings of pending floods that could affect a shipment. Accidents involving a vehicle and wildlife would not be a significant threat to release radioactive material from spent nuclear fuel and high-level radioactive waste shipments.

More detailed information on transportation planning and operations is provided in Section M.3 of the EIS.

8.8.1 (4282)
Comment - EIS001160 / 0089
Page 2-80: The third point on this page states, "Impacts from the transportation of spent nuclear fuel and high level radioactive waste from the commercial and DOE sites to the Yucca Mountain Site would be low for either national shipping mode." This statement is unsubstantiated in as much as the table it references is both unclear in its statistics and does not account for worst case scenarios. A better statement would be that statistical probability of impacts would be low, but actual impacts are not only unknown, but liable to random accident, man caused incidents and acts of nature. While these are addressed later in the study, they should at least be prefaced here.

Response
The impacts to the maximally exposed individuals listed in Table 2-7 would be, at worst, an incremental probability of 1 chance in 50 (0.02) of contracting a fatal cancer. This risk is for truck crews who are assumed to receive a maximum dose of 2 rem per year for 24 years. DOE expects these individuals would be subject to occupational exposure limits and their exposures would be monitored. The probability of a member of the public contracting a fatal cancer would be much smaller than that for the truck crew, as lis7ed in Table 2-8.

The consequences to the maximally exposed individual from maximum reasonably foreseeable transportation accidents would be low. This is based on a 1-in-about-70 chance (0.015) of contracting a fatal cancer following a maximum reasonably foreseeable rail accident. These are small probabilities in relation to the probability that an individual would contract a fatal cancer from all potential causes [22 percent or 0.22, according to the American Cancer Society (DIRS 101482-American Cancer Society 1998)], including carcinogens in the environment, natural background radiation, and all other radiation sources. Therefore, DOE believes the data in Table 2-7 are sufficient to support the conclusion that the transportation of spent nuclear fuel and high-level radioactive waste to the proposed repository would represent a low risk.

8.8.1 (4299)
Comment - EIS001160 / 0108
Page 6-31, Paragraph 3, Last Line of this page states, "The maximally exposed individual, assumed to be about 360 meters (I 180 feet) from the accident would receive a dose of about 3.9 rem (Table 6-1 1)." The assumption of the maximally expose individual at nearly 1200 feet is an unrealistic assumption. Where was this derived from? Is there a national standard that references that distance as a common reference? If an average lane, on an average

US Highway is 14 feet, and the average setback distance in any given municipality is about 50 feet, (I have no reference for this, but could probably produce one), then the maximally exposed individual might be an average (not including people who came in for closer a look) of 64 feet from the accident site. Assuming that the radiation dose is inversely proportional to the square of the distance from the source (Sourcebook on Atomic Energy, Glasstone 1979, pp 752 footnote) it is conceivable that a maximally exposed individual might receive perhaps 800 to 1000 rem. Even a brief exposure at this distance would most probably prove fatal. Extended exposures, (greater than an hour) would certainly prove fatal. The estimates of dose do not appear realistic and could be easily exceeded.

Response
As discussed in Appendix J of the EIS, the principle radiological exposure in a very severe transportation accident would be long term exposure to radioactive materials inhaled following release from a cask. Release of radioactive material from a cask would be unlikely in transportation accidents, occurring in only about 0.01-percent of accidents (DIRS 152476-Sprung et al. 2000). The small particles, gasses, and volatile radionuclides would be transported by the smoke and winds and deposited downwind from the accident. Direct exposure to gamma and neutron radiation penetrating the cask would only be the dominant exposure pathway if the shielding of the cask was heavily damaged in a so-called loss of shielding accident. The analysis in the EIS includes estimates of dose to a first responder to a rail accident where the involved cask has lost a portion of its radiation shield. The dose estimated for this first responder is 0.83 rem. This dose is smaller than the dose of 29 rem to a maximally exposed individual who would be 330 meters (1,100 feet) downwind from the accident and would be exposed to a passing cloud of radioactive particles, gasses, and volatile materials.

DOE evaluated doses to the maximally exposed individual from the maximum reasonably foreseeable accident for 50- and 95-percent atmospheric dispersion conditions (that is, consequences would not be exceeded 50 and 95 percent of the time, respectively). The atmospheric dispersion model used in the calculations accounted for several phenomena that would affect the timing and concentrations of released material as the plume dispersed. Some of these phenomena (such as plume rise from the thermal condition of the released material) would cause the concentrations of radioactive material in the plume to be higher at distances farther from the release point than they would be near the release. The model determined the distance at which the maximum concentration would occur, and calculated the consequences to an individual at that distance.

8.8.1 (4363)
Comment - EIS001157 / 0008
The transportation, assumptions must be reevaluated to reflect the transportation system development that is most likely to be in place during the transportation phase. This analysis should account for the effects of major construction activities on the shipments.

Response
The EIS reflects transportation system development in several ways. First, accidents that are caused by or have contributing factors related to highway construction are included in the state-specific accident rates used in the calculations. Second, the EIS performed an analysis that accounted for future construction of the Las Vegas Beltway (see Section J.3.1.1). Third, the EIS presents several alternatives for construction of rail corridors and heavy-haul truck routes, in addition to construction and operation of intermodal transfer stations. Fourth, population data is adjusted to account for projected population growth at the time the shipments are planned to take place. Based on this, DOE believes the EIS adequately accounts for known and projected future transportation system development. However, for purposes of estimating a conservative range of the likely impacts of transportation, the EIS does not attempt to speculate on potential improvements to the highway infrastructure and vehicles that could increase safety, such as intelligent vehicles, enhanced traffic monitoring and control, improved braking systems, improved tires, etc.

8.8.1 (4651)
Comment - EIS001462 / 0002
I agree with most of the statements except for one thing. The use of the linear no-threshold models predict health risks and deaths to the public, grossly exaggerates the risks inherent to storage and moving nuclear waste.

Response
Sections 6.1.1 and J.1.1 of the EIS provide the definitions of accident risk and dose risk used in the EIS impact analyses. DOE recognizes that, although studied extensively for over 75 years, there is still much that is not understood about the health effects of exposures to low level radiation. However, the Department is not aware of any substantial, peer-reviewed literature that indicates disproportionate harm associated with exposure to low-level radiation.

Because of uncertainties in the low-dose/dose-region of the dose effect curve, DOE has selected, for use in the EIS, dose-to-risk factors recommended by the National Council on Radiation Protection and Measurements (DIRS 101856-NCRP 1993) and the International Commission on Radiological Protection (DIRS 101836-ICRP 1991) for estimating the risk of latent cancer fatality from exposure to ionizing radiation. These factors were developed based on the linear no-threshold hypothesis, which assumes that adverse health effects could occur from exposure to ionizing radiation regardless of how small the dose.

DOE, as well as national and international scientific advisory organizations such as the Federal Radiation Council (FRC 1960), the International Commission on Radiation Protection (DIRS 147927-ICRP 1966), the National Council on Radiation Protection and Measurements (DIRS 101857-NCRP 1993), the National Academy of Sciences/National Research Council Committee on the Biological Effects of Ionizing Radiation [BEIR V] (DIRS 100473-National Research Council 1990), and the National Academy of Sciences/National Research Council Committee on an Assessment of CDC Radiation Studies (NRC 1995), have recognized for many years that the use of dose-to-risk conversion factors based on the linear no-threshold hypothesis to estimate stochastic effects (such as latent cancer fatalities) from very low exposures to ionizing radiation might overestimate the actual risk. These organizations have been careful to point out over the years that the use of the risk factors derived using the linear no-threshold hypothesis will provide reasonable assurance the actual effect would not be underestimated. For these reasons, the linear no-threshold hypothesis has been accepted for use by Federal agencies—including DOE, the U.S. Environmental Protection Agency, and the Nuclear Regulatory Commission—for radiation protection and for estimating risk from exposure to ionizing radiation. Until such time as these advisory committees change their acceptance of the linear no-threshold hypothesis and the Federal agencies agree that these changes should be incorporated, DOE will continue to use risk factors recommended by the national and international advisory groups that are based on the linear no-threshold hypothesis.

8.8.1 (4889)
Comment - EIS000337 / 0029
Page 6-24, Table 6-6. I want to know the exposure to a person with a baby who is next to a mostly legal-weight truck that is stopped next to her in a traffic jam where she is not more than 10 feet from the truck. This should be included in the Table 6-6.

Response
The actual exposure would be less than 0.02 rem indicated in the cited table. The exposure distance used in the assessment was 1.2 meters (4 feet), rather than the 3 meters (10 feet) suggested by the comment. The calculated doses are listed in Tables 6-9 (mostly legal-weight truck scenario) and 6-12 (mostly rail scenario). The exposure to a pregnant woman would be the same as the exposure to another individual the same distance from a shipment. Section J.1.3.2.2 of the EIS provides more details on the methods used to evaluate radiological doses to maximally exposed individuals.

8.8.1 (5145)
Comment - EIS001911 / 0004
An analysis of Yucca Mountain must include a complete analysis of transportation issues, including routes, transportation packages, and health and safety concerns.

Response
A complete analysis of transportation issues is presented in Chapter 6, Appendix J, and Appendix M of the EIS. Specifically addressed are issues such as routes, packages (casks), and health and safety.

8.8.1 (5192)
Comment - EIS001443 / 0017
Specific Recommendation: The DEIS should include results of a comprehensive national-scale risk analyses to determine least-risk based solutions to the question of which roadway and rail corridors to use to increase the predictability of waste transportation operations. The risk analysis should provide the quantitative information necessary to confirm or deny the value of each reasonable potential transportation scenario. Impacted populations and resources should be clearly identified in the DEIS. DOE should use the results of this analysis to systematically dictate routes to private carriers. The value of the Chalk Mountain Route for achieving major reductions in risk to civilian populations should be quantified and discussed. The specific assumptions used by the RADTRAN4 model should be discussed by the DEIS.

Response
Chapter 6 and Appendix J of the EIS present the results of a comprehensive national-scale risk analysis. This Final EIS expresses the DOE preference for the mostly rail as mode of transportation, both nationally and in Nevada. However, the purpose of the EIS is not to choose or identify national transportation routes, select a rail corridor, or dictate routes to private carriers. As discussed in Section M.3.2.1.2, carriers would follow U.S. Department of Transportation and Nuclear Regulatory Commission requirements in determining their routes. These routes would be part of the transportation plan that the carrier would prepare and that DOE would provide to states for comment. DOE and the Nuclear Regulatory Commission would approve the final routes.

DOE believes that the EIS adequately analyzes transportation-related impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site is approved. The introduction to Chapter 8 of this Comment-Response Document contains additional information.

The results of the transportation analyses described in Chapter 6 and Appendix J show that the impacts of using any of the candidate routes would be low. Appendix J summarizes the specific assumptions used in the RADTRAN computer code. The references cited in Appendix J provide more details.

8.8.1 (5289)
Comment - EIS001887 / 0035
The use of the all train scenario is especially problematic because, given the lack of rail access to Yucca Mountain, there is no justification for it. The Draft EIS, as discussed elsewhere in these comments, does not demonstrate that rail or intermodal (rail to heavy-haul truck) access to Yucca Mountain is feasible. Therefore, assuming that all spent fuel and HLW [high-level radioactive waste] can be shipped to the site via rail is inappropriate.

Response
The feasibility of constructing a branch rail line to the proposed repository was evaluated in *Nevada Potential Repository Preliminary Transportation Strategy* (DIRS 104795-CRWMS M&O 1995) and CRWMS M&O (DIRS 101214-1996). The results of these studies identified four candidate rail corridors deemed feasible based on AREA (American Railway Engineering Association) guidelines. An additional (fifth) corridor was added in 1997.

The two documents listed above evaluated and confirmed the feasibility of heavy-haul truck transportation in Nevada, based on current regulations, highway conditions, and Nevada Department of Transportation history associated with heavy-haul truck permitting.

8.8.1 (5291)
Comment - EIS000968 / 0008
A traffic safety study should be included.

Response
DOE interpreted this comment as a criticism of the scope of the transportation impact analysis in the EIS. The Department believes that the scope of the analysis is adequate. It based the development of the scope on current repository planning, reviews of past National Environmental Policy Act documentation related to the permanent disposal of spent nuclear fuel and high-level radioactive waste [for example, the *Nuclear Waste Policy Act*

(Section 112) Environmental Assessment, Yucca Mountain Site, Nevada Research and Development Area (DIRS 101314-DOE 1986)], and public scoping meetings. In 1995, DOE conducted 15 public scoping meetings across the U.S and solicited comments on the scope of this EIS, and used this information to shape the scope and analytical approaches used in the EIS.

DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada if the site was approved. However, follow-on implementing decisions, such as the selection of a specific rail alignment in a corridor, or the specific location of an intermodal transfer station in Nevada or the need to upgrade heavy-haul truck routes, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

In general, traffic safety studies support detailed designs of new transportation infrastructure (highways, crossings, traffic signals, bridges, etc.), select specific routes, and provide useful insights to infrastructure alignment in a corridor.

8.8.1 (5374)
Comment - EIS001887 / 0091
Page 2-40; Section 2.1.3.2 - National Transportation

The analysis of national transportation impacts associated with the Proposed Action contained in the Draft EIS is both legally and substantively deficient. The Draft EIS presents an inappropriately generic analysis of impacts; fails to identify cross Country shipment modes and routes that would be necessary to implement the Proposed Action; ignores impacts to corridor cities and communities across the nation; misrepresents actual shipment volumes; underestimates the impacts of worse case accidents and terrorist/sabotage events; understates the potential health effects of routine, non-accident shipment operations; employs unrealistic shipping scenarios as the basis for analysis; ignores potentially significant and pervasive socioeconomic impacts associated with the massive and unprecedented shipping campaign required to move waste from generator locations to Yucca Mountain; and generally understates risks to health, safety, and the environment.

Response
The EIS analyzes the potential environmental and socioeconomic impacts that could occur, directly and indirectly, as a result of the construction, operation, and eventual closure of the monitored geologic repository at the Yucca Mountain site. Quantitative human health and safety impacts, as well as other environmental and socioeconomic impacts (for example, impacts on land use, water resources, biological resources, employment), for transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain are presented in Chapter 6 and Appendix J of the EIS. The transportation impact analysis in the EIS is consistent with the requirements of the National Environmental Policy Act, Council on Environmental Quality guidelines, and DOE policies and guidance.

The EIS was designed to provide the quantitative information necessary to support the decisions to be made based on the EIS. As stated in the Overview of the EIS Summary:

"DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada…Other transportation decisions, such as selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews."

The commenter is correct in that the EIS does not present the impacts to specific people, specific communities, and specific elements of the environment along the national transportation routes, although this information is presented for the State of Nevada. The scope and level of detail for the transportation impact analysis is consistent with National Environmental Policy Act requirements, Council on Environmental Quality guidelines, and DOE policies and procedures.

The analysis is route- and location-specific to the extent needed to support the decisions to be made on the basis of the information contained in this EIS. Development and presentation of impacts to each potentially affected community along the transportation routes would not materially affect the comparisons of alternatives and decisions to be made with regard to construction and operation of the proposed repository. Transportation routing decisions would occur in the future, and would be conducted in accordance with U.S. Department of Transportation routing guidelines and Nuclear Regulatory Commission regulations governing safeguards and security for shipments of spent nuclear fuel.

Because the risks of the entire shipping campaign are small in relation to other risks commonly encountered and accepted by the public, DOE does not believe that nationwide, location-specific impacts for all highway and rail routes would provide any useful insights or beneficial information required to make the decisions to be made from this EIS. Potential impacts to the environment along these routes, such as impacts to water, biological resources, land use, etc., are not quantified in the EIS because no new land acquisition or construction is required to accommodate these shipments. Potential environmental impacts within Nevada are quantified because new construction will be needed to implement the rail and heavy-haul truck alternatives.

The analysis is route-specific to the extent needed to support the decisions to be made on the basis of the information contained in this EIS. Although some "generic" data is used, the analysis used route-specific population distributions, shipping distances, numbers of shipments, etc., and state-level information on accident rates. Special considerations are given to calculating the transportation impacts in Nevada. Nevertheless, in response to comments, DOE has provided in Appendix J of the EIS the detailed state-by-state maps of highway and rail routes used in the analysis in the EIS leading from generator sites to the Yucca Mountain site, the numbers of shipments on each route, and state-by-state impacts (see Section J.4).

DOE has used the best information that was reasonably available on spent nuclear fuel and high-level radioactive waste characteristics and quantities to evaluate transportation impacts (see Appendix A of the EIS). DOE has performed extensive evaluations to project shipping cask capacities that were used in the EIS to determine shipment volumes (see Section J.1.2). In addition, the transportation scenarios were constructed to bracket the total shipment volumes, which would be maximized for a near 100 percent mostly legal-weight truck scenario and minimized for a near 100 percent mostly rail scenario. Transport mode selection is further explained in Section M.3 and in the Request for Proposals for Waste Acceptance and Transportation Services (DIRS 153487-DOE 1998) and located at *http://www.rw.doe.gov/wasteaccept/wasteaccept.htm*.

The National Environmental Policy Act requires assessment of reasonably foreseeable impacts from proposed agency actions. In its various EISs, DOE has defined a reasonably foreseeable accident as one that has a frequency of occurrence of at least once in 10 million years (1×10^{-7} per year). The concept of a maximum reasonable foreseeable accident is sometimes misinterpreted as being a "worst-case" accident.

While the character of the spent nuclear fuel shipments for the project could appear to present opportunity for sabotage, DOE believes these shipments would not be attractive targets in that they would not provide the opportunity for a large number of fatalities or a symbolic blow against a symbol of the nation. DOE also believes that a shipment of spent nuclear fuel or high-level radioactive waste would be an unlikely target in part due to the physical security measures imposed by the Nuclear Regulatory Commission regulations. Under certain conditions, armed escorts would either follow or ride in the truck cab or an escort railcar. DOE would monitor its spent nuclear fuel and high-level radioactive waste shipments through a satellite-based tracking system.

For the Final EIS, DOE reexamined, for both rail and truck casks, the consequences of an attack that results in a release of material (in other words, the cask's shield wall is penetrated) (see Section 6.2.4.2.3 of the EIS), and estimated consequences exceeded those presented in the Draft EIS. Differences in the consequences between the Draft EIS and the Final EIS are due to using "representative" spent nuclear fuel isotopics (as opposed to "typical" in the Draft EIS) and an escalation of impacts to represent population growth to 2035. In addition, in the Draft EIS, the consequences of the sabotage event were bounded by those of the maximum reasonably foreseeable accident. However, the Final EIS analyses estimated that a sabotage event could cause 48 latent cancer fatalities if a legal-weight truck cask was penetrated and 9 latent cancer fatalities for a rail cask.

DOE is aware that there are uncertainties associated with the transportation impact results presented in the EIS. There are uncertainties associated with route characteristics, demographics, weather, atmospheric dispersion models, spent nuclear fuel characteristics, accident rates, release fractions, and many other elements of the risk assessments. Because one of DOE's goals is to choose between alternatives, the consistent consideration of uncertainty among alternatives means that the relative differences in impact estimates among alternatives should not be affected. To account for uncertainties in the data, conservative assumptions were made so the impacts reported in the EIS considers the range of associated potential impacts (that is, they would produce results higher than the true risk). However, DOE has chosen not to use assumptions that would result in overestimation of impacts in all cases, as this practice tends to produce unrealistic and improbable results. Consistent with Council on Environmental Quality regulations (40 CFR 1502.22), DOE is attempting to avoid compounding conservatisms, yielding unrealistic results, in analyzing environmental impacts. Such practices mask the real differences and would not produce suitable results to support choices among the alternatives.

The EIS presents potential environmental and socioeconomic impacts that could occur, directly or indirectly, as a result of the proposed siting, construction, operation, and eventual closure of a monitored geologic repository at Yucca Mountain, including transportation activities. The scope and level of detail of the socioeconomic impact analysis is consistent with the National Environmental Policy Act, Council on Environmental Quality guidelines, and DOE policies and guidance.

In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments, and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $9.4 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 included data compiled from case studies involving actual cleanup of radioactive materials contamination. The studies address consequences for releases of radioactive materials in communities.

Should Yucca Mountain be selected as the site for the monitored geologic repository, DOE would continue to provide clear, accurate information to the public regarding the potential risks of a repository at the site and of transporting waste to the site so members of the public could understand the level of risk that actually existed (rather than perceived) associated with construction, operation, and closure of the Yucca Mountain Repository and related transportation activities.

8.8.1 (5449)
Comment - EIS001887 / 0138
Page 2-79; Section 2.4.4.1 - National Transportation

The summary of national transportation impacts is based on inadequate and incomplete data and analyses and does not reflect the impacts posed by the Proposed Action to people, communities, and the environment along national shipping routes. Since specific routes are never identified, analyses of impacts to at-risk communities are never attempted in the Draft EIS. No effort is made to identify and evaluate the potential for substantial socioeconomic impacts in corridor states and communities (see comments relative to Sections 4, 5, and 6 below). The use of fatalities (either latent cancer fatalities (LCFs) or accident fatalities) as the measure of transportation impacts is inadequate and serves to grossly understate the full range of negative impacts on people and the environment associated with the Proposed Action. As noted in subsequent comments, the models and assumptions used to generate LCFs, transportation accident rates, and accident probabilities and severity are deficient and understate the consequences of a national shipping campaign of the size, complexity, and duration needed to implement the Proposed Action. In addition, entire categories of potential impacts (such as socioeconomic impacts, morbidity, quality of life, etc.) are simply ignored.

Response
The commenter is correct in that the EIS does not present the impacts to specific people, specific communities, and specific elements of the environment along the national transportation routes, although this information is presented for the State of Nevada. The scope and level of detail for the transportation impact analysis is consistent with National Environmental Policy Act requirements, Council on Environmental Quality guidelines, and DOE policies and procedures. However, in response to comments, DOE has revised Appendix J of the EIS to include the state maps showing routes used in the analyses in the EIS, estimated numbers of shipments in each state, and the impacts in each state (see Section J.4).

The transportation impact analysis in the EIS was designed to provide the quantitative information necessary to support the decisions to be made in the EIS. As stated in the Overview to the EIS Summary:

"DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada…Other transportation decisions, such as selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews."

The analysis is route- and location-specific to the extent needed to support the decisions to be made on the basis of the information contained in this EIS. DOE does not intend to designate routes based on the EIS. Rather, this would occur in the future, in accordance with U.S. Department of Transportation routing guidelines. The routes would be submitted to the Nuclear Regulatory Commission for approval.

Potential impacts to the environment along the routes, such as impacts to water, biological resources, land use, etc., are not quantified in the EIS because no new land acquisition or construction is required to accommodate these shipments (see Section 3.2.1 of the EIS). Potential environmental impacts within Nevada are quantified because new construction would be needed to implement the Nevada rail and heavy-haul truck implementing alternatives.

Throughout the EIS, the standard unit for measure of human health impacts is the risk of fatality. This approach was adopted for both radiological hazards and nonradiological hazards (for example, traffic accidents) to simplify the presentation of human health impacts and to facilitate the comparison of impacts among the alternatives. "Fatality" is an easily understood objective measure used historically in EISs prepared by DOE.

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Section 2.5.4 and Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty
- Much of the uncertainty is irreducible, and
- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents,

which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

8.8.1 (5889)
Comment - EIS001901 / 0003
California citizens have not had an opportunity to comment on the substance of the section on transportation of the draft EIS (DEIS). An example of the flaws in the DEIS is the method used by DOE to calculate the extent of a dust cloud. They used the average wind speed for the entire United States and the average model for the entire United States. This type of analysis reduces the impact of the local winds and atmospheric conditions found in California.

Response
As discussed in Section J.1.4.2.1, the EIS uses atmospheric conditions that are generally applicable throughout the contiguous United States because it is not possible to predict specific locations for accidents. These data were used to determine the most likely atmospheric conditions to prevail during a severe accident or act of sabotage. Two meteorological conditions were included in the assessment of the consequences of the maximum reasonably foreseeable accident. These included neutral or stable conditions, in which the consequences would not exceed 50 percent of time, in addition to stable conditions in which the consequences would be exceeded only 5 percent of the time. This was done to ensure that no accident scenarios that are otherwise credible would be excluded from the assessment of the maximum reasonably foreseeable accident because of a low probability of encountering stable atmospheric conditions. In other words, the already low frequency of occurrence of a severe transportation accident, when multiplied by the probability of stable atmospheric conditions, could have caused the accident scenario frequency to drop below the 1×10^{-7} per year cutoff that defines the frequency of the maximum reasonably foreseeable accident. Thus, the EIS attempts to ensure that maximum reasonable accident scenarios are not eliminated from the assessment in the EIS because of a low probability of specific weather conditions.

8.8.1 (5949)
Comment - EIS001622 / 0051
The DEIS lacks a complete and accurate project description. There is no description of transportation of radionuclide waste through California, no environmental consequences evaluation, and no mitigation offered. The DEIS should disclose the potential level of shipments through California, and evaluate potential impacts. In particular, transportation routes could potentially impact habitat for the Amargosa nitrophila, Nitrophila mohavensis, Amargosa vole, Microtus californicus scirpensis, State and Federal Endangered, and desert tortoise, Gopherus agassizii, State and Federal Threatened. The DEIS should include a description of transportation routes, improvements, impacts to these species as well as other State Species of Special Concern, and proposed mitigation measures to offset these impacts.

Response
The transportation impact analysis in the EIS was designed to satisfy the requirements of the National Environmental Policy Act, Council on Environmental Quality guidelines, and DOE policies and guidance. It was also designed to provide the information necessary to support the decisions to be made in the EIS. Lists of the threatened and endangered species, sensitive species, game habitat, springs, and riparian areas known to occur within 5 kilometers (3 miles) of rail corridors have been added to Appendix J of the EIS and those resources have been described more fully in Section 3.2.2.1.4. Sections 6.3.2.1 and 6.3.2.2 have been modified to better describe the impacts to biological resources within 5 kilometers of corridors.

Potential impacts to the environment along the national transportation routes, such as impacts to water, biological resources, land use, etc., are not quantified in the EIS because no new land acquisition or construction is required to accommodate these shipments (see Section 3.2.1 of the EIS). As a result, the EIS focuses on potential impacts to human health and safety along these routes. An environmental baseline characterization of every shipment corridor would not be practical nor would the information be needed to support the decisions to be made from this EIS. In response to comments on the Draft EIS, DOE revised Appendix J to include state route maps, the numbers of shipments in each state, and state-specific health and safety impact estimates, including data for California (see J.4). This is in addition to the route maps that were already included in the Draft EIS (see Section 2.1.3.2 for national routes and Section 2.1.3.3 for Nevada maps).

With regard to evaluating the impacts on specific species, the EIS follows the National Environmental Policy Act and the Council on Environmental Quality guidance on evaluating potential impacts to biota. Basically, plants and animals are no more sensitive to radiation than humans. Both acute and chronic radiation doses that do not adversely affect humans are not known to affect terrestrial species of plants and animals. The *Effects of Ionizing Radiation on Plants and Animals at Levels Implied by Current Radiation Protection Standards* (DIRS 103277-IAEA 1992) reports that there is no convincing evidence that indicates that the current radiological dose standards for humans will harm animal or plant populations. In other words, if humans are adequately protected, plants and animals are likely to be adequately protected.

Additional site-specific information would be necessary prior to construction of a branch rail line or road upgrades to support heavy-haul truck shipping. However (and as stated in the Overview in the EIS Summary), DOE believes that the EIS provides sufficient information on impacts (such as those to biological resources) necessary to make cetrtain decisions regarding the basic approaches (for example, mostly rail or mostly truck shipments) as well as the choice among alternative transportation corridors. Follow-on implementing decisions, such as selection of a specific rail alignment within a corridor, would require additional field surveys, state, local, and tribal government consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

Chapter 9 of the EIS provides DOE's initial list of commitments available at this time, identifies DOE-determined impact reduction features, procedures and safeguards, and mitigation measures under consideration for inclusion in the project plan and design. Chapter 9 also identifies ongoing studies that could eventually influence mitigation measures related to the project plan and design.

As indicated in Chapter 6 of the EIS, more detailed field surveys, government consultation, analyses, and appropriate National Environmental Policy Act reviews would be prepared if a decision was made to select a specific rail alignment within a corridor or a specific location of an intermodal transfer station or the need to upgrade the associated heavy-haul truck routes. This would include consultations with State wildlife management agencies, the Bureau of Land Management, the Army Corps of Engineers, and other applicable government agencies. Besides field surveys, this would include (as applicable) more detailed assessments and analyses of wetlands and other waters; floodplains; sensitive species; effects of habitat fragmentation, interruption of movements, mortality, and harassment on wildlife, horses, and burrows; loss of hunter-generated revenue, spread of noxious weeds, and soils.

8.8.1 (5991)
Comment - EIS001879 / 0017
The Draft EIS assumes that the typical spent fuel assembly has been enriched to less than 3.7 percent and has been stored on site at least 25 years after discharge from a nuclear reactor (pg. A-14). However, waste acceptance criteria permit shipment of more highly enriched, more highly irradiated and much younger (more radioactive) fuel to be shipped to Yucca Mountain. Nye County believes that a revised EIS should examine the effects of shipment of more highly radioactive material. Furthermore, the EIS should consider mitigating policies by which such fuel would be shipped only in sealed canisters that would not be unsealed for either storage or emplacement.

Response
The EIS now analyzes impacts of shipping younger, hotter fuel to the proposed repository at Yucca Mountain. It is true that DOE could ship some spent nuclear fuel that is more radioactive than the 26 year-old pressurized water reactor spent nuclear fuel analyzed in the Draft EIS scenario. Based on comments received and DOE's additional review of technical documents and conduct of hazard analyses, the basis for the transportation impact analysis has been revised to consider commercial spent nuclear fuel that has median hazard. Pressurized water reactor spent nuclear fuel having median hazard would be discharged from a reactor approximately 15 years before shipment to Yucca Mountain. The radionuclide inventories of the representative spent nuclear fuel used in the analysis are presented in Tables A-9 and A-10 of the EIS.

Fuel would be shipped either as uncanistered assemblies or in a sealed canister. The sealed canisters currently (January 2001) certified by the Nuclear Regulatory Commission can be used for storage and transport, but not for ultimate disposal. Therefore, the canisters would need to be unsealed at the repository and the fuel transferred to a waste package. If multipurpose (storage, transport, disposal) canisters were certified by the Commission, DOE would utilize them for disposal.

8.8.1 (6021)

Comment - EIS001679 / 0001

Railway in US is predominately privately owned. There is currently no responsibility of the Dept of Transportation to regulate Americas railways. DOE has relied only on CALTRANS to report on the safety of the railway in California. I submit to you that the DOE does not have adequate information regarding the safety of the rails and whether they are capable of safely carrying this dangerous material. Before moving forward I request that DOE commission an independent study on the safety of rails that are supposed to be used. Accident records and worker safety and staffing. The railways in Calif. are not being studied by anyone. How can you move forward without this valuable information?

Response

The U.S. Department of Transportation is the regulatory agency responsible for establishing and enforcing the standards for rail transportation. The Federal Railroad Administration, which is a branch of the U.S. Department of Transportation, is responsible for safety of the rail system, including track, locomotives, highway crossings, incident reporting, brake systems, etc. The Federal Railroad Administration regulations are provided in 49 CFR Parts 200 to 266.

Adequate rail lines, crossings, bridges, and tunnels exist to support the transportation of materials described in the EIS. The shipment of radioactive materials requires no special transportation infrastructure that is not necessary for safe transport of commodities in the United States today.

8.8.1 (6040)

Comment - EIS001580 / 0006

We believe they [DOE] have misrepresented the radiologic risk by using older, cooler, less radioactive fuel as their waste. We believe they've grossly underestimated routine radiation exposures, particularly at the end of the transportation funnel in Nevada. We believe they've significantly underestimated both the human health consequences and the economic costs of severe accidents, which they acknowledge could release significant amounts of radioactive materials.

Response

The EIS has been revised to use 15-year old, 50,000 megawatt-days per metric ton of heavy metal burnup spent nuclear fuel in the analysis of transportation risk. The EIS has also been revised to estimate impacts based on populations projected for 2035.

A discussion on the costs of cleanup has been added to the EIS. According to the Nuclear Regulatory Commission report *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152456-Sprung et al. 2000), in 99.99 percent of accidents involving transportation of spent nuclear fuel there would be no release of radioactive material from the cask. The economic costs of these accidents would be small.

In 0.01 percent of accidents some radioactive material could be released from the cask. Based on the studies discussed in Appendix J of the EIS, the economic costs of severe transportation accident involving spent nuclear fuel could be in the range of as little as $200,000 to $270 billion. However, extreme cost estimates are for accidents where all factors are assumed to combine in the most detrimental way to maximize consequences. Such extreme, or worst-case, accidents are not reasonably foreseeable so the estimates of cost are not useful for comparisons. The probability of the accidents analyzed in the studies range from about 1 in 1 million per year to less than one in 1 trillion (1 followed by 11 zeros) per year.

The current insured limit of responsibility for an accident involving releases of radioactive materials to the environment is $9.43 billion. Section M.8 of the EIS provides additional information on accident liability.

8.8.1 (6050)

Comment - EIS001580 / 0010

DOE has significantly overestimated the extent to which this waste can be moved by rail. They are optimistic and think they can move 90 percent of it by rail. We've looked at the same information site by site. We think they will only be able to move 50 to 60 percent by rail. The result is there will be many tens of thousands of truck shipments occurring at the same time that there are about ten thousand rail shipments.

Response
Page 6-1 of the Draft EIS clearly states the assumptions used to estimate the impacts of transportation. The mostly rail scenario assumes all waste generator sites with the capability to handle a heavy rail cask would ship by rail. The mostly legal-weight truck scenario assumes all waste except Navy fuel would be shipped by truck. These two scenarios represent the associated range of the possible combinations of rail and truck shipments.

DOE believes that the mostly rail case, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. In reaching this conclusion, DOE considered the capabilities of the sites to handle larger (rail) casks, the distances to suitable railheads, and historic experience in actual shipments of nuclear fuel, waste or other large reactor-related components. DOE also considered relevant information published by sources such as the Nuclear Energy Institute and the State of Nevada. In addition, DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada.

Nonetheless, in response to comments, DOE has analyzed the effects of different mixes of rail and truck shipments. The results of this analysis confirm DOE's estimate that the mostly rail and mostly legal-weight truck scenarios represent a reasonable range (lower and upper bound) of potential environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste.

8.8.1 (6152)
Comment - EIS001654 / 0033
The potential for transportation of the waste to "affect workers and the public through exposure to radiation and vehicle emissions, and through traffic accidents" is listed as an unavoidable adverse impact. There is substantial and adequate detailed information and analysis on that potential in Chapter 6. While there are less vehicle emissions and traffic accident impacts in the No Action Alternatives, the radiological impacts are substantially less under the Proposed Action than by leaving the waste at the 77 sites for 10,000 years under either scenario.

Response
Section 7.2.1.7.3 of the EIS discusses the radiological impacts of the No-Action Alternative. Table 2-7 in the EIS compares the estimated impacts of the Proposed Action and the No-Action Alternative. The table demonstrates that the total life-cycle health impacts of the Proposed Action are smaller than those of the No-Action Alternative even though the No-Action Alternative does not include impacts from transporting spent nuclear fuel and high-level radioactive waste to the repository.

8.8.1 (6326)
Comment - EIS001609 / 0002
During the Q and A session I asked several questions about transport. One of the questions I asked was regarding the assessment, regarding the environmental impact based on transport, you know, what traffic flow models were used. And the answer that I got, were no traffic flow models were used. The exposure, the risk was based on exposure per cask by number of casks, not taking into account traffic flow whatsoever. I think that's a little weird.

Response
The radiological impact modeling presented in Section J.1.3 of the EIS of the included the effects of reduced traffic flow, including the impact on an individual stuck in traffic. In addition, Section J.1.3 provides the average transporter speeds for rural and urban travel.

The estimated exposure of a person stuck in a traffic jam for 1 hour sitting 1.2 meters (4 feet) from a spent nuclear fuel cask is given in Section 6.2.3 of the EIS.

8.8.1 (6502)
Comment - EIS001632 / 0037
Impact on ground water from transport spills. The draft EIS assesses the impact of spills on surface water, but the final EIS should also assess ground water contamination from a surface spill. The transportation impacts analysis should consider ground water recharge zones and the proximity of transportation corridors to ground water supplies and community water systems.

Response

DOE does not specifically analyze a transportation accident, such as a spill, involving contamination of surface water or groundwater because the casks are designed to be water tight and spent-nuclear fuel and high-level radioactive waste are not easily dispersed in water. While small particles could be generated by the impact forces of an accident, and driven out of a shipping cask by a severe fire, the amount of contamination that might ultimately enter groundwater would be much lower than that which would initially enter surface waters. Factors such as soil sorption of radionuclides, rate of flow into recharge areas, dilution by rain water and surface water, dilution by the large volume of ground water, and delay associated with infiltration would mitigate and greatly reduce any contamination that might occur. Although DOE's analyses in Chapter 6 take into account the proximity of surface waters and ground water basins (see Section 6.3.2.2.1 of the EIS as an example), water pathway contamination, including subsequent contamination of food and natural resources, would not be a significant contributor to the radiological risks of transporting spent-nuclear fuel. Analyses performed in previous EISs (see Section 1.5.3 and Table 1-1) have consistently shown that the airborne pathway has the greatest potential for exposing large numbers of people to radioactive material in the event of transportation accident resulting in the release of radioactive materials. DOE has, however, identified potential mitigation measures for surface water and groundwater from the construction and operation of transportation systems. The reader is referred to Sections 9.3.3.1 and 9.3.3.2.

While DOE believes the information presented in these sections of the EIS are sufficient to assess the relative merits of the alternatives, the Department acknowledges additional environmental reviews would be required to assess the potential impacts of such things as specific alignments through a transportation corridor.

8.8.1 (6511)

Comment - EIS001241 / 0014

Does low-level radiological exposure decrease proportionally as rail speed increases?

Does low-level radiological exposure increase proportionally as rail speed decreases.

Would nuclear waste rail cars travel slower in densely populated?

Response

Radiation doses to individuals and populations in areas shipments pass through are inversely proportional to the speed of the transport vehicle through the area. In other words, radiological exposures decrease as speed increases, and increase as speed decreases. See the RADTRAN 4: Volume 3, User Guide (DIRS 101888-Neuhauser and Kanipe 1992) for additional information on the formulae used to calculate incident-free exposures from a moving shipment.

Trains travel slower in densely populated areas than in rural areas. Section J.1.3.2.1 of the EIS provides the shipment speeds used in the transportation impact analysis. As shown, the shipment speed in urban areas is slower than that in suburban areas, which are in turn slower than the speed in rural areas.

8.8.1 (6569)

Comment - EIS001632 / 0057

Page 6-20, third bullet: The term "dose risk" is not a standard term. What does it mean when used in the phrase, "to estimate radiological dose risk to populations"?

Response

DOE defined "dose risk" in a text box in Section 6.1.1 of the EIS as follows:

"Dose risk is the sum of the products of the probabilities (dimensionless) and the consequences (person-rem) of all potential transportation accidents."

8.8.1 (6634)

Comment - EIS001878 / 0027

Impacts of transportation alternatives pre-judged. Before the DEIS even describes the proposed action, the environment that would be affected, or the anticipated environmental impacts, it concludes that "environmental impacts do not appear to be a major factor in the selection of transportation mode, route, or corridor in Nevada for incoming rail shipments." (p. 2-81) Such a conclusion is inappropriate under the description of the proposed action and no-action alternative and, in any event, is unsupported by any evidence and therefore conclusory. The DEIS acknowledges that there are differences in environmental impacts for the 10 implementing alternatives for rail shipments in Nevada.

Response

The statement referred to by the commenter appeared in Section 2.4 of the Draft EIS. Under 10 CFR 1502.14, the recommended format for preparing an EIS is to provide such a summary of findings along with the description of alternatives for the proposed action. As the title of Section 2.4 indicates, this section is a summary of information and impact estimates that appear elsewhere in the document that provide the supporting evidence for DOE's conclusions. The EIS fully describes the Proposed Action for Nevada transportation in Section 2.1.3.3, the environment that would be affected in Section 3.2.2, and the impacts of Nevada transportation in Section 6.3. The commenter is correct in that the EIS acknowledges that there are differences in environmental impacts between the 10 implementing alternatives for rail shipments in Nevada. However, the EIS states that these differences would be small, with the exception of land-use and environmental impacts for each of the 10 implementing alternatives (Section 2.4.4.2).

8.8.1 (6638)

Comment - EIS001160 / 0088

Page 2-80, Table 2-8: This table is unclear to the reader in that it doesn't define time parameter being measured. Does the table imply that the Maximally exposed individual receives 48 rem per year; over the course of all shipments; and so on? Units of measure should be defined over what time period, number of individuals exposed (i.e. collective dose stats) or in percentages based on shipments. The DEIS lacks sufficient information to allow the reader to deduce from either the table or appendices how these figures were arrived at. A maximally exposed individual receiving 48 rem per year (about 10 times maximum allowed under U.S. Federal Radiation Counsel Guidelines and 24 times the maximum accepted as safe practice by DOE) would have significant health risks. Even if this individual was exposed over the course of 10 years, his latent cancer probability should, on the basis of the logic in the DEIS, be about 10 times what the table predicts. The table itself should reference the appendices and how this data was developed and how those figures were arrived at, including related references.

Response

The commenter is correct in that Table 2-8 in the Draft EIS (Table 2-9 in the Final EIS) did not clearly identify the time period over which the exposure occurs. The actual estimate is based on the entire period of transportation operations supporting the repository. Thus the 48 rem calculated for the maximally exposed worker would be the dose received over 24 years and is appropriately expressed in units of rem. This dose is a conservative upper limit dose to a maximally exposed individual worker and is based on a maximum annual dose of 2 rem for a worker at a DOE facility permitted under current DOE radiological safety guidance (2 rem for 24 years equals 48 rem). Section 6.2.3.1 of the EIS discusses the basis for this estimate. The table was clarified in the Final EIS.

8.8.1 (6855)

Comment - EIS001466 / 0003

I want to talk a little bit about the shipments, because there were speakers who said, this is perfectly safe, we're very confident that there's not going to be any problem; and I just want to talk about what these things represent, because that was something that I found amazing at the Yucca Mountain project information center in Las Vegas.

I went through the whole place looking for a definition of radioactivity or what its significance is, and the closest thing I found was a place where it was talking about the radioactive particles, and there was one sentence that said "radiation can cause changes in human tissue." And that was the closest thing to an admission that there might be health effects associated with radioactivity in the whole Yucca Mountain project information center.

Response

Appendix F of the EIS provides a primer that explains the nature of radiation and toxic materials, radiation sources in the environment, radiation effects on human health, and toxic material effects on human health

The EIS contains numerous statements that operation of the proposed repository and associated transportation of spent nuclear fuel and high-level radioactive waste could result in health effects. For example, Section 6.1.1 of the

EIS states that an estimated 2.5 latent cancer fatalities could occur in the general population along transportation routes from radiation exposures resulting from the 24-year campaign of incident-free transport of spent nuclear fuel or high-level radioactive waste.

8.8.1 (7009)
Comment - EIS000402 / 0005
The equipment used, the trucks, trains, caskets, barrels and roads are they 100 percent safe. Has the weather and other environmental factors been taken into account? Would you allow your family to be nearby as the waste is transported?

Response
Although DOE expects that accidents would occur during the transportation of spent nuclear fuel and high-level radioactive waste, families would not be subjected to undue risks from the transportation of spent nuclear fuel and high-level radioactive waste to the proposed repository. To ensure the safe transportation of these materials, DOE would use shipping casks built to the rigorous design standards for Type B containers established by the Nuclear Regulatory Commission (see 10 CFR Part 71). Type B containers are designed and built to retain their radioactive contents in both normal and accident conditions. In addition, there is substantial empirical data on the performance of shipping casks designed for the safe transport of spent nuclear fuel and high-level radioactive waste. In tests, casks have been rammed by high-speed trains, smashed into solid concrete structures, immersed in high-temperature fires, and submerged underwater. The results of these tests have confirmed that Type B casks can sustain severe transportation accidents while maintaining their safety functions. An analysis of the cask response to accident forces, referred to in the EIS as *Reexamination of Spent Fuel Shipment Risk Estimates* (Sprung et al. 2000), estimates that less than 0.01 percent of all accidents would generate forces that could lead to a release of radioactive material from a Type B shipping cask. Based on the evaluation in the EIS, no radiological impacts are projected for either the mostly legal-weight truck or mostly rail scenarios.

Weather and other environmental factors might contribute to the occurrence of accidents. Weather-related accidents are included in the state-specific accident rates use in the EIS to calculate the impacts of transportation accidents and are thus taken into account in the EIS.

DOE is confident that the transportation of spent nuclear fuel and high-level radioactive waste can be conducted in a safe and environmentally acceptable manner. The doses to maximally exposed individuals from routine (incident-free) transport, as well as the impacts from maximum reasonably foreseeable accidents, would not result in any radiation-induced prompt fatalities or latent cancer fatalities.

8.8.1 (7066)
Comment - EIS001337 / 0022
The County [Lincoln] and City [Caliente] recommended that the DEIS consider operational alternatives including escorted versus unescorted shipments; time of day travel restrictions versus unrestricted transport; and use of local versus non-local trucking firms. The first two were suggested for consideration for their contribution to risk management. The third option set was recommended for evaluation to determine regional economic benefits. The DEIS does not consider operational alternatives for legal weight trucks as recommended by the County and City during scoping.

Response
All legal-weight truck transport would have to meet the requirements of 10 CFR Part 73 for physical protection (including escorts) for shipment of regulated quantities of irradiated reactor fuel. Highway routes would be selected in accordance with U.S. Department of Transportation regulations (49 CFR 397.101) for transporting highway route controlled quantities of radioactive materials. States or tribes may designate alternative preferred routes under 49 CFR 397.103. Additional information on regulatory requirements, security requirements, and proposed operational protocols for spent nuclear fuel and high level radioactive waste transportation to Yucca Mountain have been added to the EIS in Appendix M.

Appendix M of the EIS summarizes the draft request for proposal for waste acceptance and transportation services (DIRS 153487-DOE 1998).

8.8.1 (7157)

Comment - EIS001337 / 0053

The County [Lincoln] and City [Caliente] and comments to the scope of the EIS pointed out that risks associated with transportation of radioactive wastes through the County and City have been an important topic of local inquiry. The City and County pointed to research they sponsored which was performed by the University of Nevada, Las Vegas Transportation Research Center to evaluate the risks of transporting waste by highway and by rail through the area.* The study did conclude that the total accident risk (person rem) in the County for rail and highway transport was significantly greater than that estimated for other like areas around the United States. Total risk associated with rail and highway waste transport in rural areas of the County was also found to be significantly than that estimated for other like areas across the United States. In their comments, the County and City noted that although absolute levels of risk may be considered low, this study clearly indicates that residents of Lincoln County may be exposed to significantly greater levels of risk. The County and City urged DOE to recognize that the repository EIS must consider these differences as a means to ascertain viable options for reducing risk to levels commensurate with other regions of the United States. The DEIS does not provide a comparative assessment of transportation risks through Nevada, or more importantly Lincoln County and other regions of the United States. As a consequence important differences between levels of risk are not revealed. Within Nevada, the DEIS does demonstrate that risks of transporting waste through rural areas is riskier than through urban areas. However, the DEIS does not provide sufficient identification and evaluation of measure to mitigate greater risk levels in rural areas.

*Sathisan, Shasi et. al., Risk Analysis for Spent Nuclear Fuel Transportation Through Lincoln County Volume I: Rail Shipments, Volume IIA: Highway Shipments, Volume IIB: Technical Appendix, Transportation Research Center, Howard Hughes College of Engineering, University of Nevada, Las Vegas, February 1995.

Response

More than 9,000 rail shipments would pass through Caliente and Lincoln County over 24 years under the national mostly rail scenario. In addition, Caliente is under consideration as the location of an intermodal transfer station and is the starting point for several rail corridor and heavy-haul truck implementing alternatives. However, no shipments would pass through Caliente or Lincoln County under the mostly legal-weight truck scenario. The impacts from incident-free transportation and accidents would be low for either national transportation scenario (see Section 2.4.4.1 of the EIS). Therefore, the EIS demonstrates that the transportation of spent nuclear fuel and high-level radioactive waste would pose no undue risk to individuals or populations, either in Nevada or nationally.

DOE has not performed a comparative risk assessment of transportation through Caliente and Lincoln County with other areas of the country. The results of such an assessment are not necessary to support the comparison of alternatives and decisions to be made in the EIS. However, the Final EIS includes state-specific impacts, so this information is available on a state-by-state basis.

With regard to risk reduction and mitigation, DOE is committed to protecting human and environmental health as its first priority. Transportation of spent nuclear fuel and high-level radioactive waste would be conducted and risks would be managed in accordance with Federal regulations. These regulations are established to protect human health and safety. However, DOE will consider the costs and benefits of additional protective measures as it conducts more detailed transportation planning and studies to support the proposed repository. Section 9.3 of the EIS discusses potential measures under consideration to mitigate the impacts of transporting spent nuclear fuel and high-level radioactive waste to the proposed repository. Section M.3 presents information about DOE's current planning for transportation of spent nuclear fuel and high-level radioactive waste.

8.8.1 (7209)

Comment - EIS001337 / 0088

Pages 3-1 and 3-2 The listing of topics included in the description of the affected environment is not consistent with the topics assessed in the environmental consequence section. For example, under socioeconomic, housing and community services were considered as affected environment. In the environmental consequences section for Nevada transportation no estimates of the consequences to housing and community services is provided. This implies that the analysis of environmental consequences is incomplete in that it has not considered all aspects of the affected environment.

Response
Legal-weight truck shipments in Nevada would use existing highways. Because no new land acquisition or construction would be required, this EIS focuses on potential impacts to human health and safety and the potential for accidents involving legal-weight trucks.

For development of branch rail lines and heavy-haul truck capabilities, including an intermodal transfer station, Sections 6.3.2 and 6.3.3 of the EIS have been modified to discuss impacts to the various aspects of the potentially affected environment, including housing and community services.

8.8.1 (7459)
Comment - EIS001912 / 0034
Pg. 2-81 First Bullet states, "Environmental Impacts for each of the 10 implementing alternatives will be small." How can DOE make this statement when site-specific analysis for each route has not been completed?

Response
In Section 2.4 of the EIS, DOE summarizes that environmental impacts for each of the 10 implementing alternatives for shipments coming into Nevada by rail would be small. DOE bases this conclusion upon analysis of the existing information available for analysis; a full description of the proposed action for Nevada Transportation is found in Section 2.1.3.3; a full description of the environment that would be affected is described in Section 3.2.2; and the impacts of Nevada Transportation are more fully described in Section 6.3.

Based on the results of the impact analyses presented in Chapter 6 and Appendix J of the EIS, as well as the results published in numerous other studies and environmental impact analyses cited in the EIS, DOE is confident that spent nuclear fuel and high-level radioactive waste can be and would be safely transported to Yucca Mountain. DOE believes, as the EIS reports, that the potential impacts of this transportation would be so low for individuals who live and work along the routes that these individual impacts would not be discernible even if the corresponding doses could be measured. The analysis presented in the EIS factored in the characteristics of spent nuclear fuel and high-level radioactive waste, the integrity of shipping casks that would be used in transport, and the regulatory and programmatic controls that would be imposed on shipping operations (see Appendix M of the EIS). The EIS analytical results are supported by numerous technical and scientific studies that have been compiled through decades of research and development by DOE and other Federal agencies of the United States, including the Nuclear Regulatory Commission and the U.S. Department of Transportation, as well as by the international community, including the International Atomic Energy Agency.

8.8.1 (7643)
Comment - EIS001912 / 0101
Modules 1 and 2 nearly double the amount of waste shipped to Yucca Mountain-but no additional latent cancer fatalities. Please explain how this can occur. Wouldn't it be reasonable to assume additional latent cancer fatalities would occur with an increase in shipments?

Response
The number of latent cancer fatalities from transportation does increase with the amount of waste shipped to the Repository. Section 6.2 of the EIS presents summaries of the impacts of transporting spent nuclear fuel and high-level radioactive waste for the Proposed Action. Section 8.4 presents the impacts of transportation for the Inventory Modules. The impacts presented in Section 8.4 are greater than those listed in Chapter 6.

8.8.1 (7655)
Comment - EIS001928 / 0012
Pg. S-53-3rd para. – There is some confusion on what constitutes a rail shipment. It is stated that the "…mostly rail scenario would involve approximately 13,400 cask shipments (10,800 rail shipments and 2,500 legal-weight truck shipments)". If it takes 10,800 rail shipments to transport 10,800 casks, then obviously, the load is only one cask per train. Surely, rail transport will be more efficient that that. Please clarify.

Response
Because DOE cannot predict the exact number of rail casks that would be transported in each train, it assumed conditions that would represent the upper range of the impacts of transportation. In completing its analysis, DOE

assumed that each rail cask would be shipped on a single railcar. Accident rates were used for general freight transport on a railcar-per-mile basis. This accident rate information is independent of the number of railcars containing casks that are transported in a single train. The analysis thus assumed that 10,800 shipments of rail casks would be made by 10,800 railcars, so all probable accident occurrences could be considered within the range of possible consequences.

8.8.1 (7671)
Comment - EIS000817 / 0016
Your EIS makes all the same mistakes NRC [Nuclear Regulatory Commission] made in certifying so called "generic" cask designs. You think you can create a scenario on paper that bounds all "generic" analysis of transportation so you don't look at specifics. You don't even know if rail or truck will be the priority mode. You don't even really consider the no action alternative as reasonable for implementation. You need to analyze impacts to specific national transportation routes based on available information and compare transport to leaving it in the states that created the waste.

Response
It is impossible for DOE to specify the exact mode of transportation for all shipments or the exact routes that would be used years before shipments would be made. However, even though DOE prefers that most shipments be made using rail, it should be recognized that some truck shipments would be required. This is why the EIS analyzes both truck and rail as modes of transportation.

The EIS compares the impacts of the Proposed Action and the No-Action Alternative. Section 2-4 of the EIS summarizes this comparison.

Because the specific casks that would be used for truck and rail shipments of spent nuclear fuel and high-level radioactive waste have not been designated, the EIS addresses the performance of generic cask designs in estimating transportation impacts. The important factors needed for this impact assessment are cask performance under normal and accident transport conditions and cask capacity. Any cask used by DOE would have to be certified by the Nuclear Regulatory Commission.

The transportation analysis presented in the EIS is not a generic analysis of transportation impacts. For example, the number of shipments is based on site-specific estimates of spent nuclear fuel discharges, not generic estimates. The analysis of transportation impacts was based on specific routes using route-specific population densities and distances, and state-specific information such as accident rates.

8.8.1 (7948)
Comment - EIS001903 / 0012
The list of bullet items on page J-39 and/or the discussion on pages J-40 and J-41 regarding the "second kind of information" and the third kind of information" should be clarified. For example, the first full paragraph on page J-41 states, "The third kind of information--the distances individuals live from the route used in the analysis--is the estimated the [sic] number of people who live within 800 meter…of the route." Is the "third kind of information" distances? If so, this information is not explicitly used in RADTRAN4, which assumes uniform population density within a 1-mile corridor. Or is the "third kind of information" population density? If so, How does this differ from the "second kind of information"?

Response
In response to comments, the transportation analyses in Appendix J of the EIS have been substantially revised to improve readability. The third kind of information – the distances individuals live from the route used in the analysis – is the distance from the transportation route that people live within the 800-meter (0.5-mile) corridor. This information is used to define the population density distribution inputted into RADTRAN5. The EIS has been changed to correct this error.

8.8.1 (8059)
Comment - EIS000391 / 0016
Mineral County wants it put on record that a "health assessment" (at the cost of DOE) should be done now of all the affected counties. This assessment would reflect what is out there now. By showing the present health situations

now, a case may be made for not adding to a potential number of latent cancer fatalities, and for documenting current health conditions prior to a radioactive waste accident.

Response
The EIS provides information on the radiation environment in the Yucca Mountain region in Section 3.1.8.2 and health-related mineral issues in Section 3.1.8.3. Additional information on the current conditions in the environment in the Yucca Mountain region can be found in the *Environmental Baseline File for Human Health*) (DIRS 104544-CRWMS M&O 1999). The region of influence for which data has been collected consists of land within 80 kilometers (50 miles) of the proposed repository site. Mineral County falls outside the region of influence for the proposed repository site. Mineral County is, however, within 80 kilometers of candidate transportation corridors to Yucca Mountain. However, it would not be practical to conduct a "health assessment" of all potentially affected transportation routes between the waste generator sites and the proposed repository.

8.8.1 (8139)
Comment - EIS001653 / 0084
Pg. 6-22 It does not appear that DOE considered the greater waste volume scenario in its transportation analysis, why? This should be part of the proposed action.

Response
Sections 8.4, J.3.4, and J.3.5 of the EIS quantify the transportation impacts of the greater waste volume scenarios, referred to in the EIS as Inventory Modules 1 and 2.

8.8.1 (8171)
Comment - EIS001653 / 0100
[Chapter 8] Modules 1 and 2 nearly double the amount of waste shipped to Yucca Mountain-but no additional latent cancer fatalities. Please explain how this can occur. Wouldn't it be reasonable to assume additional latent cancer fatalities would occur with an increase in shipments?

Response
The number of latent cancer fatalities from transportation does increase with the amount of waste shipped to the Repository. Section 6.2 of the EIS presents summaries of the impacts of transporting spent nuclear fuel and high-level radioactive waste for the Proposed Action. Section 8.4 presents the impacts of transportation for the Inventory Modules. The impacts presented in Section 8.4 are greater than those listed in Chapter 6.

8.8.1 (8218)
Comment - EIS001021 / 0006
I am concerned in general about the lack of DOE's solicitation of input from the academic medical community on medical safety issues regarding the overall Yucca Mountain plan. In particular, I worry about the potential adverse health effects on people who must load, unload and move the high-level radioactive waste across the country, and I worry especially about the people who inhabit the towns and cities like St. Louis, Missouri and Belleville and East St. Louis, Illinois, where the railroads pass and derailments are well known and common occurrences. We need a lot more information on nuclear transport accidents that have occurred in the 2,500 "successful" shipments of similar high-level radioactive wastes that I have read have already taken place in the U.S. Where can I get this information?

Response
Potential adverse health effects to cask handling personnel, truck and rail crews, and the general public are quantified in Chapter 6 and Appendix J of the EIS. A discussion of the basis for the health effects estimates from exposures to radioactive materials and toxic chemicals is provided in Appendix F. Information on past accidents that occurred in the transportation of all radioactive materials, including spent nuclear fuel, are available from several sources, as discussed in Section J.1.4.2.3.1.

Transportation by legal-weight truck would involve shipments along Interstate System highways in accordance with U.S. Department of Transportation regulations (49 CFR 397.101). These regulations limit shipments to Interstate System highways and require shippers to use Interstate System beltways and bypasses where available. DOE recognizes that even an incident-free transportation campaign could adversely affect people who live or work near transportation routes. Section 6.2.3.1 of the EIS indicates that there would be 2.5 latent cancer fatalities from legal-weight truck transport of spent nuclear fuel and high-level radioactive waste for the 24-years of operation. DOE also recognizes the potential for transportation accidents and analyzed impacts resulting from transportation accidents in Section 6.2.4. Although, given the number of shipments, traffic accidents would be probable, DOE does not believe that any accident would result in the release of radioactive material, primarily because of the structural integrity of the casks in which the material would be transported. In the more than 2,700 shipments involving spent nuclear fuel over the past 3 decades, there have been seven accidents, with no release of radioactive materials to the environment.

The EIS states that approximately four traffic fatalities could occur in the course of transporting high-level radioactive waste and spent nuclear fuel under the mostly legal-weight truck scenario during the 24 years of operation and 350 million kilometers (220 million miles) of highway travel. In the mostly rail scenario, there could be approximately 3 traffic and train accident fatalities. Though an accident resulting in release of radioactive material would be unlikely, DOE analyzed the maximum reasonably foreseeable accident that would involve the release of material from a transportation cask. This would be an extremely unlikely event (an annual probability of 2.8 [rail] to 2.4 [truck] in 10 million). A leaking transportation cask could only occur if mechanical forces (impact) and heat (fire) exceeded the design limits of the transportation cask structures and materials. The EIS states that in an accident involving a leaking transportation cask could result in approximately 5 latent cancer fatalities in an urban area under stable (slowly dispersing) atmospheric conditions. The air pathway is the most likely mode of exposure to radioactive materials, although the analysis included other pathways, including water and contaminated food sources. A severe accident in another population zone (for example, rural) or in other atmospheric conditions would have lower consequences.

8.8.1 (8288)
Comment - EIS000817 / 0105
P. 4-86. I frankly think that basing your analysis on some old Navy representative site from 5 manufacturers at that time probably isn't very valid. Manufacture of containers is just coming into its "heyday" with lots of new designs up for NRC [Nuclear Regulatory Commission] generic certification. Who are these 5 facilities you base your analysis on? Just what do they actually make? ("Components" are not "casks.")

Response
Section 4.1.15.1 of the EIS describes the overall approach and analytical methods used for the environmental evaluation of the baseline data from the *Department of Navy Final Environmental Impact Statement for a Container System for the Management of Naval Spent Nuclear Fuel* (DIRS 101941-USN 1996). As pointed out, cask designers have submitted designs to the Nuclear Regulatory Commission for a number of transportation casks. Manufacture of casks following issue of certificates of compliance by the Commission could be accomplished by several qualified manufacturers. For this reason and to provide information for use in the analysis, five sites, having existing buildings and equipment needed to manufacture cask components, were used to provide a representation of cask manufacturing sites. The representative sites used are located in Westminster, Massachusetts; Greensboro, North Carolina; Akron, Ohio; York, Pennsylvania; and Chattanooga, Tennessee. It is common for cask manufacturing companies to purchase certain cask components rather than manufacture the entire cask in-house. As such, impact analysis in the EIS conservatively assumed that all manufacturing would occur at a single site to overemphasize potential impacts.

8.8.1 (8376)
Comment - EIS001873 / 0061
P. 6-24 & 26. The DEIS should state in which community the "maximally exposed" resident will live and on which section of the route the worker will work.

Response
Information on how radiological impacts to workers and members of the general public from incident-free transportation and severe accidents were evaluated are explained in Chapter 6 and Appendix J of the EIS. Individuals modeled are hypothetical members of the workforce supporting transportation activities and members of the general public at a specified distance from the shipment or other transportation activity. As detailed in the EIS, specific transportation modes and routes have not yet been determined. At this time, many years before shipments could begin, it is impossible to predict accurately which highway routes or rail lines DOE could use for all

shipments that would be made. Before such shipments began, states or tribes may designate alternate preferred highway shipping routes, and highways and rail lines could be built or modified. Therefore, it is not possible to identify in which community the maximally exposed resident live or on what section of the route the maximally exposed worker would work.

8.8.1 (8470)
Comment - EIS000817 / 0142
P. 6-20. Unloading storage casks and loading transport casks will be a big concern at beginning and end of transport route. Fuel handling repeatedly will have an effect on the assemblies and they must be checked. Can you predict these effects? I don't think so. Loading operations are not "routine" and unloading has not been done!! And transportation cask testing needs to be redone. Sabotage event evaluation needs to be redone. The world has changed a lot -- these need updating as to road and rail hazards and new weapons available.

Response
The impacts of loading spent nuclear fuel and high-level radioactive waste into transportation casks at 72 nuclear powerplants and 5 DOE sites are evaluated in Section 6.2.2 of the EIS. The impacts of unloading operations at the proposed repository are evaluated in Section 4.1.7.3.

Significant experience in both wet (that is, underwater) and dry (that is, within heavily shielded enclosures) handling of spent nuclear fuel, including loading and unloading storage and transportation casks has been accumulated in the United States and Europe. This experience has been applied to the design and operation of cask and fuel handling systems. This experience confirms that handling operations can be conducted safely without undue risk to the public and workers and without causing significant damage to spent nuclear fuel assemblies.

The NWPA requires that DOE use casks certified by the Nuclear Regulatory Commission when transporting spent nuclear fuel and high-level radioactive waste to a repository. The Commission certifies that a cask meets the requirements of 10 CFR Part 71, which prescribes radiological performance standards for casks subjected to specific test conditions. These test conditions represent the kinds of forces that a cask would encounter in a severe transportation accident. A cask's ability to survive the tests prescribed by 10 CFR Part 71 can be demonstrated in several ways. These options include component, scale-model, and full-scale tests to demonstrate or confirm the performance of the casks. As part of its detailed technical review, the Commission decides what level of physical testing or analysis is appropriate and necessary for each cask design. If the applicant for a certificate fails to demonstrate compliance with the regulations, the Nuclear Regulatory Commission would not issue a certificate. Therefore, if full-scale testing was necessary, it would be done before the Commission issues a certificate of compliance. For a more complete discussion of cask testing, see Section M.4 of the EIS. DOE has the option of evaluating the need for a full-scale cask test demonstration in the future.

The Nuclear Regulatory Commission is currently considering in the Package Performance Study (DIRS 155571-Best 1999), which is an update of the *Shipping Container Response to Severe Highway and Railway Accident Conditions* (DIRS 101828-Fischer et al. 1987; also called the Modal Study) used in the EIS, a request to conduct full-scale testing of a present generation cask to demonstrate the validity of computer models used in cask design and certification activities. DOE will evaluate the results of the Package Performance Study when it is published.

The impacts of acts of sabotage on spent nuclear fuel shipping casks are evaluated in Section 6.2.4.2.3 of the EIS.

8.8.1 (8603)
Comment - EIS001837 / 0007
You heard on Tuesday, 2/22/00 at the hearing in San Bernardino, our California Governor's office, the State Departments and the County have found the Yucca Mt. DEIS document to be inadequate and deficient. The document is so deficient that it needs to be redrafted and recirculated.

Clearly, a rewrite is needed to address alternative routes that should have been included in the DEIS, for example, there are no alternate routes proposed for the area between Barstow and parts east. If the railroad line is closed down for some reason in the Needles area, what will be done with the shipment. Will roads be used? If so, alternate routes must be assessed. The routes through Nevada are no longer considered alternatives due to pressure from people in Nevada. So they forced a single funnel through Needles and left Needles totally out of the hearings. This is unacceptable and a clear case of environmental injustice.

Response
National transportation routes and associated environmental impacts are addressed in Section 6.2 of the EIS. Section 6.2.3 analyzed the impacts of transporting spent nuclear fuel and high-level radioactive waste using two scenarios: mostly legal-weight truck and mostly rail. The routes selected for the analyses met U.S. Department of Transportation regulations (49 CFR 397.101) and conformed to normal routing railroad practices. While these might not be the routes used in the future because of infrastructure changes or other variables, they are representative and therefore the analyses provide sufficient information on which to make decisions. In response to comments on the Draft EIS, DOE revised Appendix J to include state route maps, the numbers of shipments in each state, and state-specific health and safety impact estimates, including data for California (see Section J.4). This is in addition to the route maps that were already included in the Draft EIS (see Section 2.1.3.2 for national routes and Section 2.1.3.3 for Nevada maps).

Because there are not very many rail routes to choose from in the Southern California area, there is no reasonable route between Barstow and parts east. The maps available on the Yucca Mountain Internet site (*http://www.ymp.gov*) and in Appendix J of the EIS do not show any rail routes through Needles. However, if a railroad line was closed down anywhere, shipments would be stopped and protected until the line was opened.

8.8.1 (8647)
Comment - EIS001889 / 0002
The DEIS fails to consider the impacts of legal-weight truck transportation through White Pine County, and even goes on to demonstrate (Table J-78) that the risks of transporting SNF and HLRW through the County are significantly greater than risks associated with current routes used to transport low level radioactive waste (LLWR). This could possibly warrant significant cumulative impacts.

Response
Section J.3.1.3 of the EIS presents a sensitivity analysis to assess the affect on the impacts in Nevada of use of candidate alternative highway routes for legal-weight trucks. This analysis includes one route that would travel through White Pine County and provides estimates of impacts for Nevada if this route was used. The impacts are greatest for this route principally because it is the longest route. None of the transportation implementing alternatives analyzed by DOE in the EIS involves White Pine County. Under the mostly rail scenario, no shipments would travel through White Pine County, so there would be no impacts. In addition, unless the State of Nevada designated a preferred route that passed through the County no truck shipments would pass through White Pine County on the way to the proposed repository so there would be no impacts. None of the rail or heavy-haul truck implementing alternatives travels through White Pine County. Therefore, it can be concluded that no transportation impacts would occur in White Pine County under any implementing alternatives analyzed in the EIS. However, should the State of Nevada submit alternate routes to DOT and these routes meet DOT requirements, these routes could be used by DOE.

8.8.1 (8657)
Comment - EIS001837 / 0023
PARD demands to know exactly how many REMs are being emitted from the casks and what the effect of the exposure would be upon people working at the downtown Needles depot and to the people living on California Avenue and Front Street. The change over at the Needles depot is likely to be long, with security personnel, engineers, and conductors switching and with fueling.

Response
U.S. Department of Transportation regulations [49 CFR 173.441(b)] limit the amount of radiation that a cask can emit to 10 millirem per hour at a distance of 2 meters (6.6 feet) from the side of the transport vehicle. The dose rate at 30 meters (98 feet) would be less than 0.2 millirem per hour. In reality, the measured dose rates from actual shipments would probably be lower than the maximum allowable under current limits but would not be higher. Nevertheless, DOE used the maximum allowable dose rate to calculate exposures to the public along routes, which included people living or working within 0.8 kilometer (0.5 mile) on each side of the route. In addition, the analysis determined collective doses to the public while a shipment was stopped in railyards along the route. The EIS

analyzed impacts to maximally exposed individuals such as rail crew members, inspectors, and railyard workers. Section J.1.3.2 describes these analyses, and Section 6.2.3.2 contains their results.

8.8.1 (8717)
Comment - EIS002119 / 0005
About half of the -- about half of the document is devoted to transportation, to impacts related to transportation. There is little consideration of the feasibility of transportation plans. For example, there was no -- there's no thought it seems of what effect heavy-haul operations would have through rugged terrain on insufficient infrastructure through congested urban areas on insufficiency analyzed routes in conflict with present planned land uses. We would imagine that even a minor incident would lead to -- to congestion not even seen during the worst of commute hours.

Response
DOE has taken into consideration the impacts of heavy-haul truck transportation and they are discussed in Section 6.3.3.1 of the EIS and the subsequent subsections that address the specific impacts of heavy-haul truck implementing alternatives (routes), including land use and ownership and socioeconomics, including current urban and transportation plans. Since proposed heavy-haul truck routes are on existing highways that could require upgrades (see Section J.3.1.2), the analysis found no current conflicts with existing or planned land use. Some of the measures that could lessen these potential impacts are outlined in Section 2.1.3.3.3.2, which discusses the proposed road upgrades to accommodate heavy-haul truck traffic.

Operating policies and protocols that would be implemented for the transportation program are those required by the U.S. Department of Transportation, the Nuclear Regulatory Commission, and the Department, as outlined in the request for proposal for Regional Servicing Contractors and summarized in Section M.3 of the EIS. These protocols address routing procedures through rugged terrain and during severe weather and road conditions. The impacts analyzed in the EIS include impacts of traveling through urban areas including slow speeds, congested traffic and sharp turns (DIRS 154675-Ahmer 1998).

DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

8.8.1 (8786)
Comment - EIS001907 / 0021
Nuclear power plants are required to have a 50 mile radius emergency planning zone. How come the DEIS only looks at a half mile radius of these transportation routes?

Response
Emergency planning zones for nuclear powerplants in the United States are actually much smaller, with a typical radius of about 16 kilometers (10 miles). Radiological impacts of accidents, however, are typically calculated out to about 80 kilometers (50 miles), because that is the extent to which most particulates would be dispersed from near ground-level releases. This is the typical practice of Nuclear Regulatory Commission, Environmental Protection Agency, and DOE analyses. This EIS used techniques consistent with accident analyses conducted at nuclear powerplants and analyzes the impacts from transportation accidents out to 80 kilometers. Radiological impacts of incident-free transport were calculated out to 800 meters (0.5 mile) from the road or branch rail line. This is because the radiation dose rate emitted by the shipping casks would be vanishingly small and individual and population exposures would be essentially zero beyond this distance.

8.8.1 (8946)
Comment - EIS001922 / 0010
The DEIS grossly underestimates the transportation risks from the unprecedented 53,000 truck shipments (estimated) of nuclear waste over 24 years of operation. Containers have not yet been constructed or tested.

Therefore realistic estimates of radiation leakage or container performance in an accident are not possible. The DOE's assumption that accidents will not occur is entirely unreasonable. In sum, EPA's [Environmental Protection Agency's] analysis of transportation impacts is entirely unreliable and should not be used as a basis for decisionmaking. It is important to reiterate here the potential benefits of waiting fifty years before transporting irradiated nuclear fuel so that the material will be much less radioactive and thus less deadly in the likely event of an accident.

Response
The transportation analysis presented in the EIS is based on the latest reasonably available information on the performance of spent nuclear fuel casks during transportation accidents. The EIS does not assume that accidents would not occur. Instead, the EIS evaluates both the radiological and nonradiological impacts of transportation accidents (see Chapter 6 and Appendix J of the EIS). The EIS uses standard, well-accepted methods to estimate transportation impacts in a realistic, yet conservative manner, and consequently DOE does not believe that impacts are underestimated or are unreliable, and does believe that the estimates are appropriate for decisionmaking.

While it is true that spent nuclear fuel would be less radioactive in 50 years, the impacts from transporting spent nuclear fuel are already very low, so waiting 50 years would not provide a practical reduction in the already very low risks.

8.8.1 (8975)
Comment - EIS001040 / 0017
Where are the evaluations of costs, risks and route specific data on possible accidents, population density, weather?

Response
Section 2.1.5 of the EIS provides information on the costs of the Proposed Action, including the cost of waste acceptance, storage, and transportation (nationally $4.5 billion and in Nevada $0.8 billion). Section 6.2 addresses the impacts of transporting spent nuclear fuel and high-level radioactive waste from generation or storage facilities to the proposed repository. The analyses in that section covered both incident-free transportation and potential accidents. Appendix J discusses the methods and data used for those analyses, including population and weather data.

8.8.1 (9055)
Comment - EIS001284 / 0007
WHEREAS, there are many unanswered questions regarding the safety of transporting and storing radioactive waste.

Response
Based on the results of the impact analyses presented in Chapter 6 and Appendix J of the EIS, as well as the results published in numerous other studies and environmental impact analyses cited in the EIS, DOE is confident spent nuclear fuel and high-level radioactive waste can be and would be safely transported to Yucca Mountain. DOE believes, as the EIS reports, that the potential impacts of this transportation would be so low for individuals who live and work along the routes that these individual impacts would not be discernible even if the corresponding doses could be measured. The analysis presented in the EIS factored in the characteristics of spent nuclear fuel and high-level radioactive waste, the integrity of shipping casks that would be used in transport, and the regulatory and programmatic controls that would be imposed on shipping operations (see Appendix M). The EIS analytical results are supported by numerous technical and scientific studies which have been compiled through decades of research and development by DOE and other Federal agencies of the United States, including the Nuclear Regulatory Commission and the U.S. Department of Transportation, as well as by the international community, including the International Atomic Energy Agency.

DOE believes that the EIS adequately analyzes transportation-related impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site is approved. The reader is referred to the introduction to Chapter 8 of the CRD for additional information.

8.8.1 (9215)
Comment - EIS001938 / 0004
The DEIS fails to detail and analyze the transportation corridors that will be utilized to transport high-level nuclear waste to Yucca Mountain, which are an integral part of the repository project.

The DEIS fails to adequately address the issue of transport of high-level radioactive waste along state and U.S. highway systems, saying that it is not relevant to the decision being made. Without a decision to store radioactive waste at Yucca Mountain this EIS would not be prepared, thus not only is the issue of waste transport relevant, it must be analyzed in this EIS. See 40 CFR 1508.25 (Re: Scope of an EIS. Connected actions, e.g., those which are interdependent part of a larger action and depend on the larger action for their justification, should be analyzed in the same impact statement.) Without a detailed assessment of proposed routes for the transportation of high-level radioactive waste, it is impossible for the reader of the document or the decisionmaker to fully understand the (in this case) likely and significant impacts of the proposed action on the human and natural environment.

For instance, it is our understanding that State Route (SR) 127 is one of the routes of choice for transport of waste to Yucca Mountain. How will transport of high-level radioactive waste along this key access route to DVNP [Death Valley National Park] affect visitation to the Park? How, in turn, will a possible decrease in visitation to DVNP via SR 127 affect the economies of communities that lie along the transportation corridor (e.g., Tecopa, Shoshone, Death Valley Junction)? Is SR 127 a feasible route for transport of high-level radioactive waste from an engineering standpoint? Are the communities along SR 127 adequately equipped, from an emergency response standpoint, to handle likely catastrophic consequences to both humans and the environment in the event of a reasonably foreseeable accident-related spill? The DEIS has failed to address and resolve these significant issues.

Impacts to natural resources of DVNP, Ash Meadows NWR and designated Wilderness from a transportation-related accident could likewise be disastrous and should be considered in the revised EIS. Were a spill to occur in or near the Amargosa River it would destroy this important desert riparian system. Spills could -- and would -- decimate vegetation and kill wildlife. Death Valley National Park is likewise put at risk, since much of SR 127 constitutes the boundary of Death Valley National Park.

It is unclear what other routes of travel might be used beyond SR 127. Information indicates that Great Basin National Park and Lake Mead National Recreation Area might also enjoy the dubious distinction of being within the realm of transport of high-level nuclear waste. What are possible impacts to these protected areas in the event of a hazardous spill? Beyond the possible impacts to the human and natural environments from a hazardous spill, how might transport of high-level waste adjacent to other protected places in the country affect visitation to Parks and local attractions, local economics, etc?

In conclusion, the threat of disastrous accidents from transportation-related spills is very real, and needs to be comprehensively addressed in this document. The revised DEIS needs to include a clear description of transportation routes that reflects a careful consideration of potential hazards and problems with each selected route, and a thorough description of the stringent safety and mitigation measures that will be adopted in order to ensure protection of both natural resources and communities in the Death Valley region and beyond.

Response
At this time, years before shipments could begin, it is impossible to predict accurately which highway routes or rail lines DOE could use for all shipments. Before such shipments began, states and tribes could designate alternate preferred highway shipping routes, and highways and rail lines could be built or modified. Therefore, for the analysis in this EIS, DOE selected potential highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (typically highways and bypasses that are part of the Interstate Highway System). The Department based its selection of potential rail routes for use in the analysis on current rail practices, because there are no comparable Federal regulations applicable to the selection of rail routes for the shipment of radioactive materials.

In response to public comments, DOE included maps of the highway routes and rail lines it used for analysis in Section J.4 of the EIS. It also included potential health and safety impacts associated with shipments for each state through which the routes used in the analysis pass. These numbers should be considered tentative, as there are many factors that could cause the modes and routes to change including reactor operations, trading of pickup allocations, selection of a different transportation mode for shipments by the reactor operator, or recommendation of alternate routes by states or tribes. Impacts in individual states could be different if the actual routes from generator sites to Yucca Mountain are different from those analyzed. However, it is not likely that the total impacts from transportation would be changed significantly or that any particular route connecting an origin/designation pair would present a significant difference in impact from any other.

Following U.S. Department of Transportation regulations, truck shipments in Nevada would enter the State on Interstate-15 and proceed to the planned beltway and then to U.S. 95 and the repository unless the State designated alternate routes. In addition to analyzing the impacts of using highway routes that would meet Department of Transportation requirements for transporting spent nuclear fuel, DOE evaluated how the estimated impacts would differ if legal-weight trucks used other routes in Nevada. As a sensitivity analysis, six other routes identified by a Nevada DOT study were evaluated. Two of these routes used SR 127. The results of this analysis are reported in Section J.3.1.3 of the EIS. None of these routes would be used unless they were designated by the routing agencies of the affected states.

"Real-life conditions" that would involve various types of collisions (such as airplanes and military trucks with explosives), various natural disasters, specific locations (such as mountain passes), or various infrastructure accidents (such as track failure) in effect constitute a combination of cask failure mechanisms, impact velocities, and temperature ranges, which the EIS does evaluate. DOE has revised the EIS to describe the maximum reasonably foreseeable accident in terms of cask failure mechanisms, range of impact velocities, and temperature range.

As described in Section M.5 of the EIS, as with any transportation accident, state and tribal governments have primary responsibility to respond to and protect the public health and safety in their jurisdictions in accidents involving radioactive materials. This includes providing, managing, and maintaining responsibility for emergency response capabilities. Although DOE would originally provide the funding for training, each state and tribe would determine how it wants to administer that funding. Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using an up-front planning grant and based on availability of funds in annual Program budgets specified by Congress.

8.8.1 (9265)
Comment - EIS000325 / 0004
Now, we know the industry here will do a good job to start off with, but we're talking about a 30-year program. And so those shipments in Germany have been canceled and they're on hold because of the kind of sloppiness that you can except to see in a program here. So I'm just saying if we're going to talk about the international experience, let's talk about all of it.

Response
In response to comments, DOE has provided information in Appendix M of the EIS on the regulations that govern the transportation of spent nuclear fuel and high level radioactive waste. Details on the proposed operational aspects of the transportation program are also provided in Appendix M. Together, the strict transportation regulations and the detailed operational program should ensure that that a high level of quality is maintained throughout the transportation program.

DOE recognizes that human and organizational factors are important contributors to the occurrence of accidents, including transportation accidents, and recognizes that there is a potential for the performance of one or more transportation system components to degrade over time as operations become routine and repetitive. However, the contributions of human and organizational factors to the total accident risks are not explicitly analyzed in the EIS. Because the truck and rail accident rates used in the EIS include accidents from all potential causes, including those with human or organizational root causes, providing additional details on such factors would not appreciably change the results presented in the EIS.

8.8.1 (9303)
Comment - EIS001888 / 0028
The DEIS used outdated databases, geographic data files, and inaccurate or misleading maps to support the conclusions of the transportation, health effects and public safety analyses.

Response
In this EIS, DOE has used computer models it has used in previous EISs and other studies. These models are widely accepted by the national and international scientific and regulatory communities. For instance, DOE selected the RADTRAN 5 computer program to estimate radiological impacts to populations from incident-free transportation and from accidents. RADTRAN, which was originally developed by Sandia National Laboratories in the late 1970s, has been used in many other previous DOE EISs, and it has undergone periodic review and revision. In 1995, an independent review of RADTRAN 4 (immediate predecessor to RADTRAN 5) demonstrated that it yielded acceptable results when compared to "hand" calculations. More recently, an independent review found that RADTRAN 5 overestimates the measured radiation dose to an individual from moving radiation sources.

To ensure that the EIS analyses reflect the latest reasonably available information, DOE has either incorporated information that has become available since the publication of the Draft EIS or modified existing information to accommodate conditions likely to be encountered over the life of the Proposed Action. For example, the analysis in the Draft EIS relies on population information from the 1990 Census. In this Final EIS, DOE has scaled impacts upward to reflect the relative state-by-state population growth to 2035, using 2000 Census data.

DOE believes that the EIS adequately analyzes transportation-related impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site is approved. The introduction to Chapter 8 of this Comment-Response Document contains additional information.

8.8.1 (9401)
Comment - EIS001888 / 0099
The DOE adopted an unorthodox strategy in preparing the DEIS. Ignoring thirty years of best practice in the preparation of environmental impact statements, DOE chose to adopt the narrowest possible definition of an EIS and its purpose. In doing this, the DOE ensured that it found no impacts. The transportation analysis is typical of this approach. For example, the DEIS did not study traffic impacts that are normally considered in an EIS, choosing to base the estimation of transportation Impacts solely on the risk of population and worker exposure to radiation. Congestion, lane widths, shoulder widths, peak hour traffic, roadbed conditions, and other conventional measures of traffic impacts were ignored. By narrowing the range of impacts studied, DOE made certain that the DEIS would identify no substantive transportation impacts.

Response
DOE believes that the EIS adequately analyzes environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

For the reasons discussed above, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

In addition to radiological health impacts, the transportation analysis presented in the EIS considers traffic congestion and peak-hour traffic in EIS Sections 6.3.1 and 6.3.3.1. The preliminary design analyzed in the EIS included an analysis of lane and shoulder width along with roadbed conditions, see CRWMS M&O (DIRS 154448-1998). Thus, the EIS considers potential impacts other than fatalities where it is necessary to support the broad transportation-related decisions given above.

8.8.1 (9406)
Comment - EIS001888 / 0102
There is an increased interest in risk assessment methodologies that better characterize and quantify uncertainty. The National Academy of Sciences has stated that, "Whenever possible, (upper bound potency estimates) should be supplemented with other descriptions of cancer potency that might more adequately reflect the uncertainly associated with the estimates." The National Research Council has made a similar call for a characterization of uncertainty. However, the estimates in the DEIS were presented as authoritative statements of risk, and the high degree of uncertainty in the estimates was left unstated. In order for the DEIS to have credibility with the public and policymakers, the DOE should have pursued an assessment strategy that addressed uncertainty rather than ignored it.

Response
DOE is aware that there are uncertainties associated with the transportation impact results presented in the EIS. There are uncertainties associated with route characteristics, demographics, weather, atmospheric dispersion models, waste characteristics, accident rates, release fractions, and many other elements of the risk assessments. Because one of DOE's goals is to choose between alternatives, the consistent consideration of uncertainty among alternatives means that the relative differences in impact estimates among alternatives should not be affected. To account for uncertainties in the data, conservative assumptions were made so the impacts reported in the EIS would bound the potential impacts. Examples of conservative assumptions include: accident release fractions which were selected from the high end of the distribution of experimental results, regulatory maximum radiation dose rates were assumed for all shipments, even though the actual dose rates would be significantly lower for most shipments, consequences to maximally exposed individuals were presented for 50 percent and 95 percent (for example, consequences exceeded only 5 percent of the time) meteorological conditions, and evacuation and sheltering, which could reduce radiological exposures, were not included in the accident risk calculations. DOE has chosen not to use conservative assumptions in all cases, as this practice tends to produce unrealistic and improbable results. Consistent with Council on Environmental Quality regulations (40 CFR 1502.22), DOE is attempting to avoid compounding conservatisms, yielding unrealistic results, in analyzing environmental impacts. Such practices mask the real differences and would not produce suitable results to support choices among the alternatives.

8.8.1 (9552)
Comment - EIS001888 / 0225
The DOE adopted a peculiar strategy in preparing the DEIS. Ignoring thirty years of best practice in the preparation of Environmental Impact Statements, the DOE chose to adopt the narrowest possible definition of impacts. By narrowly defining what an EIS is and what an EIS is supposed to do, the DOE ensured that it found no impacts. The transportation analysis is emblematic of this approach. The DEIS did not study traffic impacts that are normally considered by an EIS. Congestion, lane widths, shoulder widths, peak hour traffic, roadbed conditions, and other conventional measures of traffic impacts are ignored. By narrowly defining impacts as solely radiological health impacts this ensures no substantive impacts will be identified by the DEIS. Another example is the emergency management section. By insisting that the DEIS is not an emergency planning document, the DOE avoided preparing any estimates of the costs necessary to mitigate the impacts of emergency response. This approach to impact assessment is consistent with other DOE impact assessments (notably the Nevada Test Site EIS), but does not conform to best practice in the field of impact assessment. While this approach may have facilitated speedy preparation of the DEIS, it did not result in a thorough analysis of the impacts of the program and violates the letter and spirit of NEPA [the National Environmental Policy Act].

Response
Section 6.3 of the EIS describes the various categories of information acquired to assess impacts of transportation in Nevada. These are the general categories usually addressed in National Environmental Policy Act documents. They include assessment of impacts of construction and operation on land use and ownership (including access, hunting, mining, and ranching), water resources, biological resources (including endangered species), occupational health

and safety, socioeconomics, noise, cultural resources, utilities and energy, flood plains, and other potential impact areas.

The EIS reflects a similar philosophy in its analyses to those that have been used in the past. In addition to radiological health impacts, the transportation analysis presented in the EIS considers traffic congestion and peak-hour traffic in EIS Sections 6.3.1 and 6.3.3.1. The preliminary design analyzed in the EIS included an analysis of lane and shoulder width along with roadbed conditions, see CRWMS M&O (DIRS 154448-1998). DOE believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada if the site was approved. However, follow-on implementing decisions, such as the selection of a specific rail alignment in a corridor, or the specific location of an intermodal transfer station in Nevada or the need to upgrade heavy-haul truck routes, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and the appropriate National Environmental Policy Act reviews.

It is the Department's opinion that the EIS adequately analyzes impacts of and emergency planning for transporting spent nuclear fuel and high-level radioactive waste.

8.8.1 (9554)
Comment - EIS001888 / 0227
There is an increased interest in risk assessment methodologies that better characterize and quantify uncertainty. The National Academy of Sciences has stated that, "Whenever possible, (upper bound potency estimates) should be supplemented with other descriptions of cancer potency that might more adequately reflect the uncertainly associated with the estimates." The National Research Council has made a similar call for a characterization of uncertainty. However, the estimates in the DEIS were presented as authoritative statements of risk, and the high degree of uncertainty in the estimates was left unstated. In order for the DEIS to have credibility with the public and policymakers, the DOE should have pursued an assessment strategy that addressed uncertainty rather than ignored it.

Response
DOE is aware that there are uncertainties associated with the transportation impact results presented in the EIS. There are uncertainties associated with route characteristics, demographics, weather, atmospheric dispersion models, waste characteristics, accident rates, release fractions, and many other elements of the risk assessments. Because one of DOE's goals is to choose between alternatives, the consistent consideration of uncertainty among alternatives means that the relative differences in impact estimates among alternatives should not be affected. To account for uncertainties in the data, conservative assumptions were made so the impacts reported in the EIS would bound the potential impacts. Examples of conservative assumptions include: accident release fractions which were selected from the high end of the distribution of experimental results, regulatory maximum radiation dose rates were assumed for all shipments, even though the actual dose rates would be significantly lower for most shipments, consequences to maximally exposed individuals were presented for 50 percent and 95 percent (for example, consequences exceeded only 5 percent of the time) meteorological conditions, and evacuation and sheltering, which could reduce radiological exposures, were not included in the accident risk calculations. DOE has chosen not to use conservative assumptions in all cases, as this practice tends to produce unrealistic and improbable results. Consistent with Council on Environmental Quality regulations (40 CFR 1502.22), DOE is attempting to avoid compounding conservatisms, yielding unrealistic results, in analyzing environmental impacts. Such practices mask the real differences and would not produce suitable results to support choices among the alternatives.

8.8.1 (9572)
Comment - EIS001888 / 0246
The software used to analyze transportation risk in the DEIS was RADTRAN version 4.019. Extensive criticism of RADTRAN has been made in other venues. Although courts have allowed RADTRAN's analysis of risk, the many shortcomings of this approach should be examined in the DEIS. In particular, the DEIS should have provided the

full RADTRAN outputs and interpreted their meaning. A portion of these outputs would have been the decontamination costs should an accident occur.

Response

Sections 6.2.1 and J.1.1 of the EIS describe in some detail the codes used, including RADTRAN, and the results they generate. Criticisms of RADTRAN were specifically discussed in Sections 3.3 and 4.3 of the report *Validation of the Transportation Computer Codes HIGHWAY, INTERLINE, RADTRAN4, and RISKIND* (DIRS 101845-Maheras and Pippen 1995). Many of the criticisms were related to previous versions of RADTRAN. Other criticisms were related to data used in other analyses, and as such are not directly related to the analyses presented in the EIS. RADTRAN 4 output for the analyses in the Draft EIS and RADTRAN 5 analyses in the Final EIS were provided to the commenter on compact disk. DOE conducted a literature review on the subject of potential cleanup costs and summarized the results in Section J.1.4.2.5.

8.8.1 (9585)

Comment - EIS001888 / 0260

Transportation System Description

The DEIS is insufficient because it fails to provide any description of the complex system that will be needed to transport SNF on the scale proposed in the DEIS. Without such a description, an assessment of the impacts of transporting waste is impossible. DOE has recognized the importance of this problem in the past, but has not addressed it in the DEIS. In previous documents, DOE identified the following components of the transportation system: Transportation Cask Systems, Service and Maintenance Support, Field Operations, and Planning and Control.

Substantial questions are raised in the DEIS but not answered. The response of the DOE to questions about the system used to move waste from origin sites to the final repository has been that there are many unknowns in the transportation system and that final study of the system requires determination of site suitability. There are two problems with this argument.

First, is that the information contained in the DEIS will be used by Congress to make decisions about the disposal program. By presenting admittedly piecemeal and incomplete information, the DOE opens itself to charges that it was disingenuous with Congress and the American people. The DOE should remedy this problem by clearly labeling those areas in the DEIS where the information is untrustworthy and incomplete. The second flaw in the DOE’s argument is that it assumes that once the site is selected, it will be possible to transport the waste. By failing to provide a comprehensive, credible study of the transportation system, the DOE gives the misleading impression that only site characterization is an important issue. In other words, only site characterization is a relevant issue. Given the quality of the DEIS’ analysis, this does not seem likely.

Response

DOE believes that the EIS adequately analyzes environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

DOE is aware of the hazards associated with spent nuclear fuel and high-level radioactive waste. DOE is also aware that the transportation system needed to ship these materials to the proposed repository would be complex, consisting of many interrelated components. However, the single most important components of the transportation system would be the Type B shipping casks. DOE would use casks certified by the U.S. Nuclear Regulatory Commission to meet the requirements of the Commission’s transportation regulations in 10 CFR Part 71.

Another important component of the transportation system would be field operations, planning, and control of the shipments. DOE has developed a draft Request for Proposal for Regional Servicing Contractor(s) for waste acceptance and transportation. Section M.3 of the EIS describes the draft Request for Proposal. The selected contractor(s) would be responsible for shipping arrangements and transportation services in the servicing region(s).

For the reasons discussed above, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

If the Yucca Mountain site was approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

8.8.1 (9589)
Comment - EIS001888 / 0263
Specialty Casks

A fundamental advantage of intermodal handling is to reduce accidents through uniform packaging. The questions raised about the MPC [multipurpose canister] are equally pertinent to the numerous specialty casks that must be designed to meet the needs of the other waste forms the DEIS proposes to dispose of in Yucca Mountain. Questions about the characteristics, designs and certification for the other waste forms are the same as for the MPC. The DEIS is mute on the significant problems of handling different waste forms and potentially different waste packages at Yucca Mountain and the intermodal facilities where the waste will be handled.

Response
DOE has considered the potential difficulties in handling different waste forms and waste packages at Yucca Mountain and different models of shipping casks the candidate intermodal transfer facilities. The Department is aware that special handling equipment and procedures could be necessary for each type of waste, waste package, and shipping cask it would handle and foresees no significant problems associated with handling at the proposed repository or an intermodal transfer facility. According to the Draft Request for Proposal for Waste Acceptance and Transportation Services (see Section M.3 of the EIS), a Regional Service Contractor(s) would be responsible for providing the equipment to handle and prepare each transportation cask for unloading. The contractor(s) would provide training on the use of the equipment and operating procedures and maintenance procedures for the equipment (including shipping casks and ancillary handling equipment). The contractor(s) would develop more detailed planning for providing these services at the repository and the selected intermodal transfer facility in the initial phase of the contract(s).

8.8.1 (9596)
Comment - EIS001888 / 0270
In-Transit Storage

It is inevitable that delivery schedules will be delayed or interrupted. The impacts of moving waste uninterrupted from the origin to the destination for a single shipping campaign are different from a complex, multi-state shipping campaign that will take place over a period of years. The DEIS transportation plan should have addressed the likely effects of in-transit storage on the risks of transporting waste. Storage in-transit is a likely event and the DEIS should describe the DOE's plans to manage that requirement and describe the amount of waste that may have to be stored in transit to the Yucca Mountain facility.

Response
In-transit storage of spent nuclear fuel and high-level radioactive waste shipments would not occur. Shipments would travel nonstop from waste generator facilities to the proposed repository, with necessary stops for food, refueling, rail classifications, and en route inspections. However, DOE recognizes that not all shipments would proceed uninterrupted. Weather, traffic, and road and rail conditions could interrupt continuous movement of a shipment from its origin to the destination. For this reason, DOE would use a satellite tracking communication system such as TRANSCOM and for the shipments. The TRANSCOM system is capable of real-time communications with truck crews and rail escorts and DOE could use it to warn them of upcoming delays and other adverse conditions. It would then be possible to reroute a shipment over an alternative route to avoid the adverse conditions. As an alternative, shipments could proceed to safe parking areas where they could wait until the condition cleared and the trip could continue. Safe parking areas would be identified for each route and the information made available to crew members and carried with the shipment, as discussed in Section M.3.2 of the EIS.

An incident that required the use of a safe parking area would be unlikely. The radiation doses from such an incident would be small, because the number of people exposed and the likely exposure durations would be smaller than those for a routine shipment. DOE believes that the combined low likelihood of occurrence and low radiation doses from a safe parking incident would not contribute significantly to the transportation impacts presented in the EIS. As a consequence, DOE has not evaluated such impacts in the EIS.

8.8.1 (9612)
Comment - EIS001888 / 0284
The DEIS should be rescinded and a new DEIS issued that 1) assesses traditional transportation impact concerns, 2) State of Nevada identified routes, 3) bypass routes (should the northern beltway become unavailable), 4) describe why the Air force was awarded special status and Clark County was not, and 5) describe the process used to select one or more implementing alternatives.

Response
The EIS addresses "traditional" transportation impacts (traffic congestion, accident rates, and traffic volume) at a level of detail sufficient for DOE to make a mode and route selection (see Section 6.3). DOE's analyses for legal-weight truck transport concludes that existing highways are sufficient and, though upgrades would be necessary for a selected heavy-haul truck route, existing rights-of-way would be sufficient. Section J.3.1.3 contains an analysis of State of Nevada-identified routes.

Public comments submitted to DOE during hearings on the scope of the EIS resulted in the addition of a fifth rail corridor and heavy-haul truck route, the Caliente-Chalk Mountain Corridor and Caliente/Chalk Mountain heavy-haul truck route. However, the U.S. Air Force has expressed concern that for reasons of national security it cannot envision any route through the Nellis Air Force Range that would not conflict with its training and testing mission. For this reason, the Caliente-Chalk Mountain Corridor and Caliente/Chalk Mountain heavy-haul truck route are listed in the EIS as nonpreferred alternatives.

Protocols for Regional Servicing Contracts given in Section M.3 of the EIS describe how the contractors would develop transportation plans, including selection of routes and modes.

If the Yucca Mountain site was approved, DOE would issue at some future date a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

8.8.1 (9613)
<u>Comment</u> - EIS001888 / 0285
National Route Selection

The DEIS is incomplete due to its failure to analyze the impact of transporting SNF [spent nuclear fuel] across the nation. Of 146 pages in the transportation section of the report, only 17 pages are devoted to national transportation of Spent Nuclear Fuel. The Problem of selecting routes on which to transport radioactive materials has incited litigation and defied every attempt at reaching consensus. The problems associated with route selection begin with construction at Yucca Mountain and flow back to each of the generating sites. Each suite of routes poses different risk characteristics nationally as well as in the State of Nevada. The DEIS assumes that truck and rail shipments on different routes possess the same risk characteristics. The DEIS presents the shortest distances to transport the waste without considering any of the likely alternatives to shortest distance.

<u>Response</u>
Chapter 6 and Appendix J of the EIS contain substantial analyses related to the national transportation of spent nuclear fuel and high-level radioactive waste. However, in response to comments, considerable state-by-state information has been added to Appendix J, which now includes maps for each state, including Federally recognized Native American Reservations, that show routes used in the analyses of impacts presented in the EIS, tables listing rail and truck shipments originating in and passing through each state, and incident-free and accident risk impacts for each state. Appendix M provides additional supplemental information related to the transportation of radioactive material, such as regulations, cask safety and testing, transportation services and protocols (including planning and route selection), emergency response, physical protection, and liability.

As discussed in Section J.1.4.2.3 of the EIS, state-specific accident rates and route-specific population density data were used to estimate transportation impacts. As a consequence, truck and rail shipments on different routes would possess different risk characteristics. In addition, the EIS does not present the shortest distance routes. For example, the truck routes were based on U.S. Department of Transportation routing regulations that recommend the use of beltways around cities. Using beltways around cities often results in routes that are longer than passing directly through these same cities. More details on transportation routing are in Section J.1.2.2, M.2.4, and M.3.2.1.2. Maps of the transportation routes analyzed in the EIS are in Section J.4.

8.8.1 (9630)
<u>Comment</u> - EIS001888 / 0299
In order for the DEIS to be a sufficient document, the practice of risk assessment used in the DEIS should conform to best practice in the field. Based on a comparison with the GEIS, it is not clear how a probabilistic risk assessment for transporting high level radioactive should be done. A primary requirement for the DOE is to recognize the unique circumstances of the planned transportation operations for which there is little or no historical experience and empirical data. The transportation of spent fuel from reactors to the proposed repository at Yucca Mountain has no parallel. Previous spent fuel transportation experience is qualitatively different from the proposed action. The DEIS should be withdrawn and replaced by new DEIS that performs a complete probabilistic risk assessment that is found to be sufficient by a qualified peer review committee.

<u>Response</u>
Over the past 3 decades, there have been more than 2,700 shipments of spent nuclear fuel in the United States with no releases of radioactive material due to a transportation accident. This excellent safety record is consistent with the overall highway and rail accident data. DOE used standard accepted analysis methods in the EIS, including probabilistic risk assessment, to estimate transportation impacts. Risk assessment accident data for commercial transport have been used in conjunction with analyses of cask performance to estimate risks associated with spent nuclear fuel transport. The approach is appropriate and widely accepted as the basis for credible risk assessment.

8.8.1 (9978)
<u>Comment</u> - EIS001888 / 0483
[Clark County summary of comments it has received from the public.]

Commenters said that the EIS should include a detailed description of all affected environments and impacts to those environments. More specifically, the analyses should include: (1) worst-case and mile-by-mile assessments of potential impacts along transportation routes and the emergency-response measures along these routes; (2) the effects of the environment on the safety of waste shipments, including a discussion of the controversial nature of waste transport; (3) Retrievability of the waste, along with the disposition of the retrieved waste; (4) the economic, social, health, and psychological costs of transporting and storing the waste, including the costs of accidents; (5) negative effects on property values, businesses, and tourism near the site and along transportation routes; and (6) risk, risk perception, and stigmatization.

Response

1. Section J.1.4.2 of the EIS has been revised to include a description of the maximum reasonably foreseeable accident. As in the Nuclear Regulatory Commission report *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000), the description is in terms of cask failure mechanism, impact velocity range, and temperature range for the accident. Accidents are not described in terms of specific circumstances, because various accidents could lead to the same combination of cask failure mechanism, impact velocity range, and temperature range. However, event trees illustrate the different combinations of events that occur during an accident. This approach to accident analysis precludes the necessity for analyzing numerous specific cases involving various collisions (such as air planes and military trucks with explosives), various natural disasters, specific locations (such as mountain passes), or various infrastructure accidents.

   As described in Section M.5 of the EIS, as with any transportation accident, state and tribal governments have primary responsibility to respond and to protect the public health and safety in their jurisdictions in accidents involving radioactive materials. This includes providing, managing, and maintaining responsibility for emergency response capabilities. Although DOE would provide funding for training, each state and tribe would determine how it wants to administer that funding. Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. Section 180(c) is discussed in Section M.6.

2. Section M.3 of the EIS provides a discussion of the protocols and procedures to be implemented by a Regional Servicing Contractor and its subcontractors under adverse weather or road conditions. Shipments would not be dispatched on a route where expected conditions would not comply with the requirements in the procedures. Weather forecasts would be obtained by the Regional Servicing Contractor as part of the preshipment planning. Forecasts for rain, snow, fog or high winds and tornado warnings would be considered in the determination of the shipment schedule. Shipments would not travel when severe weather conditions along routes or adverse road conditions made travel too hazardous to proceed.

   Nuclear Regulatory Commission regulations do not specifically address natural disasters such as earthquakes, floods, or tornadoes. However, numerous tests and extensive analyses, using the most advanced analytical methods available, have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents that occur. A study completed by Sandia National Laboratories for the Nuclear Regulatory Commission (DIRS 152476-Sprung et al. 2000) concluded that casks would continue to fully contain spent nuclear fuel in more than 99.99 percent of all accidents. DOE believes that information on planning and management of shipments for normal conditions as well as abnormal conditions caused by natural and manmade phenomena provided in the EIS is sufficient.

3. Section 122 of the NWPA requires DOE to maintain the ability to retrieve the materials emplaced in the repository in the event that a decision were made to retrieve them to protect public health and safety or the environment or to recover constituent parts of spent nuclear fuel. Although DOE does not anticipate that retrieval would be necessary, it would utilize the repository design to maintain the ability for future generations to retrieve these materials for at least 50 years and possibly for as long as 300 years after emplacement operations have begun (see Section 4.2.1 of the EIS).

4. In response to public comments, DOE has included a discussion on the costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews costs for cleanup presented in past studies, including a report used in the 1986 environmental assessment as well as information submitted by the State of Nevada in its public comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $9.4 billion. Cost data used in the studies included data compiled from

case studies involving actual cleanup of radioactive materials contamination. The studies address consequences for releases of radioactive materials in communities. Although the studies project high costs for clean up following severe accidents, the accidents evaluated are very unlikely and, as a consequence, DOE believes the economic risks of transportation accidents is very small.

5&6 In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Section 2.5.4 and Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty
- Much of the uncertainty is irreducible, and
- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

8.8.1 (10023)
Comment - EIS001888 / 0517
[Clark County summary of comments it has received from the public.]

Transportation risk assessment methodology biased toward shortest path not optimal path. DOE needs to incorporate calculated risk, collateral risk, contectural [sic] risk, and perceived risk not just use probabilistic risk analysis (PRA).

Response
The transportation risk analysis is based on U.S. Department of Transportation routing regulations for trucks and railroad operating practices for trains. This does not necessarily yield the shortest path for a route from a particular origin to a destination. The EIS uses standard and well-accepted transportation analysis methods, including probabilistic risk assessment, to estimate transportation impacts.

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Section 2.5.4 and Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty

- Much of the uncertainty is irreducible, and

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While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

8.8.1 (10025)
Comment - EIS001888 / 0520
[Clark County summary of comments it has received from the public.]

DOE's approach to risk assessment is limited to PRA [probabilistic risk assessment]. Should include Calculated Risk, DOE's approach Risk, Contextual Risk, and Perceived Risk. Suggested starting point 1993 draft Identification of Factors for Selecting Modes and Routes for Shipping HLW [high-level radioactive waste] & SNF [spent nuclear fuel].

Response
As described in Section 6.2.1 and J.1.1 of the EIS, DOE uses standard and well-accepted transportation analysis methods, including probabilistic risk assessment, to estimate transportation impacts. Consistent with the *Final Report, Identification of Factors for Selecting Modes and Routes for Shipping High-Level Radioactive Waste and Spent Nuclear Fuel* (DIRS 103718-DOT 1998), the EIS evaluated incident-free radiological exposures, accident-induced radiological exposures, and the nonradiological consequences of accidents.

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Section 2.5.4 and Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty

- Much of the uncertainty is irreducible, and

- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

8.8.1 (10034)
Comment - EIS001888 / 0521
[Clark County summary of comments it has received from the public.]

Calculated risk (i.e. PRA [probabilistic risk assessment]) needs to be broader in scope and cumulative like RADTRANS.

Response
As discussed in Appendix J of the EIS, Version 5 of the RADTRAN computer code was used in estimating radiological risks of transportation activities. As discussed in Section 8.4, a comprehensive analysis of the cumulative impacts of transportation was performed. In addition, a broad range of impacts was evaluated: (1) radiological and nonradiological impacts, (2) incident-free and accident impacts, (3) individual impacts and population impacts, and (4) radiological risks and consequences.

8.8.1 (10035)
Comment - EIS001888 / 0522
[Clark County summary of comments it has received from the public.]

Contextual Risk results from unanticipated changes in risk environment. Example, an incident that delays movement of vehicle carrying HLW [high-level radioactive waste] increases risk to public/workers. Assessments should incorporate realistic public safety capabilities.

Response
The incorporation of public safety capabilities in the EIS analyses would reduce the reported impacts of transporting spent nuclear fuel and high-level radioactive waste to the proposed repository. As discussed in Section J.1.4.2 of the EIS, to bound the potential impacts of accidents the analyses did not take credit for or assume the mitigation effects provided by such public safety capabilities as accident prevention, emergency response interdiction, dose mitigation, or evacuation to reduce accident consequences. As described in Sections J.1.3.2 and J.1.4, scenarios like those described in the comment, such as an individual stuck in a traffic jam near a truck carrying spent nuclear fuel, and accidents where the cask was not damaged but would be delayed for a period before continuing to the repository, were analyzed in the EIS.

8.8.1 (10060)
Comment - EIS001888 / 0541
[Clark County summary of comments it has received from the public.]

Commenters asked questions about the methods or data to be used in the transportation assessments in the EIS, The use of "comprehensive risk assessment" was advocated by some commenters. Other commenters advocated a comprehensive systems analysis or a traffic impact analysis. Commenters stated that the EIS should rely upon previously published studies when possible.

Response
In this EIS, DOE has used computer models it has used in previous EISs and other studies. These models are widely accepted by the national and international scientific and regulatory communities. For instance, DOE selected the RADTRAN 5 computer program to estimate radiological impacts to populations from incident-free transportation and from accidents. RADTRAN, which was originally developed by Sandia National Laboratories in the late 1970s, has been used in many previous DOE EISs, and it has undergone periodic review and revision. In 1995, an independent validation review of RADTRAN 4 (immediate predecessor to RADTRAN 5) demonstrated that it yielded acceptable results when compared to "hand" calculations. More recently, an independent review found that RADTRAN 5 overestimates the measured radiation dose to an individual from moving radiation sources.

To ensure that the EIS analyses reflect the best latest reasonably available information, DOE has either incorporated information that has become available since the publication of the Draft EIS or modified existing information to accommodate conditions likely to be encountered over the life of the Proposed Action. For example, the analysis in the Draft EIS relies on population information from the 1990 Census. In this Final EIS, DOE has scaled impacts upward to reflect the relative state-by-state population growth to 2035, using 2000 Census data.

Although the EIS analyses are based on the best latest reasonably available information and state-of-the-art analytical tools, not all aspects of incident-free transportation or accident conditions can be known with absolute certainty. In such instances, DOE has relied on cautious assumptions that tend to overestimate impacts. For instance, DOE assumed that the radiation dose external to each vehicle carrying a cask during routine transportation would be the maximum allowed by U.S. Department of Transportation regulations. Similarly, DOE assumed that an individual, the "maximally exposed individual," would be a resident living 30 meters (100 feet) from a point where all truck shipments, or 200 meters (660 feet) from a point where all rail shipments, would pass. Under these circumstances, the maximally exposed individual would receive a dose of about 6 millirem from exposure to all truck shipments, and a dose of about 2 millirem from exposure to all rail shipments (6 millirem represents an increased probability of contracting a fatal cancer of 3 in 1 million). Although it can be argued that individuals could live closer to these shipments, it is highly unlikely that an individual would be exposed to all shipments over the 24-year period of shipments to the repository, even though DOE incorporated this highly conservative assumption in the analysis.

The methods used to calculate transportation impacts are state-of-the-art. As a consequence, DOE believes the EIS adequately analyzes the environmental impacts that could result from the Proposed Action, including transportation. DOE believes the EIS fulfills all legal obligations required for an EIS and a "comprehensive risk assessment" or a "comprehensive systems analysis or traffic impact analysis" as advocated by the commenter is neither required nor necessary.

8.8.1 (10075)
Comment - EIS001888 / 0551
[Clark County summary of comments it has received from the public.]

Commenters were generally concerned that the EIS address various aspects of transportation, such as: cost; pre-notification requirements; insurance; comprehensive analysis of impacts; credible scenarios and alternatives; environmental effects; effects on infrastructure; planning; cask testing; safety; security; emergency response; routing; historical and future shipments; impacts on Native Americans; compliance with regulations and identification of assumptions.

Response
The commenters should refer to the following sections of the EIS in which the requested information is presented:

- Transportation costs are summarized in Section 2.1.5 for the Proposed Action (there are no transportation costs for the No-Action Alternative). See CRWMS M&O (DIRS 104980-1999) *Environmental Impact Statement Cost Summary Report*, for additional details.

- Prenotification requirements are addressed in Section M.2.5.

- Insurance is addressed in Section M.8.

- Comprehensive analyses of impacts, environmental effects, and effects on infrastructure are addressed in Chapter 6 and Appendix J.

- Planning for the shipments is discussed in Section M.3.

- Cask safety and testing is discussed in Section M.4.

- Security is discussed in Section M.7.

- Emergency response is addressed in Section M.5.

- Routing is addressed in Sections M.2.4 and M.3.2.1.2.

- Historic shipments are discussed in Section 8.4.1.2. Accident data for past radioactive material shipments are discussed in Section J.1.4.2.3.1 and in *Transportation Accidents/Incidents Involving Radioactive Material* (DIRS 102172-McClure and Fagan 1998). Future shipments of spent nuclear fuel and high-level radioactive waste to the proposed Yucca Mountain Repository are presented in Section J.1.2.

- Impacts on Native Americans are addressed as follows: the Ruby Valley Treaty issue is discussed in Section 3.1.1.4; Native American interests are presented in Section 3.1.6.2; Section 3.1.13 of the EIS describes the minority or low income populations in Nevada; and Sections 6.3.4 and 8.4.2.12 address environmental justice impacts. Maps showing where minority or low-income populations are in relation to the site and the transportation corridors are provided in Section 3.1.1.3.

- Compliance with regulations is addressed in Chapter 11.

- Assumptions are explicitly identified throughout the EIS. A summary of DOE's approach to describing, documenting, and evaluating the effects of assumptions made where incomplete or unavailable data currently exists is presented in the EIS Section 2.5.

With respect to the comment on credible scenarios and alternatives, the transportation scenarios were constructed to bracket the total shipment volumes, which would be maximized for a nearly 100-percent mostly legal-weight truck scenario and minimized for a nearly 100-percent mostly rail scenario. DOE recognizes that many factors influence the selection of transport modes for the shipments, many of which are beyond its control, such as waste generator site operating characteristics, trading of acceptance rights, and cask handling capabilities at commercial nuclear powerplants. Since the actual mix of truck and rail shipments cannot be determined at this time, DOE evaluated two national transportation scenarios (mostly legal-weight truck and mostly rail) that bracket the actual mix of truck and rail shipments. DOE states in Section 2.1.1.3 of the EIS that it would determine the number of shipments by either mode as part of future planning efforts. Transport mode selection is further explained in Section M.3 and in the Request for Proposals for Waste Acceptance and Transportation Services (DIRS 153487-DOE 1998), located at *http://www.rw.doe.gov/wasteaccept/wasteaccept.htm*. Therefore, DOE believes it has employed realistic shipping scenarios that provide the information necessary to support the decisions to be made based on this EIS.

With respect to impacts on infrastructure, Section 3.2.1 of the EIS states that the shipments of spent nuclear fuel and high-level radioactive waste to the proposed repository represents a small fraction of current highway and rail traffic (0.006 percent of truck miles and 0.007 percent of rail miles per year). In addition, spent nuclear fuel and high-level radioactive waste truck and rail shipments would require no special highway or rail infrastructure that is not required for other hazardous commodities. The EIS presents the impacts of new infrastructure development within Nevada (see Section 6.3) because land acquisition and new construction would be needed to implement the Nevada rail and heavy-haul truck alternatives.

8.8.1 (10077)
Comment - EIS001888 / 0554
[Clark County summary of comments it has received from the public.]

Commenters stated that radiological and non-radiological impacts from transporting SNF [spent nuclear fuel] and HLW [high-level radioactive waste] should be evaluated in the ETS, for both workers and members of the public (including people along the route and people sharing the route). Cumulative health impacts and shipment of multi-purpose canisters also should be evaluated.

Response
The transportation impact analysis in Chapter 6 and Appendix J of the EIS includes the assessments for both workers and members of the public including people along the route and people sharing the route. The transportation impacts for several shipping casks, including multipurpose canisters are provided in Section 6 of the EIS. Cumulative impacts are given in Chapter 8.

8.8.1 (10142)
Comment - EIS001865 / 0017
Furthermore, the analysis in Appendix J appears to contain factual errors or misrepresentations. For example, it can be calculated from Table J-5 (page J-16) that 1,667 truck shipments from all four California commercial sites would take place during the 24-year operational period. However, when referring to Figure J-10 (page J-85) a small notation indicates that 6,250 truck shipments will enter Nevada on I-15 from California. Where do the extra 4,583 truck shipments come from? Likewise, it can be calculated from Table J-6 (page J-18) that 408 rail shipments from all four California commercial sites would take place during the 24-year operational period. However, when referring to Figure J-11 (page J-86) a small notation indicates that 1,837 rail shipments will enter Jean, Nevada from California. Where do the extra 1,429 rail shipments come from?

Response
Chapter 6 and Appendix J of the EIS contain substantial analyses related to the national transportation of spent nuclear fuel and high-level radioactive waste. However, in response to comments, considerable state-by-state information has been added to Appendix J which now includes maps for each state, including Federally recognized Native American Reservations, showing routes used in the analyses for the EIS and tables listing rail and truck shipments estimated to originate in and pass through each state, and incident-free and accident risk impacts for each state (see Section J.4).

8.8.1 (10300)
Comment - EIS001873 / 0080
Lincoln County Independent Research:

The County, under its federally funded Nuclear Waste Oversight Program, has produced numerous studies containing information concerning local impacts of the Yucca Mountain Project. As the County has stated in comments on the DEIS, the DOE has evidently not made any use of the County effort, which has cost approximately five million dollars to date. Following are some of the findings of the County studies. (My own observations are in parentheses.)

From Analysis of 46 mile rail corridor in Lincoln County 1986.

The study notes that 40% of the rail line is curved due to rugged terrain.

Braking is required for most of the route going south.

There is potentially a problem of the rail line being washed out due to flow from several side canyons under low clearance bridges. (One such low clearance bridge drains the site of the proposed Caliente Intermodal Facility. -LB)

A good percentage of the time the wind is towards Caliente from Rainbow Canyon (and the intermodal site) and would carry fallout from an accident to the town.

There is an average of 12 trains daily, and the average speed through the area is 32 mph.

There were 18 derailments between 1979 and 1981 involving 67 cars. Subsequently the record improved. (The current derailment record should be reviewed.)

Rocking of the cars on curves at 17 mph is a main cause of derailments, but trains must travel at this speed as they frequently speed up or slow down to negotiate the curves.

Sabotage potential is increased due to the remote and rugged nature of the area.

Emergency response in parts of the canyon areas would be next to impossible.

The Union Pacific RR Co. is not prepared to provide the needed level of emergency capability.

Mitigation measures identified include (1) a new rail line bypassing the area. (2) Implementing special train operations procedures. (3) Creation of a new organization to oversee HLW [high-level radioactive waste] shipments and react to sabotage threats.

Response
The types of information on the Caliente Corridor that Lincoln County produced are valuable for rail operations but are more detailed than necessary to support the decisions DOE would make based on this EIS. DOE would not base the choice of a rail corridor solely on environmental impacts; factors such as cost, schedule, procurement regulations, and others would influence the decision. The Department would continue to involve stakeholders in the decisions.

DOE believes that there are adequate rail lines, crossings, bridges, and tunnels nationally and in Nevada to support the transportation of materials described in the EIS. The shipment of radioactive materials requires no special transportation infrastructure that is not necessary for safe transport of commodities in the United States today.

Regional Servicing Contractor(s) for Waste Acceptance and Transportation Services would conduct detailed planning for rail service. DOE has issued a Draft Request for Proposal for one or more such contractors (available on the Internet at *http://www.rw.doe.gov/wasteaccept/wasteaccept.htm*; see Section M.3 of the EIS). Section C, Appendix 8, Paragraph 1.1 of the Draft Request for Proposal, "Mode Selection," states: "DOE requires, whenever possible, rail transport shall be used." As defined in Paragraph 2.2.7 of Section C, the transportation contractor must prepare a Transportation Plan that provides for "… maximum use of special train service and advanced rail equipment features where this type of service or equipment can be demonstrated to enhance operating efficiency, dependability, cost effectiveness or lessen the potential of adverse railroad equipment incidents."

DOE does not foresee a need to create a new organization to oversee shipments and react to sabotage threats. The U.S. Department of Transportation and the Nuclear Regulatory Commission provide independent Federal oversight of the transportation of spent nuclear fuel and high-level radioactive waste, including approval authority for the design, fabrication, and use of shipping containers, route selection, security, and other safety-related elements. States participate in and provide independent oversight of certain safety-related aspects of transportation, such as emergency preparedness and route selection.

8.8.1 (10356)
Comment - EIS001927 / 0007
The DOE must publish clear, truthful maps of the high-level waste/irradiated nuclear fuel transport routes to the proposed Yucca Mountain repository. The EIS must rigorously examine the risk involved in these shipments, and it must specify the exact mode of transportation – by train, truck, or barge. Site specific risk and potential impacts must be identified, to schools, hospitals, colleges, population centers, urban areas, agricultural lands, water and food storage, other vital resources, and natural areas along the routes. Increased risks of accidents due to extremes of weather or terrain must be analyzed, as well as the history of problems on these specific routes. In short, DOE should redo the entire national transport section of the EIS, and do it justice this time. DOE's failure to adequately assess transport impacts constitutes grounds for the withdrawal of the DEIS, and its re-issuance along with a new 180 day public comment period. Literally tens of millions of Americans have been kept in the dark by DOE – DOE concealed that fact that they live on irradiated fuel/high radioactive waste transport routes. Why did DOE do this?

Response
Comprehensive analyses of impacts, environmental effects, and effects on infrastructure are addressed in Chapter 6 and Appendix J of the EIS. In response to public comments, the transportation analysis in Appendix J was substantially revised. The EIS now includes maps of the truck and rail routes used in the analysis. Routing is addressed in Sections M.2.4 and M.3.2.1.2. These routes were used for analyzing transportation impacts in the EIS and are representative of the actual routes that would be used, which could be different. It is impossible for DOE to specify the exact mode of transportation for all shipments or the exact routes that would be used years before shipments began. As a result, DOE evaluated two national transportation scenarios (mostly legal-weight truck and mostly rail) that bracket the actual mix of truck and rail shipments. DOE states in Section 2.1.1.3 that it would determine the number of shipments by either mode as part of future planning efforts. Transport mode selection is further explained in Section M.3 and in the Draft Request for Proposals for Waste Acceptance and Transportation Services (DIRS 153487-DOE 1998), located at *http://www.rw.doe.gov/wasteaccept/wasteaccept.htm*. However, the Request for Proposals directs contractors to use special train service where it can be demonstrated to enhance operating efficiency and cost-effectiveness.

The EIS has been revised to include the estimated number of shipments and impacts for each state through which the analyzed routes would pass. The impacts at a particular location within a state, such as a town or city, would be less than the total for the state. The truck and rail accident rates used in the EIS include accidents of all causes and therefore account for past accidents, and extremes of weather and terrain.

DOE has provided information concerning the transportation routes used in the EIS in several different ways. For example, maps of the transportation routes were presented at each of the Draft EIS public hearings and a complete set of transportation maps was placed on the Yucca Mountain Project web site well before the end of the public comment period. The state maps are provided in Section J.4 of the EIS.

8.8.1 (10575)
Comment - EIS001310 / 0006
Transportation of SNF [spent nuclear fuel] and HLW [high-level radioactive waste] is inherently risky business. The DEIS systematically and significantly understates the risks associated with shipments to the proposed repository in the following ways:

- The DEIS grossly underestimates routine radiation exposures to transportation workers, safety inspectors, and members of the public, especially along highway routes in Nevada.

- The DEIS significantly underestimates the human health consequences of severe transportation accidents resulting in release of radioactive materials, and ignores the social and economic impacts of severe accidents and post-accident cleanup activities.

- The DEIS significantly underestimates the human health consequences of successful terrorism and sabotage incidents involving high-energy explosive devices, and ignores the social and economic impacts of successful terrorism and sabotage incidents and post-incident cleanup activities.

Response
The transportation impact analysis, including the impacts of routine radiation exposures and consequences of severe accidents, was performed using current, reasonable, and valid methods and data available to DOE. DOE believes the analysis does not underestimate the impacts and, in fact, there are many instances in which the analysis is conservative, tending to overestimate impacts.

DOE is aware that there are uncertainties associated with the transportation impact results presented in the EIS. There are uncertainties associated with route characteristics, demographics, weather, atmospheric dispersion models, waste characteristics, accident rates, release fractions, and many other elements of the risk assessments. Because one of DOE's goals is to choose between alternatives, the consistent consideration of uncertainty among alternatives means that the relative differences in impact estimates among alternatives should not be affected.

To account for uncertainties in the data, conservative assumptions were made, so the impacts reported in the EIS considered the associated range of potential impacts. Examples of conservative assumptions include:

- Accident release fractions selected from the high end of the distribution of experimental results

- Regulatory maximum radiation assumed for all shipments, even though the actual dose rates would be significantly lower for most shipments

- Consequences to maximally exposed individuals presented for 50 percent and 95 percent (that is, consequences exceeded only 5 percent of the time) meteorological conditions

- Evacuation and sheltering, which could reduce radiological exposures, not included in the accident risk calculations

However, DOE has chosen not to use assumptions that would contain the same high degree of conservatism in all cases, as this practice tends to produce unrealistic and improbable results. Consistent with Council on Environmental Quality regulations (40 CFR 1502.22), DOE is attempting to avoid compounding conservatisms, yielding unrealistic results, in analyzing environmental impacts. Such practices mask the real differences and would not produce suitable results to support choices among the alternatives. Thus, for example, DOE has chosen to use realistic waste characteristics information, accident rates, highway and rail distances between waste generators and the proposed repository, and population demographics. DOE believes that the impacts presented in the EIS are not so conservative that the true differences among alternatives are masked.

The shipping cask performance data used to estimate the radiological risks of transporting spent nuclear fuel are from the *Reexamination of Spent Fuel Risk Estimates* (DIRS 152476-Sprung et al. 2000). These data represent the most recent and most thoroughly evaluated available information on the performance of shipping casks during severe transportation accidents.

The shipping cask performance data used to estimate the impacts of a successful sabotage event are from *Projected Source Terms for Potential Sabotage Events Related to Spent Fuel Shipments* (DIRS 104918-Luna, Neuhauser, and Vigil 1999). This report estimated maximum releases of radioactive material from the action of sabotage against a shipping cask containing spent nuclear fuel. The report considered 15 devices and chose two for detailed analyses. These data represent the most current and reasonable available information on the performance of shipping casks during a sabotage event.

Based on public comments on the Draft EIS, a discussion on the costs of cleanup has been added to Appendix J of the EIS. According to the Nuclear Regulatory Commission report, there would be no release of radioactive material from the cask in 99.99 percent of transportation accidents involving spent nuclear fuel (DIRS 152476-Sprung et al. 2000). The economic costs of accidents that did not have a release of radioactive material would be small.

In 0.01 percent of accidents some radioactive material could be released from the cask. Based on the studies discussed in Appendix J of the EIS, the economic costs of severe transportation accidents involving spent nuclear fuel could be in the range of as little as $200,000 to $270 billion. However, extreme cost estimates are for accidents where all factors are assumed to combine in the most detrimental way to maximize consequences. Such extreme, or worst-case, accidents are not reasonably foreseeable so the estimates of cost are not useful for comparisons. The probability of the accidents analyzed in the studies range from about 1 in 1 million per year to less than 1 in 1 trillion (1 followed by 11 zeros) per year.

For perspective, the current insured limit of responsibility for an accident involving releases of radioactive materials to the environment is $9.43 billion. The annual cost of transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain would be about $200 million.

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Section 2.5.4 and Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty

- Much of the uncertainty is irreducible, and

- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

8.8.1 (11010)
Comment - EIS001896 / 0008
Section 6.1.1 Impacts of Incident-Free Transportation

States that over 24 years of the proposed action, an estimated 18 latent cancer fatalities could occur in general populations along transportation route from radiation exposure under legal-weight truck scenario, and estimated 2 deaths under rail scenario. With the most heavily traveled routes being through urbanized areas in Southern Nevada and on congested highways, and the relatively slow speed of the trucks, there is a higher than normal potential for risk to our residents. Also, security and emergency response have not been adequately addressed.

Response
The transportation risk analysis in the EIS used state-specific truck and rail accident data from the U.S. Department of Transportation, supplemented by data obtained from the State of Nevada. In addition, the transportation analysis accounts for slower speeds by trucks in urban areas. The results of these analyses show that the risk to residents of Nevada would be low. Estimated radiological incident-free doses to individuals that might receive exposures, including truck crew members, inspectors, individuals stuck in traffic, and nearby residents are presented in Appendix J of the EIS. Appendix M contains an expanded discussion of security (see Section M.7) and emergency response (see Section M.5).

8.8.1 (11012)
Comment - EIS001896 / 0010
Section 10.1.2.5

The construction and operation of the rail and heavy-haul alternative will have adverse impacts on workers and the general public which are not addressed.

Response
DOE believes that Section 10.1.2.5 of the Draft EIS (Section 10.1.3 in the Final EIS) adequately summarizes the unavoidable adverse impacts of the heavy-haul truck and rail implementing alternatives within Nevada. In addition, this section references the sections of the EIS that describe estimated impacts.

8.8.1 (11424)
Comment - EIS002234 / 0008
Furthermore, the analysis in Appendix J appears to contain factual errors or misrepresentations. For example, it can be calculated from Table J-5 (page J-16) that 1,667 truck shipments from all four California commercial sites would take place during the 24-year operational period. However, when referring to Figure J-10 (page J-85) a small notation indicates that 6,250 truck shipments will enter Nevada on I-15 from California. Where do the extra 4,583 truck shipments come from? Likewise, it can be calculated from Table J-6 (page J-18) that 408 rail shipments from all four California commercial sites would take place during the 24-year operational period. However, when referring to Figure J-11 (page J-86) a small notation indicates that 1,837 rail shipments will enter Jean, Nevada from California. Where do the extra 1,429 rail shipments come from?

Response
Chapter 6 and Appendix J of the EIS contain substantial analyses related to the national transportation of spent nuclear fuel and high-level radioactive waste. However, in response to comments, considerable state-by-state information has been added to Appendix J, which now includes maps for each state, including Federally recognized Native American Reservations, showing routes used in the analyses for the EIS and tables listing rail and truck shipments estimated to originate in and pass through each state, and incident-free and accident risk impacts for each state (see Section J.4). These numbers should be considered tentative, as there are many factors that could cause the modes and routes to change including reactor operations, trading of pickup allocations, selection of a different transportation mode for shipments by the reactor operator, or recommendation of alternate routes by states. Impacts in individual states could be different if the actual routes from generator sites to Yucca Mountain were different from those analyzed. However, it is not likely that the total impacts from transportation would be changed significantly or that any particular route connecting an origin/designation pair present a significant difference in impacts from any other.

The number of shipments from generators in California identified in tables in Appendix J of the EIS are not the same as the number of shipments that would enter Nevada from California identified on figures in the appendix because shipments from generators in other states would also enter Nevada from California. For purposes of analysis in the EIS, DOE used methods described in Section J.1.1 to estimate routes shipments would use to transport spent nuclear fuel and high-level radioactive waste from commercial and DOE generator sites to a Yucca Mountain Repository. Using these methods, routes for rail and truck shipments used in the analyses included ones from generator sites that are not in California but that would enter Nevada from California either on the Union Pacific Railroad mainline or by legal-weight truck on Interstate-15.

An example of a generator site that would ship through California would be the Palo Verde Nuclear Plant in Arizona. In the mostly rail analysis scenario in the EIS, the calculated route for rail shipments from this site used Union Pacific mainlines. This route crosses the Arizona-California border near Yuma, Arizona, then travels to southeastern Nevada through San Bernardino and Barstow, California.

In the mostly legal-weight truck scenario, the route for shipments was calculated using rules in U.S. Department of Transportation regulations (see Sections M.2.4 and M.3.2.1.2 of the EIS). In this case, the required route under current regulations and following preferred routes currently designated by states and the Department of Transportation would be Interstate-10 from Arizona to San Bernardino, California, where it intersects with Interstate-215, Interstate-215 to Interstate-15, and Interstate-15 from California into Nevada.

Altogether, for the mostly rail scenario and a Jean branch rail line or Sloan/Jean heavy-haul truck route, the analysis in the EIS used rail routes from 13 generator sites outside California that would travel through the State. For the mostly legal-weight truck scenario, the analysis used routing that would travel through California for shipments from eight generators outside the State.

8.8.1 (11700)
Comment - EIS001597 / 0005
Obviously, if a spent nuclear fuel repository at Yucca Mountain is opened some time in the future, the number of shipments of spent fuel traversing Illinois will logically increase. But it seems to us that the frequency of shipments through Illinois appears to be skewed, and we wonder whether or not that skewing is not intentional. By skewing, we mean that they appear to be greater than they should be.

Response
In response to public comments, DOE has included maps of the highway routes and rail lines it used for analysis in Section J.4 of the EIS. Along with the maps the Department included potential health and safety impacts associated with shipments for each state through which shipments could pass, including Illinois.

8.8.1 (11752)
Comment - EIS001226 / 0009
I am concerned about environmental protection, safety, liability, disaster management, worker safety, incidental radiation exposure, property values. How will 30 years of nuclear waste shipments through Illinois impact the Chicago area, and what plans do you have for shipping accidents?

Response
The impacts of transportation are discussed in Chapter 6 and Appendix J of the EIS, which discuss issues such as those identified by the commenter.

In response to public comments, DOE has included maps of the highway routes and rail lines it used for analysis in Section J.4 of the EIS. Along with the maps, the Department included potential health and safety impacts associated with shipments for each state through which shipments could pass, including Illinois. The impacts in the Chicago area would be less than those for the State. Section M.5 discusses transportation emergency response.

8.8.1 (11824)
Comment - EIS001887 / 0389
In addition, the one hundred percent rail transportation scenario contained in the Draft EIS is impossible without substantial investments at reactor sites for infrastructure to accommodate large rail casks. Many reactor locations

cannot currently accommodate these types of transportation casks. Information as to which generator sites will require such upgrades is available. The Draft EIS should have evaluated the costs and impacts of such improvements.

Response
Section 2.1.3 of the EIS discusses the transportation scenarios. DOE believes that the mostly rail case, in which more than 95 percent of spent nuclear fuel and high-level radioactive waste would be shipped by rail, would most closely approximate the actual mix of truck and rail shipments. In reaching this conclusion, DOE has assessed the capabilities of the sites to handle larger (rail) casks, the distance to suitable railheads, and historic experience in actual shipments of nuclear fuel, waste, or other large reactor-related components. In addition, DOE considered relevant information published by sources such as the Nuclear Energy Institute and the State of Nevada. The mostly rail scenario would not require infrastructure improvements at commercial nuclear reactor sites.

Even if infrastructure improvements were required at some generator sites, the impacts and costs of such improvements are not in the scope of this EIS.

8.8.1 (12265)
Comment - EIS001888 / 0257
One of the primary reasons this examination is confined to truck analysis, is because the heavy rail casks assumed to be used in the DEIS do not exist at all. Several of the DEIS references were prepared assuming use of the Multiple Purpose Canister (MPC). The MPC was proposed by the DOE as a heavy transportation canister in 1994. It was later withdrawn after the preparation of an EIS. The reference documents cited to support the conclusions in the DEIS rely on the MPC canister for their conclusions. Therefore, the rail transportation scenario contained in the DEIS is almost entirely hypothetical. Past rail transportation experience, specifically data used in a risk assessment is wholly irrelevant to the proposed action.

Response
Section 2.1.3.4 of the EIS addresses shipping cask manufacture, maintenance, and disposal. In this section, DOE indicates that one or more qualified companies specializing in metal structures, tanks, and other heavy equipment would manufacture new shipping casks. Section 4.1.15.1 identifies five sites of component and/or full cask manufacturers in the United States (not to mention overseas capabilities) and the number of shipping casks needed for the truck and rail transportation program (Table 4-45). Additional detailed information is provided in the DOE report to Congress, *Plan for Transportation Cask Fabrication and the Deployment of Waste Acceptance Capabilities* (DIRS 156802-DOE 2001). In Appendix A of the plan, DOE provides three tables of existing casks and casks under development for truck transport, for rail transport, and for storage and transportation casks. The tables indicate that there are 14 truck casks built and three being fabricated, 6 rail casks built, and 11 dual-purpose casks built and nine being fabricated. A fourth table provides details of two U.S. manufacturers, indicating their capability to produce 20 casks per year after a 6-month lead-time.

The Nuclear Regulatory Commission has recently issued a 10 CFR Part 71 Certificate of Compliance for three transportation casks for rail transport. At present, one MP-187 and four HI-Star 100 casks have been produced. To date, no NAC-STC transportation casks have been produced. In addition, Transnuclear submitted a 10 CFR Part 71 application for its TN-68 rail cask in May 1999. Based on this demonstrated performance and capabilities, DOE believes the acquisition of adequate casks for the mostly rail scenario is reasonable.

8.8.1 (12302)
Comment - EIS001925 / 0004
Will the DOE agree not to ship the nuclear waste with other hazardous cargo?

Response
As described in Sections 6.1 and 6.2 of the EIS, spent nuclear and high-level radioactive waste shipped by trucks would be shipped with no other hazardous cargo present. Should spent nuclear fuel and high-level radioactive waste be shipped by trains, other hazardous cargo could be present. U.S. Department of Transportation regulations would prevent these other hazardous cargoes from being a hazard to the spent nuclear fuel and high-level radioactive waste, and the spent nuclear fuel and high-level radioactive waste would not be a hazard to these other cargoes.

8.8.1 (12361)

Comment - EIS002233 / 0002

We [San Bernardino County] border the southern portion of Nevada, and unfortunately, expect that high-level nuclear waste will be transported through this county as part of the proposal; and we are deeply concerned about potential significant consequences and impacts that an accident, sabotage, or other adverse events could have on our county. While the risk of an accident may be small, the result of even one accident could have enormous and grave consequences on the portion of the county where the accident occurred. We are not talking about an oil spill and fire. This would have long-term, wide-spread, devastating effects on our county.

If the Federal government cannot guarantee zero tolerance against the risk of accident in the transport of high-level radioactive waste across our county, then this project should not be approved and should not proceed.

We are deeply concerned that the EIS inadequately and only superficially evaluates the transporting of spent nuclear fuel and high-level nuclear waste to Yucca Mountain. The waste is controlled and supervised where it is currently located, as an example, in San Onofre. It will be controlled and supervised at Yucca Mountain. A good deal of that control and supervision is lost, however, once the fuel waste is placed in a truck or in a truck and a railroad car.

Hence, it is critical that extreme measures are taken to protect this high-level radioactive waste during transport across our county. And yet we find precious little evaluation of this risk in the EIS. It is only discussed in general terms. It gives us very little assurance that an accident during transport will not occur and how an accident will be mitigated, if it does occur.

The EIS is deficient in its current approach which fails to address the possible consequences of transportation over even plausible specific routes that are currently known or reasonably predictable. This type of evaluation is critical to local jurisdictions, such as our county, and should not be deferred until some uncertain future point in time.

The potential for release of high level radioactive materials through accidents or deliberate acts of sabotage are of grave concern to this county. The implications are far-reaching, and only minimally addressed in the EIS.

So we urge you, we implore you, to place this process on pause and undertake the needed detailed analysis of the transport of nuclear waste so that we can achieve a level of assurance that our homes, our schools, our churches, for that matter our whole living environment, is adequately protected in the years to come.

Response

The EIS acknowledges that transportation accidents can occur during the transport of radioactive materials to the proposed Yucca Mountain Repository. In Section J.1.4.2.3, the EIS estimates that there could be as many as 70 accidents under the mostly legal-weight truck shipping scenario and 8 accidents could occur under the mostly rail scenario. A study recently conducted by the Nuclear Regulatory Commission (DIRS 152476-Sprung et al. 2000) concluded that only a tiny fraction of all accidents, less than one in 10,000, would be severe enough to fail a spent nuclear fuel shipping cask. The reason for this is the rigorous design, performance, and testing requirements (see 10 CFR Part 71) for spent nuclear fuel and high-level radioactive waste shipping casks. Based on these statistics, DOE does not expect an accident to occur that would involve radiological consequences.

DOE acknowledges that all accidents cannot be prevented, even if unlimited funds and time are provided to complete an activity. However, assuring the safety of the public, workers, and the environment is the most important priority for the spent nuclear fuel and high-level radioactive waste shipping program. Many safety-related measures in addition to the use of accident-resistant Type B shipping casks would be employed to provide this assurance, including route selection to reduce risks, driver training, shipping cask and vehicle inspection and maintenance, emergency preparedness programs, prenotification requirements, preshipment planning, and others. In addition, safety incentives are included in the September 1998 Draft Request for Proposals for Waste Acceptance and Transportation Services (see Section M.3 of the EIS and *www.rw.doe.gov/wasteaccept/wasteaccept.htm*). Thus, while the risk of this or any other activity cannot be reduced to zero, DOE believes that adequate preventive, protective, and mitigative measures are or would be in place to ensure that the shipments pose no undue risks to the public, workers, and environment.

In terms of control and supervision, DOE is aware that spent nuclear fuel is better controlled at fixed locations, such as waste generator sites and the repository, than it is while being shipped. Access controls, guards, locked gates, and monitoring systems are examples of controls that are applied at fixed facilities to protect spent nuclear fuel. This is the main reason why special safeguards and security requirements (see 10 CFR Part 73) are applied to shipments of spent nuclear fuel to prevent their theft or diversion in transit. DOE would comply with all requirements of 10 CFR Part 73, including preshipment planning, communications, armed escorts, and tamper-indicating devices on shipping casks. In addition, a satellite tracking system such as the TRANSCOM system would be deployed to provide real-time tracking of the shipments and preshipment and in-transit communications. With all these controls in place, as well as the use of massive Type B containers that would provide considerable protection of spent nuclear fuel and high-level radioactive waste contents, DOE believes the shipments and the radioactive cargo would be adequately protected from theft, diversion, or acts of sabotage. See Section M.7 of the EIS for additional information on physical protection requirements.

The transportation impact analysis in the EIS is consistent with the requirements of the National Environmental Policy Act, Council on Environmental Quality guidelines, and DOE policies and guidance. It was also designed to provide the information necessary to support the decisions to be made based on the EIS. As stated on page S-2 of the Draft EIS Summary:

"DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada…Other transportation decisions, such as selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews."

DOE believes that use of location-specific data and development of location-specific impact estimates such as the commenter suggests would not be practical or possible and would not materially affect the comparisons of alternatives and decisions to be made with regard to construction and operation of the proposed repository. Nevertheless, in response to comments on the Draft EIS, DOE has revised Appendix J of the EIS to include state maps of routes used in the analyses of impacts, the numbers of shipments in each state used in the analyses, and state-specific impact estimates.

8.8.1 (12369)
Comment - EIS010207 / 0001
The "Supplement to the Draft Environmental Impact Statement for a Geologic Repository...at Yucca Mountain" does not adequately address the hazards and problems of transporting nuclear wastes through populated areas to the Yucca Mountain site. Although St. Louis is centrally located for shipment of nuclear wastes, transporting irradiated fuel rods through downtown seems unsafe. On May 31, fourteen laden coal cars derailed and dumped their contents in a St. Louis suburb. Accidents happen. The accidental spilling of nuclear wastes could be lethal. Moreover, the plutonium and uranium are vulnerable to theft during transport.

Response
DOE issued the Supplement to the Draft EIS to provide updated information to the public. While aspects of the design have evolved from those in the Draft EIS, the basic elements of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository at Yucca Mountain (such as transportation of spent nuclear fuel and high-level radioactive waste) remain unchanged. For this reason, the Supplement focused on the most recent design enhancements, including various operating modes to manage heat generated by emplaced spent nuclear fuel and high-level radioactive waste.

As discussed in Appendixes J and M of the EIS, most real-world accidents that have been postulated, including truck crashes into bridges, train derailments followed by fires, derailments followed by immersion of a cask into a river, and similar extreme accident conditions, would not be likely to result in release of radioactive materials from the shipping casks. Spent nuclear fuel casks are much more robust than the coal cars. If a spent nuclear fuel rail cask had been on the train that derailed and crashed into the river, the accident conditions would not have been more severe than the design standards for the cask. No release of radioactive materials from the cask would have been expected. The performance standards for the casks prescribed by the Nuclear Regulatory Commission (see Section M.4) were selected to ensure that the chance that a real-world accident would result in loss of cask integrity and release of radioactivity from the cask is extremely remote. These standards ensure that the casks would be extremely robust.

Based on the revised analyses, DOE has concluded in the EIS that casks would continue to fully contain spent nuclear fuel in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that there would be less than a 1-percent chance over 24 years of transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain by truck of an accident that could result in a release of radioactive material from a cask. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be much less than 1 percent.

In the Draft EIS DOE considered six categories of increasingly severe and increasingly unlikely accident scenarios. The analyses hypothesized one accident scenario to represent each category, along with a corresponding projection of the amount of radioactive material that could be released from a transportation cask. The analyses estimated impacts of postulated releases in three population zones – urban, suburban, and rural – and under two weather conditions – slowly dispersing conditions, and moving-air conditions. The analyses also estimated the impacts from an unlikely but severe accident scenario called a maximum reasonably foreseeable accident. In response to public comments and to clarify this discussion for the reader, DOE has revised the EIS to describe the maximum reasonably foreseeable accident in terms of cask failure mechanisms, range of impact velocities, and temperature range for the accident.

The probabilities of the maximum reasonably foreseeable truck and rail accidents are stated in Sections 6.2.4.2.1 and 6.2.4.2.2 of the EIS. For the maximum reasonably foreseeable truck accident, the probability is about 2.4 in 10 million per year. For the maximum reasonably foreseeable rail accident, the probability is about 2.8 in 10 million per year. Radioactive materials are easily detected and there are proven methods for cleaning up spills and releases of radioactive materials. Like hazardous materials, any released radioactive materials would be cleaned up to existing standards in a reasonable length of time.

The Nuclear Regulatory Commission regulates the packaging and transportation related operations of its licensees, including establishing safeguards and security regulations to minimize the possibility of theft, diversion, or attack on shipments of spent nuclear fuel and special nuclear materials (10 CFR Part 73). DOE would comply with all requirements, including preshipment planning, communications, armed escorts, and tamper-indicating devices on shipping casks. Physical protection requirements are described in Section M.7 of the EIS.

8.8.1 (12577)
Comment - EIS001622 / 0016
Need for a Comprehensive transportation Analysis of Public Risks and Costs

The DEIS does not provide any meaningful quantitative transportation risk assessment, but instead refers to other agencies' regulatory authority. For example, DOE addresses transportation accident hazards by simply stating that transport of wastes will occur in accordance with U.S. Department of Transportation regulations.

Any analysis of transportation risks associated with shipping spent nuclear fuel is extremely sensitive to the assumptions made regarding, for example, routing, the amount of material shipped by rail versus truck, and the number of people along the routes and at various stops. The DEIS uses the "Modal Study" (NRC 1987) to predict very low probabilities of release of radioactive materials from a spent fuel cask under accident conditions. These analyses and risk analysis tools such as RADTRAN, although accepted by federal agencies for assessing transportation risks, have been criticized because of changing assumptions about cask capacity (new-generation casks will have much larger capacities), the radioactive characteristics of the spent fuel (radioactivity varies with fuel age and burn-up levels), the role human error may play in manufacturing quality control and operation of the casks, and the risk of sabotage or terrorist threat against a shipment.

In addition, tools such as RADTRAN incorporate critical assumptions about roadway geometrics and maintenance standards that require review if non-interstate routes are to be considered. The large projected increase in the numbers and operational complexity of spent fuel shipments to the proposed repository, in comparison with past shipments, may result in greater opportunities for human error in construction and operation of the spent fuel shipping casks. These factors should be taken into consideration in the DEIS' transportation risk assessment.

Further, the DEIS should provide a route-specific evaluation of the increased transport risk as the result of earthquakes, flooding, poor road conditions, and weather conditions. In addition, some routes leading to the Nevada Test Site/Yucca Mountain area are heavily traveled tourist and recreational routes. These routes can be greatly impacted by increased traffic. Increased truck traffic could influence the safety, reliability and congestion characteristics of these routes. The EIS should evaluate such potential impacts.

Recommendation: DOE should conduct a comprehensive risk analysis of routes and transport modes including public risks and costs to states, tribes and local communities to prepare for these shipments. When the proposed routes are identified in California, future EIS analyses should include a complete environmental review, including route-specific environmental analyses, in accordance with the requirements of the Clean Air Act, NEPA [National Environmental Policy Act], and the California Environmental Quality Act. This routing analysis of the primary and secondary routes should include structural and geometric road characteristics, emergency response capabilities along these routes, socio-economic impacts, wildlife, habitat, and public parts impacts, as well as risks to human populations along these routes. The DEIS should identify the significant fiscal impacts of emergency response preparation for these shipments and necessary road and rail improvements.

Response

DOE disagrees with the comment that the EIS does not provide a meaningful quantitative transportation risk assessment. Furthermore, DOE disagrees with the commenter's statement that transportation accident hazards are dismissed by referring to U.S. Department of Transportation regulations. Quantitative human health and safety impacts, as well as other environmental and socioeconomic impacts (for example, impacts on land use, water resources, biological resources, employment), for transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain are presented in Chapter 6 and Appendix J of the EIS. This included quantification of the radiological and nonradiological impacts of transportation accidents as well as the impacts of routine transportation. The transportation impact analysis in the EIS is consistent with the requirements of the National Environmental Policy Act, Council on Environmental Quality guidelines, and DOE policies and guidance. It was also designed to provide the quantitative information necessary to support the decisions to be made based on the EIS.

The transportation analysis in the EIS used state-of-the-art risk assessment tools and the currently available information that is reasonable to estimate the impacts of transporting spent nuclear fuel and high-level radioactive waste to the repository. For example, the computer programs used in the transportation analysis have been used extensively in other environmental impact statements and environmental assessments and have been evaluated to determine their validity for this purpose. The data used in the EIS to estimate transportation impacts are those that are available, reasonable, current, and adequate. In many instances special studies were conducted to collect additional data. For example, transportation accident and fatality rates were updated for the EIS in *State-Level Accident Rates of Surface Freight Transportation: A Reexamination* (DIRS 103455-Saricks and Tompkins 1999) and source terms from potential sabotage events were updated for the EIS in *Projected Source Terms for Potential Sabotage Events Related to Spent Nuclear Fuel Shipments* (DIRS 104918-Luna, Neuhauser, and Vigil 1999). The shipping cask performance data used to estimate the radiological risks of transporting spent nuclear fuel are from the Nuclear Regulatory Commission report *Reexamination of Spent Fuel Risk Estimates* (DIRS 152476-Sprung et al. 2000). These data represent the most recent, extensively researched available information on the performance of shipping casks during transportation accidents.

DOE recognizes that human errors cannot be totally eliminated during the fabrication and operation of shipping casks. Section J.1.4.2.1 of the EIS presents a discussion of the potential effects of human error, including undetected defects, on accident impacts. The shipping casks would be fabricated under Nuclear Regulatory Commission-approved quality assurance programs. As indicated in the GA4/9 shipping cask Certification of Compliance, each shipping cask would be extensively tested prior to its first use, including radiographic and ultrasonic inspections of welds, load testing of lifting trunnions, pressure testing of the cask containment boundary, gamma scans of the depleted uranium shield, and other tests. Trained and qualified personnel would conduct all testing. The shipping casks would be subjected to periodic in-service testing and maintenance, such as seal replacement, visual inspections of seals and sealing surfaces, and leakage testing. In addition, all shipping cask handling, loading, unloading, testing, and maintenance operations would be conducted in accordance with detailed written procedures and by trained and qualified personnel. These testing, maintenance, procedural, and personnel training requirements would minimize the likelihood and consequences of human errors during cask fabrication and operation.

The shipping cask performance data used to estimate the impacts of a successful sabotage event are from *Projected Source Terms for Potential Sabotage Events Related to Spent Fuel Shipments* (DIRS 104918-Luna, Neuhauser, and Vigil 1999). This report estimated maximum releases of radioactive material from sabotage against a shipping cask containing spent nuclear fuel. The report considered 15 devices and chose two for detailed analyses. These data are reasonable, available, and appropriate information on the performance of shipping casks during a sabotage event.

Substantial amounts of site-specific data were used in the transportation analyses. For example, *Road Upgrades for Heavy Haul Truck Routes - Design Analysis* (DIRS 154448-CRWMS M&O 1998) includes tables of the speeds and times used for every section of highway for heavy-haul trucks for the entire route from the intermodal transfer station to the repository and it shows that travel speeds at intersections and in towns such as Tonopah and Goldfield, would be as low as 8 kilometers (5 miles) per hour. Based on public comments, the EIS now includes impacts representative of impacts in small communities along transportation routes. This analysis accounts for factors such as the locations of intersections, commercial establishments and residences, and traffic signals.

If data were unavailable, DOE made cautious yet reasonable assumptions to estimate impacts. These assumptions are discussed in Chapter 6 and Appendix J of the EIS, and in references for these sections. DOE is aware that there are uncertainties associated with the transportation impact results presented in the EIS. There are uncertainties associated with route characteristics, demographics, weather, atmospheric dispersion models, spent nuclear fuel characteristics, accident rates, release fractions, and many other elements of the risk assessments. Because one of DOE's goals is to choose between alternatives, the consistent consideration of uncertainty among alternatives means that the relative differences in impact estimates among alternatives should not be affected. To account for uncertainties in the data, conservative assumptions were made so the impacts reported in the EIS would consider the associated range of the potential impacts. However, DOE has chosen not to use assumptions that tend to overestimate in all cases, as this practice tends to produce unrealistic and improbable results. Consistent with Council on Environmental Quality regulations (40 CFR 1502.22), DOE is attempting to avoid compounding conservatisms, yielding unrealistic results, in analyzing environmental impacts. Such practices mask the real differences and would not produce suitable results to support choices among the alternatives. Thus, for example, DOE has chosen to use realistic waste characteristics information, accident rates, highway and rail distances between waste generators and the proposed repository, the number of people along the route and at stops, and shipping cask capacities. DOE believes that the impacts presented in the EIS are not so conservative that the true differences among alternatives are masked.

Section M.3 of the EIS includes a discussion of the protocols and procedures to be followed under adverse weather or road conditions and describes how safe parking areas are to be determined. The procedures are in two parts. One relates to pretrip planning that would use available data relating to expected conditions. Shipments would not be dispatched on a route where expected conditions would not comply with the requirements in the procedures. For in-route problems, it is expected that those with the shipment would best be able to discuss and report expected and encountered conditions. The transportation contractors are to develop detailed procedures for use by the drivers/crews in making determinations regarding adverse weather and road conditions. The procedure states that DOE would coordinate diversion to a safe area if delay was required.

With respect to the risk of transportation accidents from earthquakes, the frequency of such an event is below the 1×10^{-7} accidents per year that are considered by DOE to be reasonably foreseeable. This is because a series of events would need to occur simultaneously for a spent nuclear fuel shipment to become involved in an accident severe enough to fail the packaging system as a result of an earthquake. First, a relatively severe earthquake would need to occur. As a rule of thumb, an earthquake would not disturb drivers unless it is about Richter Magnitude 6 or greater (ground acceleration in excess of 0.1*g* or 0.1 times the acceleration due to gravity). This magnitude of earthquake is severe enough to cause extensive damage to buildings (depending on quality of construction) and cause chimneys to fall. Second, a spent nuclear fuel shipment would need to be close enough to the epicenter of the earthquake to be affected. Third, the earthquake would need to be strong enough to cause the spent nuclear fuel or high-level radioactive waste shipment to become involved in a severe accident. A ground acceleration of 0.1*g* would not be severe enough, in general, to cause highway or bridge failures that could lead to a severe accident. However, it would be noticeable to a truck driver and could cause the driver to swerve or engage in an unsafe action. Most likely, this magnitude of earthquake would cause drivers to pull over and await further instruction. Finally, the accident would need to be severe enough to cause functional failure of the shipping cask. As discussed in the EIS, spent nuclear fuel and high-level radioactive waste would be shipped in extremely accident-resistant shipping casks. Even under severe accidents, the shipping cask would be likely to remain intact and retain its radioactive cargo. As a result, DOE has concluded that the frequencies of transportation accidents initiated by earthquakes are not reasonably foreseeable and, thus, are not required by the National Environmental Policy Act to be analyzed in the EIS.

The commenter requested additional information on emergency response provisions. Two regulations address the concern. First, NWPA Section 180(c) requires DOE to provide funds for training emergency response personnel in eligible jurisdictions along selected transportation routes. These requirements are discussed in detail in Sections M.5 and M.6 of the EIS. Second, there is a Federal Radiological Program outlined in the Federal Radiological Emergency Response Plan and the Federal Radiological Monitoring and Assessment Plan. These plans outline the policies, procedures, roles, and responsibilities of Federal, tribal, state, and local agencies in planning for and responding to emergencies involving releases or suspected releases of radiological materials from government and commercial facilities or operations. Under Section 180(c), DOE will fund eligible jurisdiction planning activities to determine current capabilities and needs and fund training for emergency response activities.

With regard to road and rail improvements outside Nevada, the shipment of radioactive materials requires no special transportation infrastructure that is not necessary for safe transport of commodities in the United States today. The U.S. Department of Transportation is the regulatory agency responsible for establishing and enforcing the standards for the transportation infrastructure. Adequate highways, rail lines, crossings, bridges, and tunnels exist to support the transportation of materials described in the EIS. In Nevada, upgrades to roads for heavy-haul truck shipments and the construction of a branch rail line to the repository are discussed in Chapter 6 and Appendix J of the EIS.

8.8.1 (12694)
<u>Comment</u> - EIS001898 / 0006
In the absence of a preferred route and mode of transportation, it is unclear whether the non-radiological impacts related to transportation of SNF [spent nuclear fuel] and HLW [high-level radioactive waste] within Nevada, including impacts from construction and operation of intermodal transfer stations and rail lines, have been bounded.

Basis:

The DEIS identifies the transportation of SNF and HLW as one of the components necessary for a repository. As such, transportation is a connected action (40 CFR 1508.25(a)(1)) and should be considered an integral part of the Yucca Mountain project. The NRC [Nuclear Regulatory Commission] understands that DOE would like to benefit from public input, through comments on the DEIS, when considering preferred transportation modes and routes. However, an integrated impact assessment that connects transportation to disposal needs to be included as part of any evaluation of the Proposed Action in the FEIS.

The current analysis for transportation within Nevada provides a general discussion of impacts, but does not fully assess the non-radiological impacts. Further, it is not apparent that the transportation analysis in the DEIS bounds the non-radiological impacts (e.g., socioeconomic impacts and impacts to air quality, cultural and biological resources, and land and water use). Moreover, although DOE has identified a number of options, it has not clearly defined which options (e.g., rail line construction, mode of transportation, need for intermodal transfer stations, preferred routing within Nevada, and type of trucks) it will use to support the Proposed Action.

As noted in Comment 1, the FEIS should show that, once decisions on transportation routes and modes are made, no new information or circumstances exist that could result in significant changes to the impacts assessed in the FEIS.

Recommendation:

Transportation impacts (including non-radiological and cumulative impacts) should be discussed in sufficient detail to support selection of a Proposed Action. The FEIS should contain either a complete, integrated assessment of the connected transportation actions or sufficient information and analyses on the various options to show that the impacts of the Proposed Action have been bounded.

Response

DOE believes that the EIS adequately analyzes the environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

For the reasons discussed above, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

If the Yucca Mountain site was approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

In this EIS, DOE has used computer models it has used in previous EISs and other studies. These models are widely accepted by the national and international scientific and regulatory communities. For instance, DOE selected the RADTRAN 5 computer program to estimate radiological impacts to populations from incident-free transportation and from accidents. RADTRAN, which was originally developed by Sandia National Laboratories in the late 1970s, has been used in many other previous DOE EISs, and it has undergone periodic review and revision. In 1995, an independent validation review of RADTRAN 4 (immediate predecessor to RADTRAN 5) demonstrated that it yielded acceptable results when compared to "hand" calculations. More recently, an independent review found that RADTRAN 5 overestimates the measured radiation dose to an individual from moving radiation sources.

To ensure that the EIS analyses reflect the best latest reasonably available information, DOE has either incorporated information that has become available since the publication of the Draft EIS or modified existing information to accommodate conditions likely to be encountered over the life of the Proposed Action. For example, the analysis in the Draft EIS relies on population information from the 1990 Census. In this Final EIS, DOE has scaled impacts upward to reflect the relative state-by-state population growth to 2035, using 2000 Census data.

Although the EIS analyses are based on the best latest reasonably available information and state-of-the-art analytical tools, not all aspects of incident-free transportation or accident conditions can be known with absolute certainty. In such instances, DOE has relied on conservative assumptions that tend to overestimate impacts. For instance, DOE assumed that the radiation dose external to each vehicle carrying a cask during routine transportation would be the maximum allowed by U.S. Department of Transportation regulations. Similarly, DOE assumed that an individual, the "maximally exposed individual," would be a resident living 30 meters (100 feet) from a point where all truck shipments, or 200 meters (660 feet) from a point where all rail shipments would pass. Under these circumstances, the maximally exposed individual would receive a dose of about 6 millirem from exposure to all truck shipments, and a dose of about 2 millirem from exposure to all rail shipments (6 millirem represents an increased probability of contracting a fatal cancer of 3 in 1 million). Although it can be argued that individuals could live closer to these shipments, it is highly unlikely that an individual would be exposed to all shipments over the 24-year period of shipments to the repository, even though DOE incorporated this highly conservative assumption in the analysis.

8.8.2 NEVADA GENERAL

8.8.2 (121)
Comment - 4 comments summarized
Commenters stated that the EIS did not consider scoping comments, advice, and reference documents submitted to DOE from affected counties and State agencies in Nevada. As a consequence, the EIS ignores a host of important community issues that would reasonably be expected to be considered in a project of this scope and significance. Another commenter said that the information necessary to make an accurate assessment of the impacts to Nevada from spent nuclear fuel and high-level radioactive waste transport is available, not exorbitant to gather, and should be obtained and included in the EIS prior to any agency decision, as required by the National Environmental Policy Act.

Response
In analyzing potential impacts of transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain, DOE evaluated the potential for impacts in Nevada and counties within the region of influence in multiple environmental resource areas considered in the environmental impact analyses. These resource areas, described in Section 6.3 of the EIS, include land use; air quality; hydrology; biological resources and soils; cultural resources; human health and safety; socioeconomics; aesthetics; noise; waste management; utilities, energy, and materials; and environmental justice.

To analyze the potential for impacts that could affect environmental resources, DOE collected and considered large amounts of information, including information provided by the State of Nevada and counties in the State. For the analyses, DOE used information that it judged to be relevant and reasonable. For example, based on comments submitted during scoping hearings for the EIS, DOE added consideration of the Caliente-Chalk Mountain Corridor and Caliente/Chalk Mountain heavy-haul truck route. In response to public comments on the Draft EIS, DOE used projections of population growth in Nevada provided by Clark and Nye Counties and the Nevada State Demographer for updated information presented in the Final EIS. DOE reviewed many documents produced by Lincoln County and other county and State agencies. The transportation-related information contained in those documents was considered for inclusion in the EIS. Nevada highway traffic information was collected from the Nevada Department of Transportation (DIRS 103405-NDOT 1997). DOE obtained and used accident rates for Nevada highways from the Department of Motor Vehicles and Public Safety, State of Nevada (see Section J.1.4.2.3 of the EIS). DOE used information contained in a report prepared for the City of North Las Vegas (DIRS 155112-Berger Group 2000). The information in that report provided DOE with an estimate of the cost of advancing completion of the Las Vegas Beltway for use by heavy-haul trucks, an estimate of the populations that could live along the Beltway, and a basis for estimating the dose to a maximally exposed individual in a Nevada community from transportation of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. DOE also used information in *Statewide Radioactive Materials Transportation Plan, Phase II* to identify candidate alternative highway routes for shipments of spent nuclear fuel and high-level radioactive waste that the State of Nevada has considered in the past (DIRS 103072-Ardila Coulson 1989).

DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties, offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

8.8.2 (135)

Comment - 18 comments summarized

Several commenters identified the economic and multi-use benefits of sharing a branch rail line. The commenters stated that rail routes could enhance access to mining and mineral resource areas. One commenter offered specific considerations for the placement of a rail line near Pahrump to the west near the Von Schmidt survey line. The commenter contended this location would offer safety, aesthetic advantages, and multiple-use transportation benefits. Several commenters asked about ownership of the tracks and rights-of-way, and the final disposition of the branch rail line. Other commenters expressed concern about shared use negatively affecting the safety and environmental risk of transportation. Commenters remarked that because shared use was not specifically addressed, the true impacts of such situations are not known and decisions cannot be made. One commenter stated that the Draft EIS was a legally insufficient assessment of rail transportation risks and impacts because it provided incomplete and contradictory information on rail operating assumptions and failed to address the safety and environmental implications of potential shared use of the rail line for shipments of commercial explosives, military weapons and munitions, petroleum products, and other hazardous materials.

Response

If the Yucca Mountain site was approved, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. However, follow-on implementing decisions, such as the selection of a specific rail alignment in a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

DOE identified the potential for shared use in Section 8.4.2 of the EIS as a reasonably foreseeable future action. This section states "DOE would have to consider these impacts [of shared use] in any decision it made to allow shared use of the branch rail line." If the Yucca Mountain site was approved, then decisions regarding ownership and shared use would be made. Line ownership, however, would not affect potential environmental impacts.

Regarding rail corridor alignments different from those identified in the EIS, as discussed in Sections 6.3.2 and J.3.1.2 of the EIS, DOE has narrowed its consideration for a branch rail line to five candidate rail corridors through a process of screening rail alignments it has studied. The sections identify six earlier studies. For example, in the *Nevada Potential Repository Preliminary Transportation Strategy, Study 2, February 1996*, the Department evaluated a rail alternative called the Stewart Valley Alternate (DIRS 101214-CRWMS M&O 1996). This corridor alignment west of Pahrump was removed from further consideration because of the greater potential for land-use conflicts than in the corridors evaluated in the EIS. Chapter 4 of that report discusses potential operations of a branch rail line. Because use of the branch rail line to transport materials to Yucca Mountain would continue until 2034 under the Proposed Action, it would be premature at this time for the Department to make a decision on the use or disposition of the branch rail line after emplacement operations were completed.

Impacts, including impacts to human health and safety, biological resources, land use, aesthetics, and multiple other resource areas, of constructing and using a branch rail line for transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain are discussed in Section 6.3.2 of the EIS. In response to public comments, DOE has enhanced and clarified its analyses and discussions of these impacts. The Department's *Rail Alignment Analysis* provides evaluations of branch rail lines in each of the five candidate rail corridors (DIRS 131242-CRWMS M&O 1997). The evaluations are based on requirements and standards contained in the American Railway Engineering Association and U.S. Department of Transportation regulations and Federal Railroad Administration Track Safety Standards. Included are standards for railroad crossings over highways.

8.8.2 (179)

Comment - 3 comments summarized

Commenters said that the EIS should discuss past and current impacts to Nevada residents from the transportation of radiological materials and hazardous materials along the candidate routes for spent nuclear fuel and high-level radioactive waste shipments to Yucca Mountain. By so doing, the EIS can then determine the cumulative impacts to populations in Nevada who have been repeatedly exposed to these materials.

Response
Section 8.4.1.2 of the EIS presents the cumulative impacts of radioactive material transportation in the United States since 1943. These cumulative impacts include the impacts of historic DOE shipments, which include shipments associated with the Nevada Test Site (see Table 8-58). Table 8-58 lists the impacts for the expanded use of the Nevada Test Site. Even if all the impacts from historic DOE shipments were allocated to Nevada, the impacts would be extremely small, about a 0.1 chance of a latent cancer fatality among members of the affected population.

Section 8.4.2.7 of the EIS describes the Nevada transportation impacts and states that the estimated total collective worker dose from the entire DOE low-level radioactive waste intermodal shipping campaign, including transportation impacts, would be about 4.2 person-rem. The population dose associated with low-level radioactive waste shipments by truck would be about 7.6 person-rem for the entire shipping campaign. These impacts are extremely small, less than about a 0.01 chance of a single latent cancer fatality among members of the affected population.

8.8.2 (188)
Comment - 2 comments summarized
Commenters stated that the proposed repository raises a number of concerns for the citizens of Nye County. These include a number of transportation issues. The national transportation network shown in the Draft EIS points to the fact that shipment of spent nuclear fuel and high-level radioactive waste by truck, rail, or intermodal routes would funnel all of the shipments through Nye County. The United States must take all steps necessary to ensure safe transport methods are implemented, that Nye County residents are not subjected to additional risk, whether radiological or safety related, and Nye County be given the capability to respond to any accidents within its jurisdiction.

The transportation analysis and Draft EIS fails to consider the safety hazards along specific routes. Furthermore, by not including the mitigation measure required to safely use these roads for such a shipping campaign, DOE has failed to inform the decisionmakers of the implications of impacts that would accompany repository operations.

Response
As discussed in the EIS, accidents involving spent nuclear fuel or high-level radioactive waste shipments could occur. However, of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. Of the thousands of shipments completed in the United States over the last 30 years, none has resulted in an injury through the release of radioactive materials.

Regardless, in response to comments, DOE has revised the EIS by adding Appendix M to provide information on DOE funding for improvements in emergency response training and capabilities along the routes (see Section M.5 of the EIS). State and tribal governments have primary responsibility to respond to and to protect the public health and safety in their jurisdictions from accidents involving radioactive materials. Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. In 1998, DOE published a Notice of Revised Proposed Policy and Procedures in the *Federal Register* (63 *FR* 23753; April 30, 1998) that sets forth the proposed mechanisms for implementing the requirements of Section 180(c). As part of this program, about 4 years prior to the first shipments, eligible jurisdictions would receive a one-time planning grant to assess their training needs. In accordance with the Section 180(c) Policy and Procedures, jurisdictions could use a certain percentage of their financial assistance to purchase appropriate (for example, training-related) equipment that can be used for training, inspections, and emergency response. This could include the detection equipment mentioned in the comment. See Section M.6 for a detailed discussion of the Section 180(c) provisions and emergency response programs. If requested, DOE and other Federal agencies can assist in responding to an incident.

DOE has several programs available to provide assistance to state, tribal, and local governments in response to radioactive material accidents. The Radiological Assistance Program, for example, provides trained personnel with equipment to evaluate, assess, advise, and assist in the mitigation and monitoring of potential immediate hazards associated with a transportation accident. As part of the program, DOE maintains eight Regional Coordinating Offices across the country that are staffed 24 hours a day, 365 days a year. The staff consists of nuclear engineers, health physicists, industrial hygienists, public affairs specialists, and other personnel who provide field monitoring, sampling, decontamination, communications, and other services, as requested. In addition, DOE's Radiation Emergency Assistance Center/Training Site (REAC/TS) focuses on providing rapid medical attention to people involved in radiation accidents. REAC/TS maintains a 24-hour response center to provide direct support, including deployable equipment and personnel trained and experienced in the treatment of radiation exposure, to assist Federal, state, tribal, and local organizations.

DOE believes that the EIS adequately analyzes transportation-related impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site was recommended and approved. See the introduction to Chapter 8 of this Comment-Response Document for more information.

8.8.2 (419)
Comment - EIS000071 / 0017
Again, DOE has placed their federal emission requirements over the health and safety concerns of the citizens of Nye County.

Response
DOE believes that there is a transcription error in this comment and that "emission" should be "mission." The Yucca Mountain Project Manager, Russell Dyer, in testimony before the Nevada Senate Transportation Committee on March 22, 2001, stated, "I want to reaffirm that protection of public health and safety is our foremost objective for a potential repository and related transportation system. We remain committed to completing our ongoing scientific and technical evaluation before determining whether to recommend approval of Yucca Mountain to the President." He further stated, "We are committed to safe transportation of radioactive materials within Nevada and throughout the country, whether by highway or rail and have demonstrated our ability to work cooperatively with state authorities in conducting the Department's transportation of radioactive material."

8.8.2 (1170)
Comment - EIS000229 / 0003
The DEIS discussion of HHT [heavy-haul truck] safety issues is also deficient. Because of the lack of actual experience with long distance HHT shipments, no meaningful empirical data is available to support the DEIS assertion that accidents risks "are low for all five [route] alternatives." [p.6-96] HHT operations on the routes identified in the DEIS may experience substantially higher accidents frequencies and consequences. For example, using Nevada average accident rates, and projected shipment-miles for DOE's Module 2 scenario, the expected number of HHT accidents on the Caliente route would be about 24 (12 loaded, 12 empty) over 39 years. The severity and consequences of accidents could be greater because of unique local hazards. Steep upgrades and downgrades (especially in combination with horizontal curves less than 800 feet radius) and critical side slopes and steep drop-offs (common near the summits of mountain passes) could subject casks to extreme accident impact forces and make emergency response, cask recovery, and post-accident cleanup difficult. Such conditions appear to exist near Oak Springs Summit on US 93, near Hancock Summit on SR 375, and at several other locations along the Caliente HHT route.

Response
Heavy-haul truck impacts were calculated using the Primary road rates in Saricks and Tompkins (DIRS 103455-1999). Although the document does not explicitly address heavy-haul truck accident rates, DOE believes this document provides the best available consistent data set for the impact analyses. The accident rates used in the analysis were conservative because of the special precautions taken by heavy-haul truck shipments to prevent accidents, such as restricting travel to daylight hours and providing escort vehicles in front of and behind the trucks. The heavy-haul trucks could affect the accident rates for other vehicles. However, the additional precautions described above in addition to the planned road improvements would mitigate these effects. As a result, DOE believes the analysis of heavy-haul truck accident frequencies is adequate for its intended purpose.

The commenter expressed concern that the severity and consequences could be greater because of unique local hazards. In the analysis of accidents, these events are termed “initiating events.” A large number of specific initiating events can be identified by review of historic transportation accidents or by the imagination. These include collisions with fixed objects (bridge abutments, walls, barriers, etc.), collisions with other vehicles and animals, rollovers, jackknifes, derailments, and collisions at grade crossings. Any initiating event can be characterized in terms of its mechanical forces and heat, and the event can then be categorized according to the matrix shown in Figure J-8, which is the transportation accident risk model used in the EIS. This model was taken from Sprung et al. (DIRS 152476-2000). As a consequence, it is not necessary to analyze every possible initiating event individually because the range of accidents included in the report encompasses all credible initiating events.

Regardless of the specific initiating event and type or transport vehicle, the severity of a transportation accident can be characterized by the combination of mechanical forces and heat involved in the accident and imposed on the cask. Mechanical forces account for the severity of the crash itself, while heat accounts for the severity of fire that could be involved in the accident. The Nuclear Regulatory Commission report concluded that only a tiny fraction of all accidents, less than one in 10,000, would be severe enough to fail a spent nuclear fuel shipping cask (DIRS 152476-Sprung et al. 2000). The reason for this is the rigorous design, performance, and testing requirements (see 10 CFR Part 71) for spent nuclear fuel and high-level radioactive waste shipping casks. This study reaffirmed that the spent nuclear fuel transportation regulations provide adequate protection of public health and safety. The report is an update of the accident risk model used in the Draft EIS that was referred to as the Modal Study (DIRS 101828-Fischer et al. 1987).

8.8.2 (1796)
<u>Comment</u> - EIS000616 / 0003
And the last thing I would like to say is I tried to find a more detailed map on exactly where the railroads go, particularly Lander County, and that wasn’t available.

<u>Response</u>
Appendix J of the EIS refers to the *Nevada Potential Repository Preliminary Transportation Strategy, Study 1* (DIRS 104795-CRWMS M&O 1995) and the *Nevada Potential Repository Preliminary Transportation Strategy, Study 2* (DIRS 101214-CRWMS M&O 1996), among others, which provide information on the rail corridor alignment including detailed maps. Detailed maps of the alternative routes are included in Appendix J.

8.8.2 (3067)
<u>Comment</u> - EIS000619 / 0008
Another area where the draft is deficient is in its treatment of existing rail and highway within Nevada. For example, from West Wendover to Beowawe, the interstate and Union Pacific rail line go through several communities and cross the Humboldt several times, and you would never know that from reading the draft.

<u>Response</u>
The portions of routes that use existing rail and highways within Nevada were analyzed for each of the transportation implementing alternatives in Nevada as part of the national transportation analysis discussed in Sections 6.2.3.1 and 6.2 3.2 of the EIS. The range of impacts associated with this analysis can be found in Tables 6-8 and 6-9 for legal-weight trucks and Tables 6-11 and 6-12 for railroads. Maps of the representative national routes analyzed are given in Figures 6-11 and 6-12. In addition to analyzing the impacts of using routes that would meet U.S. Department of Transportation requirements for transporting spent nuclear fuel, DOE evaluated how the estimated impacts would differ if legal-weight trucks or railroads used other routes in Nevada in Section J.3.1. This section describes alternate routes and alignments within Nevada, identifies differences in lengths and population distributions, lists potential infrastructure upgrade needs, and assesses the impacts to individuals and populations along each of these routes. Comparisons of impacts based on populations along specific highways in Nevada are provided in Table J-48. Both the rail and highway transportation analyses have taken into account the population of the communities along the routes and the estimated accident characteristics of the given routes. Specific incident rates for Nevada routes were provided by the State and used in the analyses.

8.8.2 (4125)
Comment - EIS001458 / 0002
DOE could improve its transportation analysis by including a strong statement in the final environmental impact statement regarding the inherent safety of used fuel transportation and robust packages used to transport nuclear fuel and high-level radioactive waste. DOE should also put the risks associated with spent fuel transportation in perspective such that it's evident to members of the public and policy makers and clearly identifies that transportation risks associated with the proposed action are small.

Response
The results presented in the EIS demonstrate that the impacts of transporting spent nuclear fuel and high-level radioactive waste would be low, in large part due to the use of robust packaging. The EIS attempts to place these risks in perspective in the Summary and in Chapter 6 of the EIS. A discussion of cask safety and testing and operational protocols designed to enhance safety has been added in Appendix M.

8.8.2 (4168)
Comment - EIS000544 / 0002
As far as the infrastructure impacts are concerned, we found no inventory of locations that need remedial activity within the DEIS. There were no calculations to determine these costs. No comparisons of the benefit costs for rail as opposed to heavy-haul. And pretty much that the verbiage around heavy-haul assumes that this is something that our highway system now can sustain.

There's been a plethora of media coverage about the autoclave deliveries that we have had and these vehicle configurations to haul these amounts into our state. There's been an assumption that our heavy-haul casks, heavy-haul operations would be somewhat like that.

And the public should really realize that we only really permit about one of those vehicles a year and that we're looking at something on the neighborhood of two loaded vehicles a day going into the site and then two unloaded vehicles that are only 200,000 pounds of less weight going out of the site back to the intermodal facility. It's not a campaign that is run smoothly or efficiently, I guess is the word I can use.

Lastly, as far as the operations considerations of heavy-haul, we found absolutely no estimate of what traffic queues would be accumulated behind these convoys.

Response
Section J.3.1.2 of the EIS addresses the routes in Nevada for transporting rail casks, including heavy-haul trucks and railroads. Additional details of the rail and heavy-haul truck system infrastructure requirements and assumptions used to establish their preliminary designs are included in the EIS references listed in Section 12 as *Transportation Engineering File: Road Upgrades for Heavy Haul Truck Routes–Design Analysis* (DIRS 154448-CRWMS M&O 1998), and *Rail Alignment Analysis* (DIRS 131242-CRWMS M&O 1997). These analyses contain plan and profile drawings of the five rail corridors, and rail alignment maps showing land usage with respect to the location of the rail corridor.

Sections 6.3.3.1 and 6.3.2.1 of the EIS contain cost ranges of the five rail corridors and heavy-haul truck routes with a life-cycle cost for rail ranging from $283 million to $880 million, and for heavy haul truck life-cycle costs ranging from $387 million to $669 million. Detailed costs associated with these systems are included in *Cost Estimate for Heavy Haul Truck Transport Design* (DIRS 154675-Ahmer 1998) and *Nevada Transportation Study Construction Cost Estimate* (DIRS 154822-CRWMS M&O 1998).

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. However, should heavy-haul truck transport be selected as the preferred mode, detailed engineering and environmental studies, including dynamic traffic analysis, would be performed on the selected road route. A detailed dynamic traffic analysis would identify potential traffic queues for each route section. The road upgrades listed in Section J.3.1.2 of the EIS that have been proposed would then be modified to minimize traffic impacts. A specific cost/benefit analysis of the two scenarios, rail versus heavy-haul truck, has not been performed and is generally not necessary to support current decisionmaking.

8.8.2 (4286)
Comment - EIS001160 / 0094
Page 3-99, Section 3.2.2 address legal weight truck shipments on U.S. Highway 95. Does failure of the DEIS imply that legal weight shipments would not be allowed on other routes without supplemental NEPA [National Environmental Policy Act] documentation? The DEIS should indicate what, if any, supplemental NEPA documentation would be required for a route other than those assessed within the DEIS.

Page 3-99, Section 3.2.2 implies that only data for U.S. Highway 95 was used in the analysis. If this is the case, the analysis may not accurately represent risks of shipping fuel on other Nevada highways. Nevada's highways are characterized by unique traffic patterns, load levels, seasonal environmental conditions and physiography.

Response
The routes chosen for analysis for the legal-weight truck case were selected based on U.S. Department of Transportation rules for routing shipments of spent nuclear fuel. Briefly stated, these rules require shipments to use Interstate System highways wherever possible. When it is necessary to leave the Interstate Highway System, the rules require using the shortest route to the destination. Thus, the EIS analyzed Interstate-15 and then U.S. 95 to the repository. Additional information on route selection can be found in Appendix M of the EIS. If a state wishes, it can designate alternate routes using Federal guidelines. Nevada has not done so. If the State was to designate alternate routes, which would include conducting a safety analysis, DOE would follow those routes.

In addition to analyzing the impacts of using highway routes that would meet U.S. Department of Transportation requirements for transporting spent nuclear fuel, DOE evaluated how the estimated impacts would differ if legal-weight trucks used other routes in Nevada. Six other routes identified in a 1989 study by the Nevada Department of Transportation were used in the analysis. A discussion of this analysis can be found in Section J.3.1.3 of the EIS.

8.8.2 (4300)
Comment - EIS001160 / 0109
Page 6-38, Section 6.3.1. Although proposed shipments using legal weight trucks would represent only a fraction (about 1 percent) of total truck traffic on Nevada highways, because of the nature of the material shipped, the impact on such things as socioeconomics, aesthetics and perception by the public could be significant. The relationship to regular commercial traffic is only applicable in the amount of fossil fuels burned and related impacts. Truck volume and other impact experiences from transport of spent fuel and other nuclear and hazardous wastes should be used to determine impacts of transportation.

Response
As described in Section 6.3 of the EIS, DOE's analysis of impacts from legal-weight trucks on Nevada highways does include socioeconomics and aesthetics. The topics considered for socioeconomics include changes in employment, personal income, populations, Gross Regional Product, and state and local government expenditures. The region of influence for the analysis included Clark, Lincoln, and Nye Counties. The other Nevada counties were included collectively. The topics considered for aesthetics included visual sensitivity of view-sheds, ratings for scenery, and ratings for adjacent land use. The regions of influence included landscapes along candidate rail corridors and highway routes and near possible intermodal facilities, and aesthetics qualities that construction and operations could affect. The ratings were based on the Bureau of Land Management Visual Resource Management System.

Truck volumes are considered based on analyses provided in Section J.1.2 of the EIS. Impact experience for Nevada was considered based on incident rates provided by the State, as discussed in Section J.1.4.2.

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Section 2.5.4 and Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty
- Much of the uncertainty is irreducible, and
- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

Based on these analyses, DOE believes that the relationship between a repository and related transportation activities, and subsequent individual behavior is speculative because it does not necessarily depend on actual physical effects on individuals or the public at large. Moreover, the potential indirect effects of the proximity of a repository or of transportation activities on tourism or quality-of-life indicators would vary by individual, cannot be precisely defined, and are not reasonably foreseeable.

However, DOE will continue to work with local communities and tribal nations to understand and mitigate potential negative perceptions of DOE operations. These activities include the development and presentation of factual information regarding the actual (rather than perceived) risks associated with the construction, operation and monitoring, and eventual closure of a repository at Yucca Mountain and related transportation activities.

Given the integrity of the casks transporting the waste, and the fact that more than 2,500 shipments of spent nuclear fuel have been safely transported in the last 25 years with no fatalities, injuries, or environmental damage caused by the radioactive nature of the cargo, the chances of contamination of local communities and the environment from an incident involving this type of waste are extremely unlikely and not expected to occur. DOE believes that this waste can be transported safely.

8.8.2 (4357)
Comment - EIS001157 / 0002
Because Yucca Mountain is about 90 miles north of Las Vegas, the greatest impact to North Las Vegas will be the material transport phase. Specific impacts to North Las Vegas were not sufficiently addressed in the DEIS.

Response
Section 6.3 of the EIS provides DOE's analysis of transportation routes and their alternatives within Nevada. Note specifically that Table J-48 describes Case 6 that uses the proposed Las Vegas Beltway from Interstate-15 to U.S. 95. DOE used the best information on populations, infrastructure, planned improvements, and incident rates available at the time of the analysis. As part of the basis for the analysis, DOE evaluated *Assessment of the Hazards of Transporting Spent Nuclear Fuel and High Level Radioactive Waste to the Proposed Yucca Mountain Repository Using the Proposed Northern Las Vegas Beltway* (DIRS 155112-Berger Group 2000), which provided information specific to North Las Vegas.

8.8.2 (4365)
Comment - EIS001157 / 0011
If a rail line is built through the north end of the Las Vegas Valley, grade-separated crossings should be included as part of the project. The air quality and traffic congestion consequences of delaying vehicular traffic through the Las Vegas Valley are understated and mitigation measures need to be identified.

Response
Air quality and traffic congestion due to the operation of a branch rail line northeast of Las Vegas or any of the other branch rail line alternatives would not be a significant problem (see Section 6.3.2.2.5 of the EIS). If DOE used general freight service to transport the shipment to the branch rail line, the spent nuclear fuel or high-level radioactive waste railcars would be part of a potentially much larger train with commensurate delays at grade crossings regardless of the addition of a few railcars. However, if DOE chose dedicated rail, the train probably would consist of three to five railcars with little or no traffic buildup at grade crossings. Once the shipment(s) were on the branch rail line, the size of the train would result in little or no traffic buildups. At this time, DOE has not

determined the commercial arrangements it would request from railroads for shipment of spent nuclear fuel and high-level radioactive waste.

8.8.2 (4370)
Comment - EIS001157 / 0016
The vehicle emission analysis for the Las Vegas Valley was insufficient in two ways. First, it was based only on legal-weight trucks and did not consider the heavy-haul option which will create traffic congestion. Second, the reasoning for assuming only a limited impact was based on I-15 traffic volumes at Sahara Avenue, which is in the center of the City. None of the proposed routes go through this area, so a comparison using a more likely location (such as the permanent traffic recorder near the Apex interchange) should be used.

Response
Section 6.3.3 of the EIS evaluates air quality impacts due to vehicle emissions from heavy-haul trucks. In response to public comments, the EIS contains an expanded discussion of truck emissions in the Las Vegas Valley and the overall impacts on air quality.

8.8.2 (5529)
Comment - EIS001660 / 0039
The DEIS fails to adequately address impacts of the proposed action on existing surface transportation systems in affected Nevada counties. Transportation routes to Yucca Mountain would need to be improved. These routes are important for mining, interstate commerce, and mobility of all affected county residents and visitors. Also, a network of minor roads, mostly unpaved, serves affected county residents by providing access to public lands, private property, and mining claims. The DEIS must analyze and disclose the impacts of the proposed action on the railroad and the main improved highways. Specifically, it must consider: (1) the existing capacities of road and railroad links, in terms of both weight and traffic volume; (2) the anticipated increases in utilization of those links, in terms of weight and volume; (3) the impacts of those increases on rails, pavements, road beds, and travel times; and (4) whether the proposed action would create a need or demand for additional improved routes through affected counties in Nevada. Also, the DEIS must consider the impacts on the nation's rail transport system of an accident involving SNF [spent nuclear fuel] and HLW [high-level radioactive waste]. In the context of the mostly legal-weight truck scenario, I-80, US 50, NV 278, NV 376 (Lander and Nye Counties), US 6 (White Pine and Nye Counties, which is close to Mineral County), and other Nevada routes could be utilized as main alternate routes for transport of SNF and HLW. The impacts of the proposed action on the existing uses of those routes must be addressed in the DEIS, in addition to I- 15 in southern Nevada. Finally, the DEIS must disclose how access to minor roads would be affected and preserved.

Response
Sections 6.3 and J.3 of the EIS summarize the impacts of both incident-free truck and rail transportation and transportation accidents on Nevada. Section J.3.1 discusses the transportation modes, routes, and number of shipments of spent nuclear fuel and high-level radioactive waste for the different transportation implementing alternatives and their alignment variations. This information includes tables of information of potential upgrades needed for each option. This information provides the basis for the impact assessments. Details of impacts on existing surface transportation were evaluated in the following reference documents and summarized in the EIS. Impacts to traffic levels and road structures were evaluated in *Road Upgrades for Heavy Haul Truck Routes* (DIRS 154448-CRWMS M&O 1998); impacts to existing roads (paved and unpaved) were analyzed in *Rail Alignments Analysis* (DIRS 131242-CRWMS M&O 1997) where it was proposed to provide grade separations at major roads and at grade crossings at necessary minor roads. These analyses evaluated current traffic levels on existing roads, estimated increased traffic, and additional traffic due to spent nuclear fuel and high-level radioactive waste transport.

When a corridor or route was selected, detailed assessments and designs for rail alignments or heavy-haul truck road upgrades would be initiated. These studies would be part of engineering and environmental studies needed to develop detailed designs and to support specific National Environmental Policy Act reviews for the proposed actions. DOE would use routes that meet U.S. Department of Transportation requirements or routes designated by state or tribal routing agencies.

8.8.2 (6221)
Comment - EIS001904 / 0001
The primary concern of Elko County is for the health, safety, and welfare of it citizens. The draft environmental impact statement (DEIS) regarding the transportation of 70,000 metric tons of heavy metal (MTHM) of spent nuclear fuel and high-level waste through this county to connect a new railroad spur in Beowawe is not an acceptable transportation alternative. The Draft fails to address a host of concerns that this alternative might bring to Northern Nevada if this plan is accepted into the final EIS. The Draft is flawed because it has several transportation routes and methods of transport yet does not address the impacts or effects that would be incurred by these different scenarios.

The Carlin potential rail corridor alternative fails to address the fact that to get this new spur, the existing Union Pacific Rail Way lines will be used. This heavily used rail system will be furthered burdened by at least three to four of these radioactive waste trains traveling these lines each week for the next 24 years. The Draft EIS does not address the shared use of these rail lines that are also used for shipment of commercial explosives, military weapons and munitions, petroleum products, and other hazardous materials. [Nowhere] is the safety and environmental impacts considered in this Draft. The Department of Energy calls for shipping rail casks loaded with highly radioactive spent fuel in general freight trains and would require switching cars at the connection point thereby routinely parking loaded rail cask cars on side track for up to 48 hours. Further, most of the spent fuel is from the east and Midwest and if this rail line was used, these trains would pass through our most populous cities, namely Wells, Elko, and Carlin. The city of Elko is where the trains on this rail line change crews and it would follow that a crew change would be required for the radioactive waste trains as well in Elko, with a population 17,000 and an additional 10,000 people within 20 miles. [Nowhere] in the Draft EIS is our County mentioned as a potentially impacted area. There are no provisions for any type of Hazardous Material training for our emergency response personnel and no provisions for financial assistance if we were to be subjected to radiological disaster. The mention of upgrading of the existing rail lines as well as signalization upgrades, grade crossing or Right of way fencing is nonexistent in the Draft EIS.

Response
The EIS presents safety and environmental impacts (see Chapter 6 and Appendix J) of 10 implementing alternatives for transportation in Nevada by rail or heavy-haul truck including the construction of a branch rail line from Beowawe to Yucca Mountain. In addition, the use of legal-weight truck in Nevada is analyzed, including the sensitivity analysis of six alternative legal-weight truck routes. The analysis includes both construction-related impacts and operational impacts (including transportation of materials to the repository). As the analysis indicates, the impacts would be small regardless of which alternative was chosen. This indicates that impacts along any specific route and through any specific community would be small. In addition, the EIS presents an analysis of a generic community along the transportation route that indicates that community specific impacts would be small.

Decisions regarding the selection of a branch rail line for transporting spent nuclear fuel and high-level radioactive waste have not been made. However, it is in DOE's interest and in the interest of communities along a branch rail line to consider shared use of the line. This could involve shipments of other materials to Yucca Mountain, the Nevada Test Site, or shared usage with commercial interests. Before decisions would be made on the transportation alternatives associated with the Yucca Mountain Repository, the impacts such as shared use, would be evaluated. The specific conditions of any railway would be analyzed once specific decisions were made and potential upgrades implemented.

As requested, DOE would assist the State, tribal, and local governments in several ways to reduce the consequences of accidents related to the transportation of spent nuclear fuel and high-level radioactive waste. In addition, under Section 180(c) of the NWPA, DOE would provide technical assistance and funding to train State, local, and tribal public safety officials in safe transport procedures and emergency response. More details about the Section 180(c) process are provided in Appendix M of the EIS.

8.8.2 (6708)
Comment - EIS001878 / 0072
The DEIS fails to adequately address the impacts of the proposed action on existing surface transportation systems in Eureka County and other counties in Nevada. Interstate 80, US 50, NV 278, and NV 306 are the main improved routes in Eureka County. They are important routes for mining, interstate commerce, and the mobility of County

residents and visitors. The Union Pacific railroad generally parallels I-80 and the Humboldt River across the northern portion of the County. It is an essential component of the transportation network for interstate commerce and national defense. A network of minor roads also serves the residents of Eureka County, providing access to public lands, private property, and mining claims.

Principal transportation routes. The DEIS must analyze and disclose the impacts of the proposed action on the railroad and the main improved highways. Specifically, it must consider: (1) the existing capacities of road and railroad links, in terms of both weight and traffic volume, (2) the anticipated increases in utilization of those links, in terms of weight and volume, (3) the impacts of those increases on rails, pavements, road beds, and travel times, and (4) whether the proposed action would create a need or demand for additional improved routes through Eureka County.

Eureka County is especially concerned that utilization of the main Union Pacific tracks and facilities in the northern county could involve the storage of rail cars carrying SNF [spent nuclear fuel] and HLW [high-level radioactive waste] on sidings near Beowawe for extended periods of time. The impacts of such storage on transcontinental rail operations and on existing sidings in the vicinity (including those at Carlin and Dunphy) must be considered. In addition, the DEIS must consider the impacts upon the nation's rail transport system of an accident involving SNF and HLW and one of the UP bridges over the Humboldt River.

Alternative routes. In the context of the mostly legal-weight truck scenario, I-80, US 50, NV 278, NV 376 (in Lander and Nye Counties), US 6 (in White Pine and Nye Counties), and other Nevada routes could be utilized as main or alternate routes for the transport of SNF and HLW. The impacts of the proposed action on the existing uses of those routes must be addressed in the DEIS, in addition to I-15 in southern Nevada. Among other information, the DEIS must disclose the alternative routes that would be used, and the anticipated impacts along those routes, when rail or legal-weight truck operations are interrupted by flooding, range fires, and other natural events.

R.S. 2477 roads and other access routes. Rights of way over public lands for many roads were granted by Section 8 of chapter 262, 14 Statutes 253 (former 43 U.S.C. Sec. 932, commonly referred to as R.S. 2477) enacted in 1866. Such roads serve the public interest; provide access for fire control, law enforcement, search and rescue, medical personnel, and public utilities; provide access to public lands for members of the general public; and enhance the taxable value of the private property they serve.

Eureka County is concerned that many R.S. 2477 roads and other roads along the proposed Carlin corridor may be affected by construction of the roadbed, access roads, and fences. The DEIS must disclose: (1) whether the proposed action would result in the closing of any of these roads, (2) whether it would restrict access to them in any way, and (3) how the proposed action would ensure the continuity of such roads, through the use of at-grade crossings, underpasses, overpasses, or other means. Subsection 1 of Nevada Revised Statutes (NRS) 405.204 authorizes Nevada's attorney general to bring an action for declaratory judgment against an agency of the United States responsible for the lands over which an accessory road runs that pursues the closing of an accessory road or demands a fee or permit for its use.

Response

The current rail traffic on existing rail lines within Nevada is large (approximately 1,000 railcars per day) compared to the railcars per week that could be expected with spent nuclear fuel or high-level radioactive waste destined for Yucca Mountain. The increase in rail traffic would have little or no impact on the existing rail infrastructure. DOE has identified rail as its preferred mode of transportation within Nevada. It is not expected that the construction of a branch rail line would affect R.S. 2477 roads and other roads along the candidate rail corridors.

The incident-free transportation analysis considers the stop of railcars in classification yards throughout its journey from origin to destination. These classification stops are assumed to occur once in the state of origin, once in the state of destination, and a number of times in between depending on the number of kilometers traveled. The population density at each of the stops is conservatively assumed to be a suburban population zone (719 persons per square kilometer). Therefore, any layover of railcars in Nevada while awaiting transfer to a train for travel to Yucca Mountain has been addressed in the EIS.

The accident analysis in the EIS considered the impacts of low probability severe accidents. If an accident was severe enough to require closing the railroad track at the location of the accident, alternative routing measures could be employed to circumvent the area of the accident.

For the mostly legal-weight truck scenario in Nevada, the analysis looked at the routing according to U.S. Department of Transportation routing regulations and analyzed the impacts of six alternative legal-weight truck routes. The analysis indicated that there were not significant differences in impacts across the legal-weight truck routing alternatives.

Following are responses to the three specific requests for disclosure:

- The closing of specific roads is not anticipated although specific routes have not been defined.
- Specific access to these roads has not been designed but access is not expected to be restricted.
- The continuity of these roads would be determined by DOE and the State using the route/mode decision process.

8.8.2 (7011)
Comment - EIS001887 / 0140
Page 2-81; Section 2.4.4.2 - Nevada Transportation

The Draft EIS states, "With the exception of Land Use, differences in environmental impacts for the ten implementing alternatives related to incoming shipments by rail would be small, so environmental impacts do not appear to be a major factor in the selection of transportation mode, route, or corridor in Nevada for incoming rail shipments." This statement is inaccurate. Rail operations associated with heavy-haul shipments present major problems for the operational highway network in Nevada. The Draft EIS ignores such impacts as traffic queuing, failing structural sections, remedial actions for reducing traffic accidents, and institutional anomalies (such as providing a portable crane capable of lifting overturned vehicles and casks).

Response
As discussed in Section J.3.1.2 of the EIS, several highway upgrades would be proposed for any of the five heavy-haul truck implementing alternatives. There is a table listing and describing the upgrades proposed for each route. Nevada highways upgraded for heavy-haul truck use would include new truck turnout lanes at frequent intervals along two-lane highways to allow other traffic to pass the slower heavy-haul vehicles in order to reduce traffic queuing. A detailed analysis of structural sections, remedial actions for reducing traffic accidents, and institutional anomalies would be conducted in subsequent engineering and environmental analyses once a mode and route were selected. As a part of these studies, government agency consultation and appropriate National Environmental Policy Act reviews would be conducted. In addition, as a part of the permitting process, the State Engineer may, as necessary, conduct an engineering evaluation (including a structural analysis) of the proposed heavy-haul truck route according to Nevada Administrative Code Chapter 484.530. Cranes and equipment used for non-NWPA rail incidents could handle NWPA equipment, including casks.

8.8.2 (7043)
Comment - EIS001160 / 0044
It is very difficult within the DEIS to evaluate impact on communities in the major zone of influence. One is hard pressed to find any quantification of how many actual legal weight truck haul loads could be expected through Ely on the US 93 or SR 318 scenario. The table on J-7 might indicate around 1500 shipments from the Idaho National Engineering and Environmental Laboratory 800 shipments from Hanford that might use a route through Ely as an alternate to Interstate routes, spread over a 20-year period (Table J-4). It would be useful if there was analysis of some key points like Ely (apparently a relatively low impact area with about 350 shipments of high-level radioactive waste a year, Table J-4) as opposed to perhaps high impact Mesquite with perhaps an average of 1700 shipments a year of commercial spent nuclear fuel (Figure J-10).

Response
As described in Section 2.1.3.2 of the EIS, the Department describes the national transportation scenarios and provides maps of the Interstate Highway System and the national rail system. Under the Proposed Action, DOE would ship spent nuclear fuel and high-level radioactive waste from 72 commercial and 5 DOE sites in some combination of legal-weight truck, rail, heavy-haul truck, and possibly barge. Because DOE cannot anticipate the exact number of shipments and mode that would be used, the EIS considers two transportation scenarios, a mostly legal-weight truck scenario and a mostly rail scenario, in order to illustrate the broadest range of operating conditions relevant to potential impacts to human health and the environment (see Table 2-2 of the EIS).

In addition to analyzing the impacts of using highway routes that would meet U.S. Department of Transportation requirements for transporting spent nuclear fuel (49 CFR Part 397), DOE evaluated how the estimated impacts would differ if legal-weight trucks used other routes in Nevada, including representative routes that would pass through the community of Ely (see Table J-47 of the EIS). This analysis was made for the range of operating conditions illustrated in the mostly legal-weight truck scenario and the mostly rail scenario (see Section J.3.1.3). Under the range of operating conditions, DOE assumed that all legal-weight shipments would travel along the given routes under each of the scenarios. The results of this analysis can be found in Table J-48, which indicates the variations in impacts between various Nevada routes. The impacts to the community of Ely would be a small fraction of the impacts to Nevada. In response to public comments on the Draft EIS, DOE has included an analysis for a maximally exposed individual of a small community in Section 6.3. Section J.4 contains maps of each state where shipments would originate or through which they would pass. Each state map lists the number of shipments used in the analysis and the impacts within the state of such shipments.

DOE expects that the mostly rail scenario best represents the mix of truck and rail transportation modes it would use. To determine this mix, DOE considered whether sites are able to handle larger (rail) casks, distances to suitable railheads, and historic precedent in actual shipments of fuel, waste or other large reactor-related components. DOE also has considered relevant information published by knowledgeable sources such as the Nuclear Energy Institute and the State of Nevada. The analysis has confirmed DOE's belief that the mostly legal-weight truck and mostly rail scenarios provide the range (lower and upper bound) of environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste.

8.8.2 (7141)
Comment - EIS001337 / 0038
The County [Lincoln] and City [Caliente] recommended that an assessment of paleontologic resources within alternative rail corridors and at potential borrow pit sites within Lincoln County be conducted and reported on within the scope of the repository DEIS. The DEIS does not identify potential borrow pits and therefor has not included an assessment of the paleontologic resources at such sites. Such an omission makes the document less useful as a decision-support tool, particularly in choosing among transportation corridor alternatives.

Response
As stated in Section 6.3 of the EIS, the evaluation of impacts of cultural resources considered the potential for disrupting or modifying the character of archaeological or historic sites, artifacts, and other cultural resources. The region of influence for the analysis included the lands in the 400-meter (0.25-mile)-wide rail corridors. Cultural resource impacts of each rail corridor implementing alternative are provided in Section 6.3.2.2. Should the mostly rail transportation scenario be selected and a preferred corridor identified, additional engineering and environmental studies would be initiated to select a specific alignment of the tracks within the selected corridor. Appropriate National Environmental Policy Act reviews would be conducted to support selection of a specific alignment and design. Borrow pits would not be identified and assessed for cultural resources until geotechnical surveys and other environmental studies were conducted in conjunction with subsequent design activities following the selection of a rail corridor or intermodal transfer station location. An assessment of paleontologic resources at borrow pits would be included in such National Environmental Policy Act reviews for the specific rail alignment.

8.8.2 (7521)
Comment - EIS001912 / 0050
Section 3.2.2.1. Did any member of the EIS team make site visits and site investigations for the various rail corridor alternatives? If yes, please explain the nature of the investigations?

Response
Section 3.2.2.1 of the EIS is based on a combination of published information and field observations. Based on published environmental data, 54 springs, perennial streams, and Bureau of Land Management-designated riparian areas were visited by DOE biologists to determine if those sites contain wetlands (DIRS 155378-Reilly and Smith 1997). Fifteen locations with sensitive species were visited to ensure that the sites still had suitable habitat for the species (DIRS 154825-CRWMS M&O 1997). In addition, DOE engineers made an initial visual survey of all rail corridor alternatives as a part of the routing analysis. Topography, land use, and known areas of environmental concern were observed as a part of the corridor centerline selection to minimize impacts to stakeholders (DIRS 131242-CRWMS M&O 1997). Cultural resources, noise, aesthetics, and existing visual conditions were observed by contractor personnel on a field trip along proposed heavy-haul truck routes and rail corridors. Additional interviews with responsible State and Federal agencies were conducted and additional literature searches were performed during the trip. A report has been prepared detailing the information obtained during the trip (DIRS 155826-Nickens and Hartwell 2001) and the relevant information is included in Chapter 6 of the EIS.

8.8.2 (8725)
Comment - EIS002119 / 0010
And last, I'd like to mention that should there be an incident, even if the routes do not go through Clark County, under certain governmental agreements, we do provide as a large county with a number of resources assistance to other counties, nearby counties in the event of hazardous materials or nuclear materials or waste incidents. And lastly, I'd like to say that this community, Clark County and its urban areas especially and rural areas has been built up from the desert. We have developed. There have been the talents and skills and efforts of a number of people, many of whom have testified here. This has value. There's value in the quality of life. There's value economically. There's value for the future. And these have not been given serious consideration in the DEIS.

Response
Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to state, local, and tribal governments to support training of public safety officials to help ensure safe routine transportation and emergency response for shipments to a repository. The state could provide funds allocated under Section 180(c) to support a county providing assistance to other jurisdictions through mutual aid agreements. Appendix M of the EIS contains more information on Section 180(c).

8.8.2 (9431)
Comment - EIS001593 / 0002
You have got several railroads that would go to this Yucca Mountain, proposed possible railroads, and one of them, this Chalk Mountain or Caliente Chalk Mountain Route, I believe is what it's called, would go through the Air Force's Flying Saucer Base out in Nevada.

Now, I don't know if it is so much interesting from an environmental standpoint, but you know, we hear a lot about this rogue agency, you've heard some today about this rogue agency, rogue power behind nuclear power, the Nuclear Power Industry. Well, I am, actually a little more worried about this black operation crowd out there in Nevada, and I would just love to see a knock-down, drag-out fight between the two of you.

Now that would be -- I think that could really open up -- you know, people wonder, you know, if this isn't some kind of military coup, I mean, all this secret stuff, and wondering, you know, if elected officials are really in control.

Response
DOE reevaluated whether the Caliente-Chalk Mountain Corridor and the Caliente/Chalk Mountain heavy-haul truck route should be eliminated from further evaluation. DOE met with the Air Force (see Appendix C of the EIS), considered the information provided, and concluded that the Caliente-Chalk Mountain Corridor and the Caliente/Chalk Mountain heavy-haul truck route implementing alternatives should remain identified as "nonpreferred alternatives" in this Final EIS.

DOE has not identified a particular rail corridor or heavy-haul truck route as "environmentally preferable." If the site was approved and a mode of transportation (rail or heavy-haul truck in Nevada) was selected in a Record of Decision, DOE would then identify an environmentally preferable corridor or route in a subsequent Record of Decision to select a rail corridor or heavy-haul truck route. In making such a determination, DOE would consider a variety of environmental factors, including many raised by the commenters. The potential environmental impacts from the construction and operation of the Caliente-Chalk Mountain Corridor and the Caliente/Chalk Mountain heavy-haul truck route are included in Sections 6.3.2.2.3and 6.3.3.2.2 of the EIS.

8.8.2 (9607)

Comment - EIS001888 / 0279

An analysis of the risks and impacts of the heavy haul transportation routes through urban Clark County. This analysis should examine the traffic impact of the transportation as well as the risks of this unprecedented program. The engineering data should be modified to include the costs to acquire right of way for the additional travel lanes. The report should also include an estimate of the costs to improve existing infrastructure to accommodate the transportation program.

Response

DOE analyzed heavy-haul truck implementing alternatives in EIS Section 6.3.3, including routes through Clark County. In this analysis, DOE assumed that heavy-haul truck shipments in Clark County would utilize the planned Las Vegas Beltway. In doing so, DOE assumed that funding would be made available to accelerate Beltway Phase II construction to meet a 2010 transport date. DOE used the best available cost estimate for Beltway Phase II construction, taken from the *Environmental Study for the Northern and Western Las Vegas Beltway Transportation Facilities and Right-of-Way Footprint* (DIRS 103710-Clark County 1997). Costs to acquire right-of-way for additional travel lanes and costs to improve existing Nevada highway infrastructure to accommodate a heavy-haul truck transportation campaign are included in the Department's cost estimate (DIRS 154675-Ahmer 1998). However, Interstate System highways, and the Las Vegas Beltway after Phase II construction, would not need improvement because they meet, or will meet, standards necessary to sustain heavy-haul truck shipments.

8.8.2 (9664)

Comment - EIS002074 / 0008

With respect to the intermodal sites that was stated in the American Indian prospectus on the Yucca Mountain Site Characterization Project that was done by the American Indian Writers subgroup, there's been no systemic ethnographic interviews that have been conducted to evaluate the epidemiological and sociological impacts to Indian people and their communities regarding cultural resources of sacred sites. The studies only focus on the impacts to the physical artifacts and no subsistence patterns, no traditional eligibility for traditional cultural properties or cultural landscape as considered in the bulletin number 30 and 38 by the National Park Service.

Response

Section 3.2.2.1.5 of the EIS discusses the existing, documented information on cultural resources along the candidate rail corridors. Limited field surveys were conducted (DIRS 155826-Nickens and Hartwell 2001). Should the mostly rail transportation scenario be selected and a preferred corridor identified, additional engineering and environmental studies would be initiated to select a specific alignment. During this process, specific data-gathering efforts and analyses would be conducted, including focused cultural resource studies and Native American consultations, as well as consultations with responsible State and Federal agencies, as applicable. Appropriate National Environmental Policy Act reviews would be conducted to support selection of a specific alignment and design.

8.8.2 (9671)

Comment - EIS002074 / 0016

With health and safety, and this is just going down on the record, is that there is concern by this group of terrorism and felt that the potential of those kind of situations occurring, as well as looking at the potential of derailments. It was felt that there was an accident that happened, I believe it was December 24th in 1997 or 1998, on the Caliente, that that was not felt that it was adequately considered or there was an indication as to how those kinds of things could occur -- I mean, how those kinds of things were considered into the decisions of looking at various sites, including the Caliente intermodal site.

Response

In the Final EIS, DOE estimated that the greatest consequences would occur if the sabotage event occurred in the center of a highly populated metropolitan area. The dose from such an event to a maximally exposed individual (about 110 rem over the person's lifetime) would increase his or her lifetime risk of a fatal cancer from about

23 percent to about 28 percent. However, doses to most affected individuals would be much lower than that to the maximally exposed individual; these individuals' increased risk of a latent fatal cancer would also be lower. It was not predicted that there would be any prompt fatalities from very high levels of exposure, and immediate health consequences from radiation exposure would be unlikely, but by combining the large number of small individual risks in the population of a metropolitan area, DOE estimated that a sabotage event could lead to as many as 48 latent fatal cancers. Although not estimated in the analysis, injuries and deaths from blast effects of a device that might be used would be expected for individuals who would be as close to the event as the hypothesized maximally exposed individual. However, exposure to radioactive materials sufficient to lead to an individual lifetime dose of 110 rem could result in a need for medical attention. DOE designed the analyses to identify the maximum consequences that a severe accident could reasonably be expected to produce (reasonably expected is defined as a likelihood greater than, but on the order of, 1 in 10 million in a year), but the analysis did not make extreme assumptions that would identify the worst possible consequences that could be imagined.

DOE believes that a shipment of spent nuclear fuel or high-level radioactive waste would be an unlikely target in part due to the physical security measures imposed by the Nuclear Regulatory Commission regulations. Under certain conditions, armed escorts would either follow or ride in the truck cab or an escort railcar. DOE would monitor its spent nuclear fuel and high-level radioactive waste shipments through a satellite-based tracking system.

8.8.2 (9771)
Comment - EIS001160 / 0123
The use of conventional highway traffic data, while convenient may have limited applicability when examining scenarios within White Pine County.

Response
The highway traffic data used to estimate impacts on the highways within Nevada are representative of the types of trucks that would be utilized to transport spent nuclear fuel and high-level radioactive waste within Nevada. National, State, and regional traffic data were used to ensure that transportation analyses were representative. Reviewing the references for Section 6 and Appendix J of the EIS shows the breadth and depth of traffic data used.

8.8.2 (10232)
Comment - EIS002115 / 0007
Other transportation issues of the waste to the site are: Mode, not clearly identified. Three possible modes of transportation are identified.

The waste could be driven on interstates using legal weight trucks. It could be sent by train, which includes five options of building a railroad to Yucca Mountain. It could be transported by heavy-haul, which is rail to a transfer point in Nevada, then transferred to 220 foot heavy-haul trucks and transported to Yucca Mountain. Routing, many possible routes not studied adequately. Rural areas do not have good or safe roads to transport this nuclear waste, especially if alternative routes are selected, nor do they have railroads to get it to Yucca Mountain. Land use. Consideration of present and planned land uses along possible routes identified.

Response
DOE used current regulations governing highway shipments and historic rail industry practices to select existing highway and rail routes to estimate potential environmental impacts. These routes are representative of the routes that the Department could use to transport spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Section J.3.1.2 of the EIS discusses the rail implementing alternatives, which are the five candidate rail routes in Nevada to Yucca Mountain.

In addition, Section J.3.1.3 of the EIS describes the sensitivity of the impact analysis to the routing assumptions. With regard to land-use impacts, Sections 6.1.2.1 and J.3 discuss land-use impacts associated with the transportation implementing alternatives. If DOE selected a specific alternative, it would complete a more detailed analysis of environmental, engineering, and socioeconomic impacts along the corridor.

8.8.2 (10770)
Comment - EIS002144 / 0007
The Department of Energy operations office puts you guys to shame. They've done studies that we've told them to do. They came to us last year says, "Hey, we got studies this thick about intermodal transportation to the Nevada Test Site." We did an EA on it -- on the same thing that they had. They had $350,000.00. We had ten days to do this and about a hundred dollars a day per person to do it. When we got finished, our document was five times bigger. Our document talked about transportation. How are you going to get it there? How is it going to get there in the first place. And then after that, what's going to happen?

Our document talked about a lot farther than a half mile, because our document talked about real life. When -- when a crow flies in, he's not coming in just from a half mile; he's coming in from many miles away, and every time he goes to the bathroom, he drops that radiated part out of his body. Coyotes don't just come from a half mile away. Eagles don't just come from half mile away. They all come from a lot farther, and they don't consider that because they say -- and they're right. I'm not a scientific person. I know from my experience at home and my teachings from my people what we -- what has happened and what is going to happen, and it's a shame that we -- that I have to cry and scream and yell just like you at your site and go home.

Response
The analysis of impacts from the construction and operation of an intermodal transfer station in Section J.3.3.1 of the EIS indicated that there are no credible accidents that would result in a release of radioactive material. The analysis evaluated radiological and nonradiological impacts and found that they would be low.

8.8.2 (11277)
Comment - EIS001814 / 0011
DEIS Page 2-9
DOE is looking at three transportation scenarios for Nevada. These scenarios include legal-weight truck and rail, which are the same as the national scenarios but highlight the Nevada portion of the transportation, and heavy-haul truck.

Although DOE maintains that the "mostly legal weight truck" and "mostly rail" scenarios adequately bound the analysis for the national transportation scenarios, this is not true for the Nevada Transportation Scenarios. Under the "mostly legal weight truck" scenario, DOE must still deal with more than 300 rail shipments of high-level waste and Naval fuel (references). The Nevada Transportation Scenario fails to describe how DOE will deal with these shipments without either constructing a rail line or operating an intermodal transfer site and heavy-haul.

Response
Section 2.1.3.3.1 of the EIS states that DOE would use heavy-haul trucks and would establish an intermodal transfer capability. These 300 shipments would be spread over a 24-year period, which would arrive within Nevada by rail. Section 6.3.3 states, "This EIS assumed that DOE would not build an intermodal transfer station to handle those shipments." The intermodal transfer capability would consist of a suitable crane and an existing rail siding suitable for transferring the transportation cask (approximately 12 per year) onto a heavy-haul truck described in Figure 2-28. In this limited heavy-haul truck scenario, there would be no road upgrades required as described in this section for the mostly rail scenario. Nevada Department of Transportation currently issues approximately 400 permits on a single-trip permit basis for vehicles capable of transporting 68 metric tons (75 tons) or more payload on the five candidate heavy-haul truck routes evaluated in the EIS, excluding the use of the Las Vegas Beltway. DOE believes that the 12 additional heavy-haul truck shipments per year on these roads would not warrant large-scale, costly highway improvements that are included in the mostly rail scenario, nor would they cause significant additional highway deterioration or traffic hazards.

8.8.2 (11278)
Comment - EIS001814 / 0012
DEIS Page 2-40
These scenarios illustrate the broadest range of operating conditions relevant to potential impacts to human health and environment.

This statement is incorrect, since the "Mostly LWT [legal-weight truck]" scenario includes rail shipments. Without constructing a new rail line in Nevada or operating an intermodal transfer and heavy-haul in Nevada, the shipments dependant on rail will either have to be repackaged in smaller containers in Nevada or not shipped to the proposed repository at Yucca Mountain.

Response
As described in Section 2.1.3.2.1 of the EIS, part of the mostly legal-weight truck scenario includes the shipment of naval spent nuclear fuel that would be shipped to Nevada by rail. These shipments incorporate approximately 300 shipments over a 24-year operational period. The EIS assumed that these shipments would use the services of a commercial intermodal operator. The EIS also assumed that DOE would not build an intermodal transfer station to handle naval spent nuclear fuel shipments. Naval spent nuclear fuel shipments, equating to approximately 16 casks per year, would then be shipped from the intermodal transfer point to Yucca Mountain by heavy-haul truck as described in Section 6.3.3.1. It is the Department's opinion that the EIS adequately analyzes the mostly legal-weight truck transportation shipping scenario.

8.8.2 (11285)
Comment - EIS001814 / 0017
DEIS Page 2-49
Construction activities would include the development of construction support areas; construction of access roads to the rail line construction initiation points and to major structures to be built, such as bridges; and movement of equipment to the construction initiation points. The number and location of construction initiation points would be based on such variables as the route selected, the length of the line, the construction schedule, the number of contractors used for construction, the number of structures to be built, and the locations of existing access roads adjacent to the rail line.

The construction activities listed cannot be completed without some environmental impact, and will require appropriate mitigative measures. Without a detailed description of these activities it is impossible to conclude that they can be completed without causing unacceptable adverse environmental impacts, even with mitigative measures. Until these construction activities are specified, DOE cannot conclude that the proposed action will not result in unacceptable impacts as required by the National Environmental Policy Act.

Response
Section 6.3 of the EIS describes different categories of environmental information acquired and evaluated for Nevada transportation. The results of the evaluation of this information for each mode and route in Nevada are provided in the subsequent sections. Should the mostly rail transportation scenario be selected and a preferred corridor identified, additional engineering and environmental studies would be initiated to select a specific alignment of the tracks within the selected corridor and related construction activities. Appropriate National Environmental Policy Act reviews would be conducted to support selection of a specific alignment and design. Detailed branch rail line construction activities would be evaluated in subsequent engineering and environmental analyses in conjunction with government agency consultation and evaluated in appropriate National Environmental Policy Act reviews conducted in union with these analyses and consultations. Access roads and construction support areas would be evaluated as short-term temporary impacts.

8.8.2 (11286)
Comment - EIS001814 / 0018
DEIS Page 2-50
Railroad track construction would consist of the placement of railbed material, ties, rail, and ballast (support and stabilizing materials for the rail ties) over the completed railbed platform.

Construction of the railroad in any of the proposed rail corridors will require significant quantities of ballast and probably significant quantities of sub-ballast. The EIS does not provide a description of the source for these materials. The quantity of ballast and sub-ballast required should be accurately defined, and sources for the material described. Quarrying the ballast and sub-ballast could result in significant environmental impacts not assessed in the EIS.

<u>Response</u>
Detailed evaluations for the source of sub-ballast, ballast, and fill materials would be performed in subsequent National Environmental Policy Act evaluations, should rail be selected as the preferred mode for transportation. Determination of material sources is very route-specific, and the detailed engineering required to develop accurate source requirements is more applicable to the next level of National Environmental Policy Act activities, once a route had been selected. Preliminary quantities of fill material, sub-ballast, and ballast were evaluated in *Nevada Transportation Study Construction Cost Estimate* (DIRS 154822-CRWMS M&O 1998).

The estimated land disturbance for obtaining fill materials was included in the land disturbance quantities in the EIS. The ballast and sub-ballast materials were assumed to be available from existing quarries, either in Nevada or from quarries in neighboring states. Sub-ballast and ballast materials could be transported to the rail construction site by completed rail section. Therefore, the transportation of those materials from quarries in other parts of the country is not a great economic differentiation, unlike the transportation of the base fill materials that would have to be transported by truck. Fill material transport would a significant cost driver, which would require the use of local borrow sources. This is why the EIS includes fill borrow source disturbed land and not sub-ballast and ballast borrow source estimates.

8.8.2 (11287)
<u>Comment</u> - EIS001814 / 0019
DEIS Page 2-50
Other activities would include the following: Installation of fences along the rail line, if requested by other agencies (for example, the Bureau of Land Management or the Fish and Wildlife Service).

The description of the proposed action should include the location and type of fencing to be installed. Without this information, it is not possible to assess the impacts of the proposed action, particularly on wildlife and on land use. The two agencies listed could, in fact, request conflicting requirements for fencing based upon the impact within their area of jurisdiction. Depending on the types and locations of fencing, the proposed action could create significant impacts to wildlife, particularly where the proposed corridors cross critical habitat areas.

<u>Response</u>
Section 6.3 of the EIS addresses the potential needs for fencing under the categories of land use and ownership and biological resources, and identifies potential impacts. Should the mostly rail transportation scenario be selected and a preferred corridor identified, additional engineering and environmental studies would be initiated to select a specific alignment of the tracks within the selected corridor. Appropriate National Environmental Policy Act reviews would be conducted to support selection of a specific alignment and design. Detailed analysis of fencing locations and types would be evaluated in subsequent engineering and environmental analyses and government agency consultation and evaluated in appropriate National Environmental Policy Act reviews conducted in conjunction with these analyses and consultations. It is the Department's opinion that the EIS adequately analyzes potential needs for fencing along candidate railroads and roadways, and their use and impacts.

8.8.2 (11288)
<u>Comment</u> - EIS001814 / 0020
DEIS Page 2-50
This EIS assumes there would be about four trains per week for shipments of spent nuclear fuel and high-level radioactive waste to the repository. In addition, the rail line would enable the transport of other material to the repository, including empty disposal containers, bulk concrete materials, steel, large equipment, and general building materials. The EIS assumes one train per week for this other material for a total of about five trains per week to the repository from about 2010 to 2033.

The EIS does not include an estimate of the number of trains leaving the repository. This would presumably include return of empty shipping casks as well as additional unloaded cars that were used to ship materials to the site. One cannot automatically assume that the number of unloaded trains leaving the repository will be the same as the number of loaded trains arriving. Therefore, it is not possible to assess the impacts of the rail line from the description of the proposed action.

Although discussed in the references to the EIS, this EIS does not discuss the different options for ownership and operation of the rail line or the possibility that the rail line would be used for other purposes than the proposed action described in the EIS. Use for other types of shipments could increase the impacts of the proposed action above that is described in the EIS.

Response
All transportation in the EIS is considered to be round-trip. Therefore, the transportation discussed in the comment (the return trip from the repository) is addressed in the EIS. Section 8.4.2 of the EIS discusses the shared use of a branch rail line. Decisions regarding the selection of a branch rail line for transporting spent nuclear fuel and high-level radioactive waste have not been made. However, it is in DOE's interest and in the interest of communities along a branch rail line to consider shared use. Before decisions were made on the transportation alternatives associated with the Yucca Mountain Repository, the impacts, such as shared use, would be evaluated. In addition, the NWPA, through its section on consultation and cooperation, requires DOE to consult with affected units of local government. Potential benefits of the shared use of the branch rail line would be explored through that process.

8.8.2 (11293)
Comment - EIS001814 / 0022
DEIS Page 2-51
Intermodal transfer station operations would depend on whether the railcars that carried spent nuclear fuel and high-level radioactive waste arrived on dedicated or general freight trains.

DOE states that there will be operational differences for the intermodal transfer station between the dedicated train and general freight options. The EIS, however, does not contain sufficient information on these differences to allow an evaluation of the difference in impacts between the two options. The difference between staging requirements for the heavy-haul vehicles for the two options should be described. If general freight was used, the EIS states that the "General freight trains would switch from the main Union Pacific track to an existing or newly constructed passing track." The EIS does not state where the existing or newly constructed passing track would be located. If it is located at the intermodal transfer station, this would significantly alter the design of the station. If a new passing track is constructed at a location independent of the station, this would create potential impacts that have not been evaluated. Even if an "existing passing track" is used, this would probably require the Union Pacific to construct a new passing track for other railroad traffic.

Response
Table J-25 in the EIS presents a comparison of general freight and dedicated rail service. However, available information has not indicated a clear overall advantage of using general freight or dedicated rail service for the transportation of spent nuclear fuel and high-level radioactive waste. At this time DOE has not determined the commercial arrangements (dedicated or regular freight) it would request from railroads for shipment of spent nuclear fuel and high-level radioactive waste. Once that determination was made, the logistics of transporting the railcar(s) would be discussed with the rail carriers, states, tribes, and other stakeholders.

8.8.2 (11296)
Comment - EIS001814 / 0025
DEIS Page 2-54
Most borrow material for construction could come from existing Nevada Department of Transportation borrow areas, if the State agreed.

Most road design projects attempt to balance cut and fill requirements during construction of the roads. Therefore, it is not reasonable to assume that borrow material will be available in existing borrow areas for the extensive fill requirements necessary to construct truck climbing lanes and other road improvements. Obtaining fill material from other areas could result in significant impacts not discussed within the EIS.

Response
Section J.3.1 of the EIS discusses the transportation modes, routes, and number of shipments of spent nuclear fuel and high-level radioactive waste for the different transportation implementing alternatives and their alignment variations. This information includes tables of information of potential upgrades needed for each option. This information provides the basis for the impact assessments. Details of impacts on existing surface transportation was

evaluated in CRWMS M&O (DIRS 154448-1998) and summarized in the EIS. These analyses evaluated current traffic levels on existing roads, estimated increased traffic, and additional traffic due to spent nuclear fuel and high-level radioactive waste transport.

Costs estimated for the road upgrades associated with the heavy-haul truck transportation systems assumed that fill material would be hauled in from existing borrow areas. If the State's current borrow areas were insufficient to provide the material needed, the fill would be obtained from existing private borrow sources or quarries.

When a corridor or route was selected, detailed assessments and designs for rail alignments or heavy-haul truck road upgrades would be initiated. These studies would be part of engineering and environmental studies needed to develop detailed designs and to support appropriate National Environmental Policy Act reviews for the proposed actions. DOE would use routes that meet U.S. Department of Transportation requirements or were designated by State routing agencies.

8.8.2 (11304)
Comment - EIS001814 / 0033
DEIS Page 3-100
DOE expects waste quantities generated by rail line construction and operation to be minor in comparison to those from repository construction and operation. As such, no discussion of existing waste disposal infrastructure along the routes is provided.

It is true that waste quantities generated by rail line construction and operation should be minor in comparison to those from repository construction and operation. The comparison, however, is meaningless. Most of the rail construction would take place far from the repository, much of it in remote, sparsely populated areas. Waste generated during the rail construction will undoubtedly not be hauled to the same disposal site as waste generated during repository construction. Rather, it will be disposed in facilities along the corridor.

What is significant, therefore, is the volume and type of waste generated by rail line construction and operation in comparison to the capacity of waste disposal facilities along the various corridors. Given the remote, sparsely populated areas crossed by the proposed rail line, solid waste disposal facilities probably do not have sufficient capacity to handle waste generated during rail construction. Many times construction waste is not compatible with the waste handling facilities at existing sites. (Note: this same discussion applies to the intermodal transfer station and heavy-haul routes.)

Response
Section 6.3 of the EIS addresses waste generated by branch rail line construction and operation. It was assumed that the waste materials from construction and operation of a branch rail line would be transported to a facility with sufficient capacity to dispose of the waste material without any undue impacts. Should the mostly rail transportation scenario be selected and a preferred corridor identified, additional engineering and environmental studies would be initiated to select a specific alignment of the tracks within the selected corridor and evaluate the impacts of construction and operation of the branch rail line and supporting facilities. Appropriate National Environmental Policy Act reviews would be conducted to support selection of a specific alignment and design. Details on the location of such a facility would be further evaluated if a branch rail line was selected.

8.8.3 SPECIAL TOPICS

8.8.3 (171)
Comment - 42 comments summarized
Commenters disagreed with DOE's conclusion that there would be no environmental justice impacts from spent nuclear fuel and high-level radioactive waste transportation to Yucca Mountain and stated that the Draft EIS findings regarding environmental justice were unjustified since analysis along specific transportation routes was not conducted. Commenters stated that actual routes on a segment-by-segment basis must be considered when estimating impacts (latent cancer fatalities) to low-income or minority communities. Commenters stated that it is well known that low-income and minority communities are located along railroads and highways and that DOE would need to name the transportation routes and prepare maps to show the locations of potentially affected minority and low-income populations. As analyzed in the EIS, it is impossible to assess whether impacts would fall

inequitably on certain sectors of the population. Another commenter stated that the so-called "hypothetical" populations analyzed in the EIS in fact comprise low-income and minority populations that already have experienced disproportionate impacts and compromised their quality of life because of previous environmental decisionmaking. Commenters gave examples of specific communities that could be affected depending on the selected transportation route, such as the Duckwater and Ely Shoshone Reservations in Nevada, Interstate-70 through Denver, Interstate-90/State Route 2 "Shoreway" through Cleveland, communities in San Bernardino County, California, and the Interstate-25 corridor. Another commenter stated that certain types of trucks are barred from traveling on elevated highways (Interstate-70), and so must pass through minority neighborhoods near residences and schoolyards. Commenters stated that because of the generic nature of the national transportation analysis, DOE could not substantiate the statement that there would not be disproportionately high and adverse impacts to minority or low-income populations from the Proposed Action.

Response

Consistent with Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, DOE performs environmental justice analyses to identify and address, as appropriate, the potential for its actions to cause disproportionately high and adverse impacts to minority or low-income populations. The approach to environmental justice analysis in the Draft EIS and Final EIS is consistent with Council on Environmental Quality guidance. The goal of this approach is to identify whether any high and adverse impacts would fall disproportionately on minority and low-income populations. The approach first analyzes the potential impacts on the general population as a basis for comparison. Second, based on available information, the approach assesses whether there are unique exposure pathways, sensitivities, or cultural practices that would result in high and adverse impacts on minority and low-income populations. If such potential impacts would be high and adverse, the approach then compares the impacts on minority and low-income populations to those on the general population to determine whether any high and adverse impacts fall disproportionately on minority and low-income populations. In other words, if high and adverse impacts on a minority or low-income population would not appreciably exceed the same type of impacts on the general population, no disproportionately high and adverse impacts would be expected.

In response to comments, DOE has reevaluated available information to determine whether the Draft EIS overlooked any unique exposure pathways or unique resource uses that could create opportunities for disproportionately high and adverse impacts to minority and low-income populations, even though the impacts to the general population would not be high and adverse. Additional unique pathways and resources were identified and analyzed, although none revealed a potential for disproportionately high and adverse impacts. For example, DOE estimated the potential health impacts from a subsistence diet based primarily on game taken from lands near the repository exclusion areas and concluded that high and adverse health and safety impacts would be unlikely.

DOE has updated and refined information germane to its environmental justice analysis. The EIS now includes, for example, additional and more detailed mapping of minority populations, and additional mapping and information that describes the proximity of tribal lands and cultural and ceremonial areas to candidate rail corridors in Nevada. Based on the additional information and resulting analysis, DOE has concluded that disproportionately high and adverse impacts from the construction and operation of a branch rail line or intermodal transfer facility would be unlikely.

The EIS analyzes potential public health effects of both routine (incident-free) transportation of radioactive materials and transportation accidents involving radioactive materials. First, regarding routine transportation, the EIS considers air emissions and doses from exposure to radioactive materials during transport. The EIS estimates the impacts from air emissions to be 1 emission-related fatality. The EIS estimates that the 24-year national transportation campaign would cause fewer than about 3 latent cancer fatalities among the public, and fewer under the preferred mostly rail scenario. Although many people would be exposed nationwide over a long campaign, the radiation dose to any exposed individual would be very low. In this context, DOE does not consider such impacts to be high. In addition, DOE does not know of a plausible mechanism under these circumstances by which low-income or minority populations could incur high and adverse impacts when the general public would not. Because there could be no disproportionately high and adverse impacts on any population, including low-income or minority populations, it is not necessary to examine the composition of the population along existing transportation corridors to conclude that potential public health effects from exposure to radioactive materials during routine transportation would not involve environmental justice concerns.

The EIS estimates the number of people in the general public who could be killed by accidents involving transportation of spent nuclear fuel and high-level radioactive waste. The two mechanisms for such impacts are bodily trauma from collisions or exposure to radioactivity that would be released if a sufficiently severe accident occurred. The EIS estimates that the 24-year national campaign would cause fewer than 5 deaths among the general public from trauma sustained in collisions with vehicles carrying spent nuclear fuel or high-level radioactive waste. In this context, DOE does not consider such impacts to be high. Moreover, DOE does not know of a plausible mechanism under these circumstances by which low-income or minority populations could incur high and adverse impacts when the general public would not.

Only if a severe accident occurred that resulted in release of radioactive materials would it be possible for the affected population to sustain high and adverse health effects, but the probability of such an event occurring is remote, so the overall associated risk to the general public would be low. Moreover, as is true of all transportation accidents, it is impossible to predict where along a transportation corridor an accident might occur (unlike accidents at fixed-facility locations), and, thus, who might be affected. Therefore, as with routine transportation and trauma effects of accidents, it is not necessary to examine the composition of the population along transportation corridors to conclude that the radiological risk resulting from transportation accidents would not constitute a disproportionately high and adverse impact on low-income or minority populations.

Although the transportation of radioactive materials would not result in disproportionately high and adverse impacts on low-income and minority populations, there are reasons to examine the composition of the population along newly proposed transportation corridors (such as the alternative locations of rail corridors within Nevada) that do not apply to existing highways and railways. When considering where to locate a new transportation corridor, the impacts of the construction and use of a newly created route on land use, socioeconomics, noise, air quality, and esthetics, to name a few categories, might vary by location. For example, constructing a new highway that might benefit the population as a whole might, nevertheless, so disrupt a minority or low-income population living along the proposed route as to result in disproportionately high and adverse impacts. Selecting among alternative new routes might offer opportunities to avoid high and adverse impacts that would fall disproportionately on low-income or minority populations in relation to the general population that would not be present when considering existing transportation corridors. Therefore, even though the health effects from exposure to radioactive materials from transportation activities would not involve environmental justice concerns in selecting new routes, other factors could. For these reasons, DOE examined the composition of the populations along the five alternative routes for a rail corridor in Nevada to determine the minority and low-income populations residing along the corridors.

In the EIS analyses, DOE assumed shipments would use highway routes that would comply with U.S. Department of Transportation regulations for transporting spent nuclear fuel. With the exception of routes to the nearest Interstate System highways or state or tribal designated preferred routes used to pick up shipments from generator sites and to deliver shipments to Yucca Mountain, Department of Transportation regulations require carriers to use Interstate System highways, bypasses, and beltways, or state or tribal designated preferred routes that reduce time in transit. DOE shipments would comply with these regulations.

8.8.3 (173)

Comment - 4 comments summarized

Commenters disagreed with DOE's analysis of impacts at generator facilities of loading spent nuclear fuel and high-level radioactive waste into shipping casks and delivering the casks to carriers for transport to Yucca Mountain. One commenter observed that DOE's estimate of 0.1 person-rem exposure to the public from loading spent nuclear fuel and high-level radioactive waste for transportation is much lower than impacts for other accidents analyzed in the EIS. The commenter asked what units of measure apply to the 0.1-person-rem impact – per year, per accident, per hour, average? The commenter suggested the estimate of 0.1 person-rem is based on experience to date but could be expected to increase as the quantities of spent nuclear fuel that are handled and loaded increase. This commenter disagreed with DOE's assertion that risks associated with handling and loading high-level radioactive waste would be less than those from handling and loading spent nuclear fuel.

A commenter stated that the Schneider report (DIRS 101747-Schneider et al. 1987) does not provide valid information for evaluating impacts of loading spent nuclear fuel at generator sites. The commenter argued the report did not consider a much different loading scenario in which storage casks (which at the time of the Schneider report did not receive general certificates of compliance from the Nuclear Regulatory Commission) would be unloaded into transportation casks at generator sites.

A commenter stated DOE did not address risks of or procedures to transfer spent nuclear fuel and high-level radioactive waste from DOE or utilities to a carrier and must provide further analysis of waste transfer procedures, risks, modes among generators, carriers, and receiver.

A commenter observed that most accidents to date at nuclear powerplants have been industrial accidents, and asked what are DOE's grounds for asserting there would be no worker fatalities from industrial accidents in loading spent nuclear fuel for transport?

Response

Section 6.2.4.1 and Table 6-16 of the EIS provide a summary of information on the impacts associated with accidents of handling and loading spent nuclear fuel and high-level radioactive waste. DOE based its estimate of 0.1 person-rem per year to the onsite workforce, not the general population (see Table 6-16), on information presented in a report on health and safety impacts for the multipurpose canister system (DIRS 104794-CRWMS M&O 1994). This report estimated that impacts to members of the onsite workforce from a loading facility would be no more than 0.1 person-rem in the event of an accident in loading and handling a multipurpose canister system for transport. The collective dose to the public would be much less. This estimate is consistent with DOE estimates of offsite impacts from accidents at a monitored retrievable storage facility (DIRS 104731-DOE 1986). The estimated impact to workers and the public health and safety is for a single handling accident. DOE's estimate for the rate for lift-handling accidents involving spent nuclear fuel casks presented in Section 6.2.4.1 is 1 in 10,000 handling operations.

These dose risks would be lower than those for transportation accidents for several reasons. The forces involved with a handling accident would be much less severe than those postulated for the maximum reasonably foreseeable transportation accident. Handling accidents would occur inside nuclear facilities designed to protect the public from the consequences of handling accidents and much more severe reactor accidents. DOE used information from *Preliminary Preclosure Design Basis Event Calculations for the Monitored Geologic Repository* as the basis for projecting that handling accidents involving loading high-level radioactive waste for transportation would have lower consequences than those involving loading spent nuclear fuel (DIRS 103237-CRWMS M&O 1998).

DOE based its estimates of impacts of loading spent nuclear fuel and high-level radioactive waste on *Analysis of Radiation Doses from Operation of Postulated Commercial Spent Fuel Systems* (DIRS 101747-Schneider et al. 1987). The information in this report is based on analysis of loading procedures and risks among generators at commercial nuclear facilities for shipping spent nuclear fuel using truck casks and rail casks. DOE believes this report provides the latest reasonable information for estimating impacts of loading spent nuclear fuel and high-level radioactive waste at generator facilities. To estimate loading impacts, DOE assumed spent nuclear fuel and high-level radioactive waste would be available in locations where loading operations occur, for example storage pools at commercial nuclear reactors. DOE did not analyze the impacts of loading and unloading dry storage casks at nuclear facilities because these impacts are addressed in environmental analyses prepared by the Nuclear Regulatory Commission to support licensing of the independent storage facilities.

At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. Operational protocols and procedures would be developed with each generator by Regional Servicing Contractors as part of the planning process to be completed prior to initiation of transport of spent nuclear fuel or high-level radioactive waste from generators to the repository. Section M.3 of the EIS contains more information on operational protocols required of the Regional Servicing Contractors.

Section 6.2.2.2 of the EIS presents an analysis of industrial safety impacts of loading spent nuclear fuel and high-level radioactive waste at generator facilities. Because the estimates suggested there would be a 1-in-50 chance (2-percent probability) of one fatality from an industrial accident for the mostly rail scenario and a 1-in-20 chance (5-percent probability) for the mostly legal-weight truck scenario over 24 years of the Proposed Action, the EIS concluded no worker fatalities from industrial accidents would be expected.

8.8.3 (174)

Comment - 21 comments summarized

Commenters questioned the relevancy of the 30-year safety record of transporting spent nuclear fuel and high-level radioactive waste cited in the EIS for predicting the safety of future shipments to Yucca Mountain. Reasons given by commenters included (1) the proposed number of shipments is unprecedented and (2) the types of casks, procedures, and protocols used in the past are not applicable to the Proposed Action. Commenters also questioned DOE's contention that the safety record is good, citing transportation accidents involving spent nuclear fuel and low-level waste (72 incidents from 1949 to the present according to a database at Sandia National Laboratories). Others argued that shipping casks have not yet been built and tested, so their performance is not yet known and the impacts of accidents cannot be judged. Commenters said that the EIS should have predicted accidents and described how they would be mitigated.

Commenters said DOE should use "shipment miles" rather than "number of shipments" as the measure for predicting safety, noting that the total number of shipment miles to date is very small compared to the total number of shipment miles associated with the repository. Some commenters stated that past shipments of spent nuclear fuel from a reactor's core to its storage ponds should not even be considered a "shipment."

Response

Sections J.1.1 and J.1.4.2.1 of the EIS present the approach DOE used to estimate the number of accidents and the associated impacts that would occur in transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain for the Proposed Action. As requested by public comments, DOE has included maps showing the routes used in the analysis and estimates of the state-by-state impacts based on these routes (see Section J.4). The approach, which is not based on the safety record of shipments of spent nuclear fuel over the past 30 years, uses U.S. Department of Transportation state-by-state accident and fatality statistics for highway, rail, and barge transportation. The statistics were compiled from accidents that occurred during all four seasons from 1994 through 1996 (DIRS 103455-Saricks and Tompkins 1999), which is the most current information of this type available. The approach includes the assumption that the number of potential accidents and impacts would be proportional to the number of total kilometers that shipments would travel in each state (number of cask shipments times distance traveled). Annual accident data were used and routes were assumed not to change with season. Thus, the number and impacts of accidents would be independent of the time of year travel would occur.

Total incident-free impacts for 24 years, which would be dependent on the total number of shipment kilometers, would not be affected by the time of year shipments were made if routes remained the same. Because accident rate data are not available for specialized logistical arrangements, such as convoys and dedicated trains, DOE assumed the industry-wide accident rates for individual truck, railcar, and barge shipments used in the EIS would apply. Because incident-free impacts would be proportional to the number of cask shipments over 24 years, transporting casks in multiples in convoys or dedicated trains would not affect these impacts. Because accidents at intermodal transfer facilities would not exceed cask design requirements, DOE estimated that radiological impacts would not occur for these (see Section J.3.3.1 of the EIS).

Section 6.3.3 of the EIS presents estimates for industrial safety impacts from operations at an intermodal transfer station in Nevada. In one area the approach for estimating the number and severity of accidents relied on historic experience. It assumed spent nuclear fuel and high-level radioactive waste would be properly packaged for shipment in Type B shipping casks certified by the Nuclear Regulatory Commission to comply with the performance standards contained in 10 CFR Part 71, as required by Commission and U.S. Department of Transportation regulations. Type A and strong-tight packaging, which are not accident-resistant (see 49 CFR 173.403), would not be used to ship spent nuclear fuel or high-level radioactive waste. The approach also assumed transport carriers' operations and vehicles would comply with applicable Federal, state, Native American tribal, and local regulations; occur during all four seasons of the year; and resemble those used for other commodities transported in interstate commerce. DOE would ensure that shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain and the return of empty shipping casks and vehicles for further use would comply fully with applicable Federal, state, tribal, and local regulations, including those of the Nuclear Regulatory Commission and U.S. Department of Transportation (see Section 2.1.3.2). These regulations include, among other things, requirements for operator training, vehicle safety, records, communications and tracking, and security. These measures are implemented to minimize potential human errors and other conditions that could lead to accidents.

The analyses used “fatality” as the measure of impacts to the public because it is an easily understood objective measure used historically in EISs prepared by DOE. In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments (DIRS 154814-Sandquist et al. 1985), and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $9.4 billion. Cost data used in the studies included data compiled from case studies involving actual cleanup of radioactive material contamination. The studies addressed consequences for releases of radioactive materials in communities. In response to comments from the public, DOE has included additional information on Federal, state, tribal, and local responsibilities and preparedness for emergency response to accidents involving radioactive materials shipments (see Section M.5 of the EIS). Section M.8 discusses the Price-Anderson Act, which provides for indemnification for public liability to redress costs of accidents involving releases of radioactive materials to the environment or authorized precautionary evacuations.

8.8.3 (176)
Comment - 7 comments summarized
Commenters stated that because the EIS does not define floodplains within rail corridors, along heavy-haul truck routes, and at potential sites for an intermodal transfer station, the analysis of floodplains and wetlands in Appendix L is insufficient to support decisions to select a transport mode or route in Nevada.

Commenters said that wetlands, which some corridors are known to cross, are valuable resources in Nevada, and that it is not sufficient to simply state in the EIS that impacts to wetlands would be mitigated. Commenters also said that the floodplain information that is in the EIS has not been verified by ground surveys.

Commenters stated that the analysis of surface-water resources in the EIS is insufficient because it does not acknowledge that flooding and flash flooding can occur along parts of the rail corridors and along the heavy-haul truck routes. In wet years, parts of any rail line in Nevada could be covered with floodwater and these routes are not in an area that is appropriate for the shipment of spent nuclear fuel and high-level radioactive waste. Referring to DOE’s commitment to temporarily stop shipments whenever flooding affected a route, commenters asked if these shipments would be parked and if a flash flood could be detected in time to stop a shipment before it was threatened by flood waters. Commenters stated that none of the candidate routes avoid designated groundwater basins. Other commenters said that flash floods entering Pahrump Valley from the Wheeler Pass area would require a large retention basin, and that the EIS did not address the impacts of this manmade structure.

Response
Sections 3.2.2.1.3 and 3.2.2.2.3 of the EIS present information concerning current conditions of potentially affected surface-water and groundwater resources along the candidate rail corridors, heavy-haul truck routes, and intermodal transfer station sites. Sections 6.3.2 and 6.3.3 identify potential impacts on surface-water and groundwater resources along each candidate route and site for an intermodal transfer station. Appendix L examines the effects on floodplains and areas that could have wetlands in Nevada of construction and operation and a branch rail line or intermodal transfer station associated with routes for heavy-haul trucks. The assessment in Appendix L did not evaluate potential floodplain or wetlands effects along highway routes because these existing roads should already be designed to meet 100-year floodplain design specifications. Appendix L states that if DOE decided to construct a branch rail line or use heavy-haul trucks in Nevada, a more detailed floodplain/wetlands assessment of the selected rail corridor or route for heavy-haul trucks and associated intermodal transfer station site would be prepared. However, DOE has added additional flood zone information to the floodplain/wetlands assessment in Appendix L. Specifically, the appendix now identifies 100-year flood zones crossed by rail corridors or their alignment variations if such information is available on maps published by the Federal Emergency Management Agency.

DOE would select the specific alignment within a corridor and design of a branch rail line or specific location and design of an intermodal transfer station to preclude flood water, including water from flash floods, from a 100-year flood from inundating rail track or facility operations areas. Engineering designs used as a basis for the EIS considered the potential for flooding along candidate routes and sites for an intermodal transfer station. The designs included culverts and bridges that would be needed to accommodate water from a 100-year flood.

If DOE decided to construct a branch rail line or an intermodal transfer station, it would require a hydrological analysis and evaluate the impacts of designing for floods for 25, 50, and 100 years. Critical areas might require the design to address a 100-year storm, based on appropriate engineering criteria.

As stated in the *Manual for Railway Engineering*, "The design flood frequency to be used is a matter of engineering judgement and economics. A number of trials should be made using a wide range of frequencies. In this way the possibilities of damage because of too small an opening can be assessed. The cost of providing for the maximum possible flood of 100 years frequency or greater can also be determined and a prudent decision made. In general practice, railroad drainage openings should be designed for floods in the range of 25 to 50 years. This does not imply that a 100-year flood design would be out of place in certain instances" (DIRS 106860-AREA 1997).

Disturbed area estimated in Chapter 6 of the EIS for each candidate branch rail line, highway route for heavy-haul trucks, and site for an intermodal transfer station includes areas for retention basins and engineered flow channels. DOE would temporarily discontinue shipments of spent nuclear fuel or high-level radioactive waste that would use a highway or rail route where flooding could compromise safety. Shipments that were underway at the time of an ongoing or potential flooding event would be temporarily delayed at a safe, secure location along the route until the affected section of track, roadway, or intermodal transfer station was determined to be safe for use. DOE would monitor weather forecasts to ensure shipments would not occur in areas where, and at times when, the potential for flash flooding could compromise safety.

Groundwater basins underlie all areas of Nevada including areas where shipments would travel. Designated groundwater basins identified in Chapter 6 of the EIS are basins for which the Nevada State Engineer has determined that permitted water rights approach or exceed the estimated perennial water or that additional administrative oversight is required. Designated Groundwater Basins are identified to provide information regarding availability of groundwater needed for constructing a branch rail line or upgrading highways for use by heavy-haul trucks. As described in Section 6.3 of the EIS, DOE would transport water by truck to construction areas if it could not obtain permits for withdrawals from a Designated Groundwater Basin.

Chapter 9 of the EIS, which provides DOE's initial list of mitigation commitments available at this time, identifies DOE-determined impact reduction features, procedures, and safeguards and mitigation measures under consideration for inclusion in the project plan and design. Chapter 9 also identifies ongoing studies that could eventually influence mitigation measures related to the project plan and design. For example, Section 9.3 discusses mitigation measures to reduce potential impacts from the transportation of spent nuclear fuel and high-level radioactive waste nationally and in Nevada. These measures address impacts from the possible construction of a branch rail line or an intermodal transfer station in Nevada; construction of other transportation routes; upgrading of existing Nevada highways to accommodate heavy-haul vehicles; transportation of spent nuclear fuel and high-level radioactive waste from existing storage sites to the proposed repository; and fabrication of casks and canisters. As suggested Chapter 6 and Section 11.2.2 (subsection on Compliance with Floodplain/Wetlands Environmental Review Requirements), more detailed field surveys, government consultation, analyses, and appropriate National Environmental Policy Act reviews would be conducted if a decision was made to select a specific rail alignment within a corridor or a specific location of an intermodal transfer station or the need to upgrade the associated heavy-haul truck routes. These would include consultations with State wildlife management agencies, the Bureau of Land Management, the Army Corps of Engineers, and other applicable government agencies. They also would include field surveys (as applicable) and more detailed assessments and analyses of wetlands and other waters; floodplains; sensitive species; effects of habitat fragmentation, interruption of movements, mortality, and harassment on wildlife, horses, and burrows; loss of hunter-generated revenue, spread of noxious weeds, and soils.

8.8.3 (177)
<u>**Comment**</u> - 8 comments summarized
Commenters stated that the EIS is inadequate because it did not consider the effects of the proposed Private Fuel Storage facility in Skull Valley, Utah, on transportation of spent nuclear fuel to Yucca Mountain. Commenters expressed concern that utilities would ship their older commercial spent nuclear fuel currently in storage to the Private Fuel Storage facility (if it is licensed), before a repository at Yucca Mountain was constructed. Therefore, at a later date, much younger and more radioactive spent nuclear fuel from commercial facilities would be shipped to the Yucca Mountain Repository. Commenters argued that DOE's Acceptance Priority Ranking (DIRS 104382-DOE 1995) did not consider the Private Fuel Storage facility in determining the order in which spent nuclear fuel would

be delivered to Yucca Mountain. Commenters stated that NUREG-1437 (DIRS 101899-NRC 1996 and DIRS 101900-NRC 1996) states that the minimum cooling time for transporting spent nuclear fuel is 5 years; however, the Draft EIS used a cooling time of 25.8 years to assess health impacts. Based on this information, the cooling time for spent nuclear fuel used in the EIS analysis of impacts should be much less than 25.8 years.

Commenters stated that the Private Fuel Storage facility and the Yucca Mountain Repository would likely be used together and the Private Fuel Storage facility could become a clearinghouse for spent nuclear fuel. This would mean that Utah could become the state of origin for more than half of the commercial spent nuclear fuel shipped to the Yucca Mountain site. The combined transport for the Private Fuel Storage facility and the Yucca Mountain Repository would be greater than that estimated in the Draft EIS, resulting in more shipment miles. This would cause a greater hazard than that reported in the Draft EIS. Commenters stated that impacts in Utah would be much greater than that estimated in the Draft EIS because of the combination of shipments to both the Private Fuel Storage facility and to Yucca Mountain. As a consequence, there would be a major impact on a national scale that would need to be assessed in the analysis of cumulative impacts. Failure to consider the Private Fuel Storage facility would segment the National Environmental Policy Act process. Commenters stated that Utah deserves special consideration in the EIS, similar to that given Nevada, because 92 percent of the spent nuclear fuel would be transported through the State and the Private Fuel Storage facility would be located there. The Draft EIS is inadequate because specific information for routes in Utah were not considered in the estimate of health and economic impacts from the transport of spent nuclear fuel and high-level radioactive waste. Commenters observed that heavy-haul trucks could be used to transport spent fuel casks to and from a rail line near the Private Fuel Storage facility, and stated that the EIS was deficient because it did not address the use of heavy-haul trucks in national transport of spent nuclear fuel to the Yucca Mountain site.

Response

On the basis of public comments that DOE received and the issuance of a draft EIS by the Nuclear Regulatory Commission, DOE determined that the proposed Private Fuel Storage, LLC, facility is a reasonably foreseeable future action whose impacts would be cumulative with those of the Proposed Action. Because licensing, construction, and operation of a private facility for storage of spent nuclear fuel would not be actions undertaken by DOE, the cumulative impacts, including potential affects on transportation impacts presented in Chapter 6, are included in Chapter 8 of the Yucca Mountain EIS. Impacts of constructing and operating a private storage facility, including impacts of transporting spent nuclear fuel from generator sites to the facility, are included in an EIS prepared and issued by the Nuclear Regulatory Commission (DIRS 152001-NRC 2000).

Based on public comments, DOE has revised the spent nuclear fuel used in the transportation analysis to spent nuclear fuel with less cooling time [15 years rather than 26 years and fuel with higher activity (50,000 megawatt-days per metric ton of heavy metal [MTHM]) versus 40,000 megawatt-days per MTHM]. The radionuclide inventory contained in spent nuclear fuel is presented in Appendix A of the EIS.

Section J.4 of the EIS presents maps showing the routes in each state, including Utah, used in the analysis of impacts of transporting spent nuclear fuel and high-level radioactive waste from generator sites to Yucca Mountain. This section also presents estimates of the impacts in each state for the routes used in the analysis. The impacts in each state were estimated using information such as projected number of shipments, along-route populations; route lengths in urban, suburban, and rural areas; and state-specific accident rates.

Based on information it has developed and information from other sources, DOE believes the mostly rail scenario described in the EIS would most closely approximate the actual mix of truck and rail shipments of spent nuclear fuel and high-level radioactive waste to a Yucca Mountain Repository. DOE considered whether sites are able to handle larger (rail) casks, distances to suitable railheads, and historic precedent in actual shipments of fuel, waste, or other large reactor-related components. It also considered relevant information published by knowledgeable sources such as the Nuclear Energy Institute and the State of Nevada. In addition, based on this information, DOE believes the mostly legal-weight truck and mostly rail scenarios bracket the range of reasonable mixes of truck and rail transportation. Furthermore, DOE believes this range of the possible mix of transportation modes that could be used is a sufficient basis for estimating the range (lower and upper bound) of potential environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste.

DOE has estimated the characteristics of commercial spent nuclear fuel that would be delivered to a Yucca Mountain Repository under the Proposed Action. For the purpose of the EIS, DOE did not have additional information it could use to estimate how shipments to a private storage facility might affect the characteristics of shipments to Yucca Mountain and potential changes in impacts from those presented. DOE agrees that use of the Private Fuel Storage facility could result in different schedules for shipping specific spent nuclear fuel to Yucca Mountain. However, if younger spent nuclear fuel was shipped to Yucca Mountain in early shipments because older spent nuclear fuel was shipped to Private Fuel Storage, older spent nuclear fuel would be shipped to Yucca Mountain in later years. Thus the cumulative impacts of transportation would be similar. DOE would evaluate information that became available to determine if shipments to a private facility would affect the results presented in this EIS. If DOE determined changes could be significant, it would perform additional National Environmental Policy Act evaluations and determine appropriate actions to be taken.

8.8.3 (205)
Comment - 5 comments summarized
Commenters noted that DOE used 25.9 years and 27.2 years for the respective ages of pressurized-water reactor and boiling-water reactor spent nuclear fuel that would be transported to Yucca Mountain. They suggested that a more realistic and conservative assumption would be 5 to 26 years to analyze the consequences of severe transportation accidents and successful acts of terrorism. Commenters said that the Nuclear Regulatory Commission approved shipments of 5-year Cooled spent nuclear fuel with up to 5-percent enrichment and 62,000 megawatt-days per metric ton uranium burnup. Commenters cited information from the DOE Statement of Position, Waste Confidence Proceeding, April 15, 1980 to argue that the single most important determinant of radiological risk is the cooling time for spent nuclear fuel. Commenters suggested the analyses should use bounding parameters for enrichment, cooling time, and burnup of spent nuclear fuel. Commenters expressed concern that exposures estimated in the EIS were based on 26-year-old spent nuclear fuel and that exposures would exceed the EIS estimates if 10-year-old fuel was shipped. Accidents and incidents involving 5-year-old fuel could have radiological consequences 5 to 10 times higher than those reported in the EIS.

Response
DOE has revised its description of spent nuclear fuel characteristics. As discussed in Section A.2.1.5 of the EIS, the revised spent nuclear fuel characteristics are

- Pressurized water reactor -- 15 years old, 50 megawatt-days per metric ton of uranium of burnup, 4.5 percent enrichment

- Boiling water reactor -- 14 years old, 40 megawatt-days per metric ton of uranium of burnup, 3.5 percent enrichment

DOE derived these characteristics through a dose-based hazard index analysis using the radionuclide inventory of the spent nuclear fuel assemblies and the screening models in *Screening Models for Releases of Radionuclides to Atmosphere, Surface Water, and Ground* (DIRS 101882-NCRP 1996). These screening models account for all exposure pathways.

Accidents modeled with these spent nuclear fuel characteristics provide a conservative estimate of the impacts of transportation accidents. While some fuel could be slightly more radioactive, most would be considerably less radioactive.

8.8.3 (2453)
Comment - EIS000679 / 0002
We said ship the oldest fuel first. It has the smallest amount of gamma neutron radiation. It's the safest from a transportation standpoint.

DOE has not only made no commitment to do this, they've actually put some scenarios in their DEIS where they have to ship hotter, more dangerous fuel in order to get hot fuel to Yucca Mountain to heat up the repository horizon.

Response
The fuel that can be shipped by the utilities is dictated by the provisions of the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (10 CFR Part 961). In order to be considered "Standard Fuel" under the contract, spent nuclear fuel must have been cooled for at least 5 years.

DOE is required by the terms of 10 CFR Part 961 to assign priority to those waste generators whose spent nuclear fuel was discharged earliest. This is usually called the "Oldest Fuel First" priority. At sites designated by the generators who own the oldest spent nuclear fuel, DOE must pick up fuel the generators have selected and that has been cooled for at least 5 years.

Regardless of which fuel is shipped first, it would be done safely in casks certified by the Nuclear Regulatory Commission for that type of fuel.

8.8.3 (2499)
Comment - EIS010294 / 0009
Explain how and where the Heavy Haul Shipping Casks are loaded. Current Spent Fuel [Buildings] have limits on cask size. Define the limit for all existing nuclear stations.

Response
The mostly rail scenario in the Final EIS assumes that DOE and the Navy would transport most of the spent nuclear fuel and high-level radioactive waste to Nevada by rail, with the exception of material from commercial nuclear generating sites that initially would not have the capability to load large-capacity rail shipping casks. Those sites would use legal-weight trucks to ship material to the repository. Commercial sites with the capability to load the rail shipping casks but without rail access could use heavy-haul trucks or barges to ship spent nuclear fuel to the nearest rail line.

At this time there is no rail access to the Yucca Mountain site. This means that material traveling by rail would have to continue to the repository on a new branch rail line or be transferred to heavy-haul trucks at the intermodal (that is, from rail to truck) transfer station in Nevada and then travel on existing highways.

Section 6.2.2 of the EIS describes the potential impacts from loading spent nuclear fuel and high-level radioactive waste in transportation casks and onto transportation vehicles at the 72 commercial and 5 DOE sites.

8.8.3 (3428)
Comment - EIS001160 / 0126
The FEIS should consider the changing demographics of "snow-birds".

Response
The Final EIS used population estimates based on U.S. Census data and projected the population growth along transport routes to 2035. Because the Census only counts people at their permanent residences, the effect of seasonal relocation of population ("snowbirds") is not included in the analysis. However, the analysis does assume that individuals are in their places of residence when each shipment passes. Thus, while individuals who relocated into an area through which shipments passed are not included in the Census for the area, those who would temporarily relocate from another area through which the shipments passed are included even though they would reside elsewhere at the time. Thus, the analysis is balanced, counting some who would not be along a route when shipments pass as well as not counting some who would ("snowbirds").

8.8.3 (5872)
Comment - EIS001803 / 0002
My concern about the transportation of nuclear waste is based largely on a brief career that I had several years ago. I got a job selling railroad salvage, and while I only worked at that job for a few months, I clearly remember the enormous amount of salvage that we handled. One day I asked my boss whether our business was really based on railroad salvage or was this simply a way to push goods that some company wanted to sell cheap. I was assured that the items we sold were indeed railroad salvage items. At that time I was told that there was an average of 14 to 20 accidents per week in our catchment area which, I believe, was a two-state area. The public didn't hear about these

accidents because they were not newsworthy; a crate falling off a flatcar when a car hit an uneven piece of track, a car being derailed in an unpopulated area or merchandise being damaged when one rail car slammed into another.

Since the rail tracks that run through our communities and neighborhoods are even older now and since other forms of transportation have become more popular than rail, leaving the railroad industry financially unhealthy, I cannot imagine that our rail system is in better shape now than it was then. And while the entire DOE may work hard to keep the initial nuclear load from having an accident, what about the future?

You know as well as I that while there is much ado about this initial train trip, the time will come when the transportation of nuclear waste will not even be a blip on our radar screen. Nuclear waste transported once will become an acceptable activity because after the first trip, rail transportation will have become considered an acceptable form of transportation for nuclear waste.

Response
Rail transportation is an acceptable form of transportation for spent nuclear fuel. Of the thousands of shipments completed over the last 30 years, much of it by rail, none has resulted in an identifiable injury through the release of radioactive material. DOE would work with the railroad companies to determine routes based on safety, best available trackage, schedule efficiency, and cost-effectiveness. This includes selecting routes that result in minimum time in transit, minimum interchanges, and maximum use of mainline tracks.

In 1991 the Federal Railroad Administration established an enhanced inspection policy for rail movements of spent nuclear fuel and high-level radioactive waste. This policy sets forth enhanced inspection criteria for use by Federal Railroad Administration inspectors. It requires, for example, the entire track and signal system be inspected along the designated route prior to the initial movement. Follow-up inspections for track, signal systems and operating practices would be conducted on a 6-month basis, unless information is obtained that might dictate that follow-up inspections be conducted more (or less) frequently.

8.8.3 (5992)
Comment - EIS001879 / 0018
The Draft EIS underestimates the radiological risk of routine transportation over a 30-40 year campaign of shipment through rural communities along US-95 in the site county. The factors that contribute to the underestimation include: 1) a larger proportion of current resident and workforce population is closer to the shipment route than is assumed in the EIS; 2) more current and potential future population (lodging visitors, school children in busses, pedestrians) is exposed to routine transportation than is assumed in the EIS; 3) the average shipment speed in through these communities is slower than assumed in the EIS.

As it did for the Draft EIS, Nye County offers to work with DOE in a revised analysis to develop measures that more correctly reflect local conditions in the affected Nye County communities.

Response
To address the issue of local conditions within Nye County, the EIS has been revised based on comments to use Nye County population data extrapolated to 2035 to estimate the transportation impacts of the Proposed Action (see Section 3.1.7 of the EIS).

In addition, the EIS has been revised based on comments to include impacts representative of impacts in small communities along transportation routes, such as are in Nye County. This analysis accounts for factors such as the location of people, slower speeds of shipments, locations of intersections, commercial establishments and residences, and traffic signals (see Sections 6.3.1, 6.3.2, 6.3.3, and J.1.3.2.2.1 of the EIS).

8.8.3 (6287)
Comment - EIS001727 / 0006
Let me start by saying that it's sad that they don't know their document well enough to have answered Kay Drey's question about the curies in a cask. This is on page J-36, Table J-14 of Appendix J. You'll find that a rail cask loaded with typical commercial fuel has a total of 2,000,000 curies, 800,000 of which are Cesium 137. Actually, that's an optimistic assessment because that assumes the fuel has been cooled for 26 years. We believe a lot of this

fuel will only have been cooled five to ten years, and one ten-year cooled assembly from a pressurized water reactor -- remember, they're going to ship several hundred thousand of these -- just one of those assemblies has enough Strontium-90 to contaminate all the water in Lake Mead, which is 23 trillion gallons in a good year, to twice the EPA [Environmental Protection Agency]-allowable drinking water standards, so we're talking about very hazardous radiological materials here, materials that if I had been here standing next to an assembly for, what, three minutes now, I'd already have a lethal dose of radiation, so this is even after the materials have been cooled down from the reactor for 10 years, or even 26 years as the DOE assumes, very dangerous.

Response
Spent nuclear fuel and high-level radioactive waste are transported in very robust casks, designed to withstand the impact forces and fires that could occur with very severe transportation accidents. Furthermore, the casks are designed to be watertight following severe accidents. Numerous tests and extensive analyses, using the most advanced analytical methods available, have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents that occur. A study completed by Sandia National Laboratories for the Nuclear Regulatory Commission (DIRS 152476-Sprung et al. 2000) concluded that casks would continue to contain spent nuclear fuel in more than 99.99 percent of all accidents. See Section M.4 of the EIS for additional information on the safety and testing of transportation casks.

Spent nuclear fuel and high-level radioactive waste are not easily dispersed; they do not dissolve in water; they are not liquids or gasses that can be easily spilled or leaked, and, with the exception of a very small, nearly undetectable effect, radiation from them does not make other materials radioactive. Spent nuclear fuel and high-level radioactive waste are solids. They are hard, tough, and dense ceramics, metals, or glasses contained within tough metal barriers.

The radionuclide inventory contained in spent nuclear fuel is presented in Appendix A of the EIS.

Unshielded spent nuclear fuel can be hazardous and for this reason spent nuclear fuel is shipped in heavily shielded casks. The maximum radiation dose rate from a spent nuclear fuel cask is about 10 millirem per hour at 2 meters (6 feet) from its transporting vehicle. For perspective, the radiation dose from a single chest X-ray is about 8 millirem. Therefore, the radiation dose from standing 2 meters away from a shipment of spent nuclear fuel for 1 hour would be equivalent to a little more than one chest X-ray, and much lower than a lethal radiation dose.

8.8.3 (6568)
Comment - EIS001632 / 0056
Page 6-17, Section 6.1.3, second paragraph: The next-to-last sentence says that "an air quality conformity analysis [for carbon monoxide] may be required." If a conformity determination is needed, it should be made before completion of the NEPA [National Environmental Policy Act] process. EPA [Environmental Protection Agency] suggests such information be included in the final EIS.

Response
The Conformity Review discussions have been updated in all sections. Conformity Review results are summarized in Section 6.3.1.1 of the EIS for the mostly legal-weight truck scenario, in Section 6.3.2.1 for the mostly rail scenario, and in Section 6.3.3.1 for the heavy-haul truck scenario. The Conformity Review was focused on with levels of carbon monoxide and particulate matter (PM_{10}), for which the Las Vegas air basin has been classified as being in "serious nonattainment." Since the Draft EIS was published, the mostly rail scenario has been selected by DOE as the preferred transportation option. The Conformity Review found that more detailed analyses (that is, a Conformity Determination) would be required for the construction phase of a branch rail line in the Valley Modified Corridor, if that rail corridor was selected. The other corridors would not present a conflict with the General Conformity requirements for carbon monoxide and PM_{10}. Emissions for constructing a branch rail line in the Valley Modified Corridor are estimated in the Conformity Review to be up to 145 metric tons (160 tons) per year (160 percent of the General Conformity threshold level) for carbon monoxide, and up to 120 metric tons (130 tons) per year (190 percent of the General Conformity threshold level) for PM_{10}.

The carbon monoxide emissions within the nonattainment area would result from fuel use by the construction vehicles and vehicle emissions from commuter and supply traffic to the Yucca Mountain site. The PM_{10} releases would include the emissions from disturbing the ground and from fuel combustion of the construction equipment. Dust abatement measures (for example, water applications) would reduce fugitive dust PM_{10} emissions by

70 percent. The emissions estimates could be reduced further by lengthening the construction time or more detailed task planning to reduce the production of emissions.

Emissions from a branch rail line in the Valley Modified Corridor into the nonattainment area would occur during the much longer operations phase, as the locomotive passed through the nonattainment area on its way to the Yucca Mountain site. However, operations phase emissions would not exceed the General Conformity threshold levels. The estimated operations emissions for a branch rail line in the Valley Modified Corridor would be 81 percent of the carbon monoxide General Conformity threshold level and less than 3 percent of the PM_{10} General Conformity threshold levels.

In addition, the Conformity Review compared the Valley Modified Corridor carbon monoxide and PM_{10} release estimates to the Nevada carbon monoxide and PM_{10} State Implementation Plans (DIRS 156706-Clark County 2000; DIRS 155557-Clark County 2001). The construction phase Valley Modified carbon monoxide emissions estimates would be less than 0.2 percent of the total daily carbon monoxide inventory emitted into the nonattainment area. The construction phase Valley Modified PM_{10} emissions estimates would be less than 0.08 percent of the daily and annual PM_{10} inventory emitted into the Las Vegas Valley air basin.

8.8.3 (7219)

Comment - EIS010270 / 0007

Movement of large concentrations of radioactive materials may interfere with normal sub-atomic atmospheric dynamics to the extent of causing weather and climate extremes. While radioactive atomic and molecular gases have been suggested as agents of weather and climate change in work such as "Meteorological Consequences of Atmospheric Krypton-85" (SCIENCE, vol. 193, #4249, 7/16/76), sub-atomic radioactive interactions and their effects in the field (rather than the lab) are just beginning to be explored. The physics sub-atomic world of "strings," etc. is like the biology sub-viral world of "prions." Mad Cow disease (and possibly AIDS, another "wasting" disease) are poorly understood, but real nevertheless. We ignore "prions" at our peril. I think that we should not ignore the possibility that the cloudburst that drenched the three trucks here in St. Louis last week was an effect of the movement of the material. It is anecdotal, but real, that in the last three years nearly all local tornadoes have formed over the Weldon Springs nuclear storage dump where truckloads of radioactive materials from downtown St. Louis and from the airport have moved during that time. Energetic actions at a distance are the meat of modern physics. We should be looking at the pragmatic energetic effects of the movement of these immensely energetic radioactive materials, before moving huge amounts of them.

If due to tangible dangers the materials must be moved, then I would suggest as a precaution moving the materials at night and during the winter months when the atmosphere is less energetically active - and on a sparsely populated route.

Response

DOE believes that the EIS adequately analyzes the environmental impacts that could result from either the Proposed Action or the No-Action Alternative. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts that could occur, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. As the commenter stated, the meteorological phenomena described are in an early stage of observation, are poorly understood, and are not predictable. Therefore, the data and analytical methodologies that could be used for an analysis are not available and DOE has not addressed it in its analysis.

However, DOE would consider all aspects of safety in transporting spent nuclear fuel and high-level radioactive waste. Shipments of spent nuclear fuel and high-level radioactive waste to a Yucca Mountain Repository would comply with all applicable regulations and accepted standard practices to help ensure their safely. In addition, as described in Appendix M of the EIS, the Department would require its contractors to follow "Operational Protocols," which provide additional measures to enhance safety in transporting radioactive materials, including requirements for transportation under inclement weather conditions. In addition, DOE plans to require that each shipment be tracked and continuously monitored using a satellite-based tracking system. Routes that would be used would comply with U.S. Department of Transportation regulations that prescribe how routes are selected for highway shipments and railroad industry practices that emphasize use of main-line track, shortest transport distance, and fewest interchanges between railroads. Routes would be approved by the Nuclear Regulatory Commission to ensure that transportation safeguards and security objectives and requirements specified in 10 CFR 73.37 would be satisfied.

8.8.3 (7230)
Comment - EIS001337 / 0107
Page 4-88 Section 4.1.15.4. Sites for cask manufacturing should have been considered within Nevada. The FEIS should consider sites along transportation corridors in Nevada. The description of environmental setting for these facilities belongs in Section 3, Affected Environment.

Response
DOE would not develop transportation casks, but plans to contract with the private sector to provide waste acceptance and transportation services, including equipment. All cask designs must contribute to overall efficiency and operability of the entire transport systems and meet Nuclear Regulatory Commission regulations. Information on the process for acquisition of waste acceptance and transport services, including casks, through the Regional Servicing Contractors is provided in Section M.3.1 of the EIS.

Because there are existing manufacturing facilities that could meet the projected manufacturing requirements, the EIS assumed that new cask manufacturing facility construction would not be necessary and that there would be no change in land use for the manufacture of disposal containers and shipping casks. Therefore, it was not necessary to consider manufacturing sites in Nevada.

8.8.3 (7789)
Comment - EIS002093 / 0002
I'm disappointed that the DEIS largely characterizes potential waste management systems impacts in Nevada as insignificant, generally positive in terms of job creation or both. If transportation through and disposal of waste within Nevada is such a benign activity, then why is no other state in the nation willing to host a facility like Yucca Mountain? The DEIS should answer this by way of a more thorough and fair assessment of impacts, including stigma.

Beyond its deficient approach to treating equity between Nevada and the rest of the nation, the DEIS does not provide sufficient treatment of the distribution of radioactive waste transportation risks among Nevada's urban and rural communities. In 1975, Governor O'Callaghan, State Senator Richard Bryan and their respective colleagues formally requested this activity come to Nevada with one particular caveat, that transportation avoid the Las Vegas Valley.

Today Nevada's governor and congressional delegation have made clear their intent to restrict shipments of nuclear waste from highways in Nevada's urban centers. Rather, Nevada's leaders see it as in Nevada's best interest to shift transportation related risk to rural counties and communities. As a consequence, low-level radioactive waste is now and spent nuclear fuel and other high-level radioactive waste in the future will be shipped through Nevada's rural counties and communities on its way to the Nevada Test Site.

I find it ironic that just a few years ago a suggestion by Lincoln County and City of Caliente officials to avoid shipments through the Las Vegas Valley resulted in the Nevada Attorney General seeking to throw several of my colleagues and I out of office.

Response
The Nuclear Waste Policy Act, enacted by Congress in 1982 and amended in 1987, has set forth a process that requires the Secretary of Energy to undertake site characterization activities at only one site, Yucca Mountain, Nevada. An analysis of impacts associated with transportation in Nevada can be found in EIS Section 6.3. The routes analyzed in Section 6.3 represent the reasonable alternatives consistent with National Environmental Policy Act provisions, and include routes that travel through both urban and rural areas of Nevada. The use of Interstate System highways and beltways is mandated by U.S. Department of Transportation routing guidelines. State or tribal routing agencies may designate preferred routes within their jurisdictions in accordance with 49 CFR 397.103. If such routes are designated and they can be used in a manner that complies with the requirements of regulations of the Department of Transportation and the Nuclear Regulatory Commission, DOE would use them. The State of Nevada has not designated preferred routes within the State. However, DOE performed sensitivity analysis that

analyzed the impacts of using potential alternate routes identified in a report prepared for the Nevada Department of Transportation. The analysis evaluated the impacts in Nevada and the remainder of the nation for six alternate routes for legal-weight truck shipments within Nevada, including highway routes through rural areas (see EIS Section J.3.1.3.).

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Section 2.5.4 and Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty

- Much of the uncertainty is irreducible, and

- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

8.8.3 (8849)
Comment - EIS000869 / 0021
Paragraph three [of Section S.4.2.2] involves an intermodal transfer station. Caliente and Jean are both located near existing or planned correctional facilities. Any radiation exposure, intentional or accidental, to employee or inmate populations of these facilities could result in cruel and unusual punishment and potentially skyrocketing legal costs for the counties, state, and federal governments.

Response
The average radiation dose to a person residing within 800 meters (0.5 mile) of a transportation route was estimated to be less than 0.1 millirem over 24 years. For perspective, the average background radiation dose is about 300 millirem per year and the Environmental Protection Agency radiation dose limit for members of the public from all manmade sources of radiation is 100 millirem per year. A dose of 0.1 millirem would increase the risk of a latent cancer fatality over a person's lifetime by about 1 in 20 million. Therefore, health and safety impacts to an individual from a dose of 0.1 millirem over 24 years would not be discernible.

8.8.3 (8972)
Comment - EIS002127 / 0013
Radiation release causes health risk and contaminates the highway surface and the surrounding area. Using your own DOE accident and incident data, Clark County estimates that forty such incidents of surface contamination will occur within Clark County for the proposed action of this DEIS and that three incidents of radioactive contamination beyond the vehicle will occur. These figures are only within Clark County. The response to all such accidents and incidents must be addressed by the DEIS.

Response
DOE has reviewed the potential for contamination of the transport vehicles and beyond during spent nuclear fuel and high-level radioactive waste cask transportation and does not consider it a significant threat. Minor surface contamination of spent nuclear fuel casks is well understood and controllable through the use of conventional operational practices.

Surface contamination of spent nuclear fuel casks would usually be due to cask weeping. The phenomenon of cask weeping can be described as follows: a cask that has been loaded or unloaded in a spent nuclear fuel storage pool becomes contaminated with radioactivity on its surface. Before shipment, the external surface of the cask is decontaminated to levels specified by regulations, but when the cask is inspected on arrival at its destination, contamination above the levels allowed by regulations is sometimes found. It is believed that when a cask is repeatedly placed into water-filled spent nuclear fuel storage pools, it becomes increasingly contaminated over time, with the contamination penetrating deeper into the cask's surface. Routine decontamination, which removes surface contamination, is sometimes not sufficient to remove contamination that has migrated deeper into the surface. As a consequence, if decontamination prior to shipment is not aggressive enough, during transportation the level of surface contamination can increase as deep contamination weeps out of the cask's surface.

The levels of contamination associated with the weeping phenomenon are not high enough to be factored into the risk assessment for transportation. Operational procedures would be used to preclude this problem during shipments. For example, wrapping the cask in plastic before entry into spent nuclear fuel storage pools is an effective practice that is often used. Therefore, contamination weeping is not expected to be a significant contributor to risk during spent nuclear fuel transportation.

The EIS has been revised to describe the maximum reasonably foreseeable accident in terms of accident conditions such as impact velocities and fire durations as well as the failure mechanisms that could lead to releases of radioactive materials from a cask. "Real-life conditions" that would involve various types of collisions and associated impact velocities, natural disasters, specific locations (such as mountain passes), or various infrastructure accidents (such as track failure) in effect constitute a combination of events that could lead to failure of a cask to contain spent nuclear fuel or high-level radioactive waste fully. Thus, DOE has reflected real-life accident situations and conditions in its analyses.

States and tribes are primarily responsible for the health and safety of their citizens. However, in the event of an accident that released radioactive materials, a state or tribe could request assistance from Federal agencies under the Federal Radiological Emergency Response Plan and Federal Radiological Monitoring and Assessment Plan. DOE has several assets that could assist, including the Radiation Emergency Assistance Center/Training Site (REAC/TS). REAC/TS is on call 24 hours a day to provide direct or consultative help with medical and health physics problems associated with an accident or incident involving radioactive materials.

8.8.3 (9424)
Comment - EIS001888 / 0115
The DEIS failed to examine the likely interaction of the Yucca Mountain Program and other federal activities in Nevada. For example, while Clark County is in non-attainment for National Ambient Air Quality Standards (NAAQS), the DEIS did not mention the potential impact of the addition of heavy haul or legal weight trucks into the transportation system.

Response
Sections 8.2 and 8.4 of the EIS address the cumulative short-term impacts during construction, operation and monitoring, and closure of the repository and transportation in relation to other Federal activities in Nevada. Cumulative impacts on air quality also are addressed.

In response to comments, the EIS includes an expanded discussion of the potential impacts of increased truck and rail traffic on air quality in the Las Vegas Valley. Based on additional analysis and revised data, DOE has determined that an air quality conformity analysis and determination would not be required as a result of increased traffic in the Las Vegas Valley due to workers commuting between the Las Vegas area and the proposed repository at Yucca Mountain or the transportation of materials other than spent nuclear fuel and high-level radioactive waste. This modification was made to the EIS (see Sections 6.1.3, 6.3.2, and 6.3.3).

8.8.3 (9649)
Comment - EIS001888 / 0313
The DEIS' analysis of the human health risks of transporting waste through Clark County is insufficient. The DEIS understates the risks because of a failure to realistically describe the population of the affected area. Specifically, the

DEIS underestimates the current population of Clark County, the likely size and direction of population growth in Clark County, and the specific sensitive populations.

The DEIS defines the affected population as those Clark County residents living within .5 miles of the route. Unfortunately, the DEIS relies on 1990 census data, although data that is more current was available. The most current demographic information was readily available from a number of different sources in the county and should have been consulted by the DOE in preparing the estimates. This is an important issue because of Clark County's rapid population growth.

The failure to account for Clark County's population changes indicates that the DEIS underestimates risk. The DOE response will undoubtedly be that the 1990 Census remains the only official estimate of the population of Clark County. In many parts of the United States and indeed in Nevada, this is a reasonable assumption. In the case of Clark County, Nevada, however, that assumption is not reasonable. No responsible authority in the region uses the 1990 census for any planning purposes. Utilities, the school district and local planning agencies have all come to rely on the consensus estimate of the population.

The changes in Clark County's urban population have significant impacts on the exposed population considered in the DEIS. The population living within .5 miles of likely nuclear waste routes through urban Clark County using the 1990 census data is 88,745. The estimate of that same population using the year 2000-population estimate is 154,792, almost twice the 1990 population.

Even the Nuclear Regulatory Commission in its recent rulemaking, felt compelled to adjust the population figures to provide a more realistic appraisal of the public health risk. The DEIS did not take even this modest step. Based on these figures, the Department of Energy's analysis is misleading. To remedy the situation, the DOE, prepare a new EIS that uses the most relevant population figures when the 2000 Census becomes available. The current DEIS provides, at best a lower bound of the health risk.

Due to Clark County's rapid growth and uncertainties about the DOE's program, the DEIS should have based its risk estimates on a responsible forecast of population along the potential routes. There is no clear indication when the DOE will be in a position to ship high-level waste to Yucca Mountain.

The population living within .5 miles of likely nuclear waste routes through urban Clark County using the 1990 census data is 88745. The estimate of that same population using the year 2020 population estimate is 372579, more than four times the 1990 population used in the analysis contained in the DEIS. Population forecasts for the area surrounding the likely radioactive waste routes are readily available and should have been consulted in the preparation of the DEIS. The DEIS underestimates the human health effects to Nevada's population by a considerable degree.

In 1960, the State of Nevada produced tourist map of Nevada that indicates the Nevada Test Site (NTS) is 100 miles northwest of urbanized Clark County. Recent briefings by DOE staff describe the NTS as being 65 miles northwest of urbanized Clark County. This change is due to Clark County's growth. It suggests that the direction in which Clark County's urban area is growing should have been an important consideration in preparing the EIS.

The valley in which urban Clark County rests is geographically constrained. That is, the physiographic features of the region force human activity to take place in certain areas rather than others. Future population growth in Clark County must take place along potential HLW [high-level radioactive waste] transportation routes. Urban Clark County has outgrown its original bounds and one of the most contentious issues in the region is the disposal of land from the US Bureau of Land Management (BLM). The original boundaries for urban Clark County have been adjusted several times to account for this growth.

Any future population growth that occurs in Clark County will take place along likely HLW transportation routes. Because of land use plans and zoning restrictions, the nighttime population density along the beltway will be similar to the urban core densities. The only foreseeable difference in population density between the routes through Clark County will be in employment. Unfortunately, the DEIS does not consider employment population data in any of the calculations. These data are readily available from Clark County. The DEIS should anticipate the likely population growth in Clark County when preparing its risk estimates.

Past experience suggests that the center of gravity of population in urban Clark County will continue to shift to the northwest. This phenomenon has already occurred in the City of Las Vegas. It is likely that the Population growth along the route will have two effects. The first and most obvious is that the number of people exposed to radioactivity due to the proposed action will increase. The second is that the risk characteristics of the transportation routes through the area will change. The ongoing construction of homes and businesses will create heavy truck traffic and continual construction on the roads in the area. Construction zones typically increase accident rates by 50%. The DEIS fails to consider this substantial and imminent threat to public health and safety.

The special populations used for these comments are derived from the Clark County Hazardous Materials Emergency Response Plan for 1998. This report is prepared by the Local Emergency Planning Committee (LEPQ) to support emergency management activities. The sensitive population section of the report describes facilities that contain difficult to evacuate populations.

A special population of particular concern to Clark County is the nonresident population. From 1991, the number of tourists visiting Clark County grew from 23 million to 33 million. The occupants of these hotels are also at risk and should be included in the population total. Along the currently existing legal weight truck route (which for an unknown reason the DEIS did not analyze) there are 17 hotels within .5 miles of the legal weight truck route. Preliminary estimates indicate that approximately 6,000 hotel rooms are within .5 miles of potential routes through urban Clark County. Besides the human health considerations, there are two additional concerns with regard to the DEIS.

The first of these is that the nonresident population contributes to higher accident rates. Approximately 40% of the 33 million visitors to Clark County arrive by car. These drivers are unfamiliar with the road network and make a significant contribution to accidents in the valley. Most traffic accidents are caused by drivers unfamiliar with the area in which they are driving. Clark County's tourist population presents an additional accident risk that was not considered by the DEIS.

Another concern for Clark County is the problem of evacuating these nonresidents, should an accident occur. There is no discussion in the DEIS of the size of the area that may have to be evacuated or for how long that evacuation must last. The problem of evacuation in case of a radioactive emergency has been studied by the DOE and the benefits of these studies should have been applied in the DEIS. Depending on the location and size of the plume, potentially thousands of nonresidents may have to be evacuated or relocated within Clark County. The likely effect of an evacuation are considered in another section of these comments, however, it is important to point out that the problem of controlling the evacuation of a highly mobile nonresident population is extremely difficult and could easily cause impacts to the community that were not considered in the DEIS.

The DEIS does not consider the problem of radiation exposure to schoolchildren. There are currently 37 schools within .5 miles of a potential nuclear waste route in Clark County. The number of schools near these routes will increase because new schools will be constructed along the beltway to service development in the area. The risk analysis presented in the DEIS does not consider the effects of radiation on the children attending these schools. A supplemental report that presents a radiological health examination of the effects of radiation on children attending schools adjacent to nuclear waste routes should be performed.

Analysis of the Potential HLW routes indicates that the Columbia Sunrise Hospital in Summerlin is the only health facility within .5 miles of a potential nuclear waste route. No jails, group homes, drug treatment centers or senior health centers were identified. Although no special event center was identified within the .5-mile distance, Clark County believes the Las Vegas Speedway center should be considered as an effected facility. The speedway is adjacent to Interstate 15. The parking lot for the Speedway falls within .5 miles of the route. In case of an accident, it is likely that the Speedway will be affected in some way.

Response

The transportation impact analyses in Section 6.3.1 of the EIS account for population growth in Nevada. Impacts in states other than Nevada are based on 1990 census data adjusted to reflect U.S. Bureau of Census forecasts of state populations for 2025 and state census reported for 2000 and extrapolated to 2035. These forecasts account for population growth and migration of the national population and include adjustment for the 2000 Census. With the exception of areas adjacent to the Las Vegas Beltway, impacts in Nevada were adjusted using population forecasts estimated by the REMI model (DIRS 103074-BEA 1992) using forecast data provided by Clark and Nye Counties and the Nevada State Demographer and adjusted for data from the 2000 Census.

For purposes of analysis of impacts presented in Section 6.3.1 of the EIS and to account for anticipated growth in the vicinity of the Las Vegas Beltway, DOE assumed the density of populations along the Beltway in 2020 could be represented by estimates presented in the report prepared for the City of North Las Vegas (DIRS 155112-Berger Group 2000). DOE assumed this population would grow at the same rate as for all of Clark County from 2020 to 2035. To estimate impacts, the analysis used the population along highways and railroads in Nevada forecast for 2035. Figures 6-13 and 6-20 show the Las Vegas Beltway and the proposed routes for legal-weight trucks and heavy-haul trucks that would use the Beltway. Impacts in other Nevada counties, including mostly rural counties, are adjusted using REMI-generated estimates of future populations based on data provided by the Nevada State Demographer's Office. DOE used the latest reasonably available data in the analysis for use in estimating transportation impacts.

Information on locations of schools, hotels, and other special facilities as well as the condition of existing highway infrastructure (for example, pavement condition, highway capacity, width, shoulders) is a level of precision that is not necessary for DOE to evaluate impacts and provide a reasonable estimate for each alternative in the EIS. If the Yucca Mountain site was recommended and approved, at that time, prior to constructing a branch rail line in Nevada or working with the State of Nevada to upgrade highways and constructing an intermodal transfer station, DOE would conduct additional engineering and environmental studies along with consultations with responsible Federal, State, tribal, and local authorities. Appropriate National Environmental Policy Act reviews would be conducted.

The traffic accident and fatality rates used in the environmental impact analyses (DIRS 103455-Saricks and Tompkins 1999) are the latest reasonably available consistent data applicable for use in estimating impacts of transportation accidents. The data are state-specific and have been divided into accidents by road type in each state. The accident rates are developed from data taken from all areas of a given state and include accidents that occur in areas with high accident rates (for example, they include the effects of tourists on accident rates in the Las Vegas area) as well as areas with lower rates. Thus, although the results might not predict the impacts in specific areas precisely, the aggregate total impacts both nationally and within Nevada, on average, are accurate. This level of precision is all that is necessary to support the decisions to be made from this EIS.

With respect to the comment on evacuating hotels in the event of a radiological accident, State and tribal officials have the responsibility to protect persons, the environment, and property within the State or reservation from unwarranted radiation exposure or consequences of radioactive material contamination. As discussed in Section 6.2.4.2 of the EIS, if requested by a state or tribal authority, DOE would provide assistance from its Regional Coordinating Offices located across the United States to reduce the consequences of accidents related to the transportation of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. The assistance would include providing equipment, logistical and medical resources, and qualified personnel as necessary. States and tribes can request and obtain assistance from other Federal agencies including the Federal Emergency Management Agency, Environmental Protection Agency, Nuclear Regulatory Commission, Department of Transportation, and Department of Defense. Under Section 180(c) of the NWPA, financial and technical assistance can be made available for emergency response training and preparation of emergency response plans. A portion of these funds can be used for equipment. Additional information on emergency response is provided in Sections M.3.2.2.5 and M.5.

The EIS expresses radiological health impacts as the incremental changes in the number of expected fatal cancers (latent cancer fatalities) for populations as well as the incremental increases in lifetime probabilities of contracting a fatal cancer for an individual. The estimates are based on the dose received and on the dose-to-health-effects conversion factors recommended by the International Commission on Radiological Protection. The Commission estimated that, for the general population, a collective dose of 1 person-rem would yield 0.0005 excess latent cancer fatalities. This value includes the effects on pregnant women, children under the age of 18 years, and the elderly.

8.8.3 (10345)
Comment - EIS001543 / 0005
I'm concerned about the health impact and I'll conclude with this statement. I'm concerned that the 10th district, which I represent, and beyond the 10th district is being asked to accept a massive increase in transportation and

radiological risks to transport this waste in an expedited manner to the satisfaction of the nuclear industry. While you're called upon to handle this problem with Yucca Mountain, we have a major problem in our energy policy because this waste is going to keep being created. And unless we start to look at the development of new energy technologies so this Country can transit from this wasteful and dangerous nuclear technology, which future generations will be saddled with, we will have done a disservice if we don't find other ways to create energy.

Now, this Draft Environmental Impact Statement fails to fully inform my constituents of the risks of this waste. According to the testimony from the State of Nevada, which we were able to obtain for purposes of filing a response to the DEIS. The typical characteristics of waste to be transported contained 31,000 curies of cesium-137, 21,000 curies of strontium-90 and as a powerful source of penetrating gamma and neutron radiations. A surface dose rate is estimated to at least 10,000 REM per hour or about 166 REM per minute. A person standing or sitting next to unshielded assembly that would be containing this waste would receive, at least, 100 REM per minute. And I think people would want to know if they're getting dozens of free x-rays as they're moving through traffic, as they're sitting in their living rooms with trains passing by. These issues must be looked at to protect the public health.

The first concern here should not be the transportation of nuclear waste, the first concern should be the public's health and when you can secure the public's health, without any question and in doing that through public hearing, that's the point at which I think it's logical to have a discussion about the transportation of this waste.

Response
Appendix J of the EIS has been revised to include maps of the truck and rail routes used in the analysis of impacts, the estimated number of shipments, and the estimated impacts for each state through which spent nuclear fuel and high-level radioactive waste transport was analyzed. The impacts in a particular town or city in a state would be less than those for the state. These are estimates for analyzing transportation impacts in the EIS and the actual routes, the number of shipments, and impacts for these states could be different depending on the actual routes that are chosen.

Unshielded spent nuclear fuel can be hazardous and for this reason spent nuclear fuel is shipped in heavily shielded casks. The maximum radiation dose rate from a spent nuclear fuel cask is about 10 millirem per hour at 2 meters (6 feet) from the side of the transporting vehicle. The radiation doses from shipping spent nuclear fuel and high-level radioactive waste are presented in Sections 6.2 and 6.3 of the EIS. The average radiation dose to people along transportation routes would be about 0.1 millirem over 24 years. This is equivalent to a lifetime risk of fatal cancer of 1 in 20 million. For perspective, the risk of fatal cancer from all causes ranges from 1 in 4 to 1 in 5.

In relation to public involvement in transportation planning, Section M.3.2.1 of the EIS describes the process by which transportation routes would be selected and transportation plans developed. Routes would be selected in accordance with U.S. Department of Transportation regulations and approved by the Nuclear Regulatory Commission. DOE would approve the Regional Servicing Contractor's plans prior to their submittal to the Commission for approval. In addition, at least 4 years prior to the first shipment, in the course of implementing its policy and procedures for Section 180(c) of the NWPA, DOE would notify potentially affected states and tribes of its preliminary determinations of routes that would pass through the state or tribal jurisdictions.

8.8.3 (10996)
Comment - EIS001952 / 0011
Sliding scale in calculating less harm to rural populations from accident/incident/non-event exposures from routine transport supports de-facto transportation routing through rural areas. At the same time, rural areas are receiving considerable monetary and infrastructure incentives to grow/increase populations which will actually be exposed when transportation begins. As incentives, rural areas are promoted as tourism centers which increases likelihood that non-resident populations will also be exposed to risk of transport in rural areas. The inconsistency is similar to the Las Vegas area which is promoted as one or the fastest growing populations in the nation--for tourism and real estate purposes--but, is a desert with sparse population during discussions as to where to site a HLRW [high-level radioactive waste] site!

Response
As stated in Section 2.1.3.2.2, routes for national and Nevada truck transportation were selected for the purpose of analyzing impacts in the EIS. These routes are representative of routes that would ultimately be used. At this time,

years prior to when shipments could begin, DOE has not selected routes for transporting spent nuclear fuel and high-level radioactive waste to a Yucca Mountain Repository. The routes used in the analysis were selected in accordance with U.S. Department of Transportation's highway routing regulations in 49 CFR 397.101. These regulations require the use of the Interstate Highway System for transporting spent nuclear fuel and high-level radioactive waste and selection of routes that would reduce time in transit. A key element of the regulations is that reducing time in transit would reduce radiological risk, and thus the emphasis on use of Interstate System highways. In rural areas, traffic generally flows freely at highway speeds and there are fewer delays and less traffic than suburban and urban areas. In addition, there are fewer people in the vicinity of the shipments in rural areas than suburban and urban areas, which would lead to lower radiological impacts. The radiological exposures to maximally exposed individuals, as shown in Sections 6.2.3 and 6.2.4 for the national mostly legal-weight truck scenario, would be well below the exposures for which any health effects would be expected. These impacts are stated as being a total of 6 millirem over 24 years (3-in-1-million chance of a lifetime latent cancer fatality) for legal-weight truck transport and 0.75 rem (about 4-in-10,000 chance of a lifetime latent cancer fatality) for a maximum reasonably foreseeable accident involving a legal-weight truck cask. Regardless of whether a person was a tourist, nonresident, or resident or whether a person lived in a rural, suburban, or urban area, the maximum incident-free and accident radiological exposures calculated in the EIS would lead to small impacts.

8.8.3 (11861)
Comment - EIS000764 / 0003
Since the Private Fuel Storage [PFS] project will transport its customers spent nuclear fuel to the storage facility by rail, the conclusions reached by DOE in the DEIS concerning transportation are relevant to the PFS project. For the last fifteen or so years, I have been actively supporting the ability of the nuclear industry to safely transport spent nuclear fuel. And the conclusions of the DEIS serve to re-enforce the fact that spent nuclear fuel has and can be transported safely and efficiently.

There has been ample historical evidence that safe, routine transportation of spent nuclear fuel can be accomplished. For more than three decades, the domestic nuclear industry has conducted almost three thousand shipments of spent nuclear fuel without a release of radioactive material or a failure of the transport cask. This is a remarkable safety record. I believe this is not the result of chance, but the result of a comprehensive federal regulatory regime of cask design criteria and certification regulation, and transportation regulation, and the conscious effort of the nuclear industry.

As I mentioned before, the conclusions of the DEIS with regard to transportation have relevance to the PFS project which is currently in the licensing process with the Nuclear Regulatory Commission. While the transportation of spent nuclear fuel to the PFS project from our customers is the subject of a separate NRC [Nuclear Regulatory Commission] licensing process, any future shipments to the repository from the PFS facility would be bounded by the evaluations of this DEIS.

Response
DOE agrees with the commenter's remarks about the safety record of shipments of spent nuclear fuel. Section 6.2 of the EIS provides a discussion of transportation impacts related to the potential use of the Private Fuel Storage Facility. Section J.4 provides a map of Utah showing the location of the Private Fuel Storage Facility in relation to transportation routes used in the analysis. Section 8.4 reports the cumulative impacts of the Private Fuel Storage project.

8.9 Transportation Costs

8.9 (193)
Comment - 13 comments summarized
Commenters stated that the EIS does not adequately analyze the impacts to rail lines and highways from the transport of spent nuclear fuel and high-level radioactive waste to Yucca Mountain, nor does it describe the agencies that would pay for transportation-related improvements, mitigation, and monitoring. Commenters said that these are important issues because transport would last several decades. Some said that it is DOE's responsibility to make sure that all needed upgrades of infrastructure are done.

With regard to rail shipments, commenters questioned the adequacy of rail maintenance and believed that a high likelihood exists for mechanical breakdowns and errors because of the ever-increasing numbers of trains and their adverse effects on rail ties, switches, and roadbed. Safety practices were questioned, especially considering that the trains carrying spent nuclear fuel and high-level radioactive waste would pass within 6 meters (20 feet) of other trains traveling in opposite directions at high speeds.

With regard to highway shipments, commenters said that most states are having financial difficulty keeping up with road repairs and maintenance, and that Federal monies are not available for maintenance. Others questioned how DOE can adequately assess the impacts of truck transportation on state and local highways without understanding site-specific conditions. Some said that the EIS did not examine the impacts of long, slow-moving spent nuclear fuel and high-level radioactive waste trucks on roads, bridges and culverts; highway safety and traffic disruption; and impacts to levels of service.

With regard to Nevada, commenters said that the EIS should describe road upgrades and maintenance, as well as who would pay for these upgrades and maintenance. Some said that there are no roads in Nevada that are able to withstand the weight of a single 110-metric-ton (120-ton) truck, much less 300 trucks. Because of extreme heat in southern Nevada during the summer and extreme cold in northern Nevada during the winter, some commenters said that the EIS should evaluate the potential that asphalt roads would have to be replaced by concrete roads and that the EIS should include an estimate of the costs to do so. Commenters noted that the statement on page 6-9 of *Nevada Potential Repository Transportation Strategy, Study 2*, Volume 1 (DIRS 101214-CRWMS M&O 1996), that the "estimated pavement wear would increase by 10 percent" is not substantiated by any detailed analysis, even though the EIS recognizes that pavement wear is a major cost of the heavy-haul truck option. Others wanted to know the locations of truck-turnout lanes and whether these lanes would be sufficient over the life of the repository. These commenters said that it was inappropriate for DOE to expect that upgrades that are sufficient to meet today's traffic would be adequate over the life of the repository.

Response

Projected annual shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain by truck, rail, and barge would be a very small fraction (less than 0.01 percent) of domestic highway, railroad, and barge traffic (see Section 6.2 of the EIS). For the most-used highways and railroads, which would be those in Nevada, shipments to Yucca Mountain would be less than 1 percent of Nevada truck shipments and 0.1 percent of Nevada railcar shipments.

DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties, offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

In this EIS, DOE has used computer models it has used in previous EISs and other studies. These models are widely accepted by the national and international scientific and regulatory communities. In addition to ensuring that the EIS analyses reflect the latest reasonably available information, DOE has either incorporated information that has become available since the publication of the Draft EIS or modified existing information to accommodate conditions likely to be encountered over the life of the Proposed Action. For example, the analysis in the Draft EIS relies on population information from the 1990 Census. In this Final EIS, DOE has scaled impacts upward to reflect the relative state-by-state population growth to 2035, using 2000 Census data.

Although the EIS analyses are based on the latest reasonably available information and state-of-the-art analytical tools, not all aspects of incident-free transportation or accident conditions can be known with absolute certainty. In such instances, DOE has relied on conservative assumptions that tend to overestimate impacts. For instance, DOE assumed that the radiation dose external to each vehicle carrying a cask during routine transportation would be the maximum allowed by U.S. Department of Transportation regulations. Similarly, DOE assumed that an individual, the "maximally exposed individual," would be a resident living 30 meters (100 feet) from a point where all truck shipments would pass. Under these circumstances, the maximally exposed individual would receive a dose of about 6 millirem from exposure to all truck shipments (6 millirem represents an increased probability of contracting a fatal cancer of 3 in 1 million). Although it can be argued that individuals could live closer to these shipments, it is highly unlikely that an individual would be exposed to all shipments over the 24-year period of shipments to the repository, even though DOE incorporated this highly conservative assumption in the analysis.

However, in response to comments, DOE has considered locations at which individuals could reside nearer the candidate rail corridors and heavy-haul truck routes in Nevada as a way of representing conditions that could exist anywhere in potentially affected communities. For example, DOE assumed that a maximally exposed individual could reside as close as 4.9 meters (16 feet) to a candidate heavy-haul truck route. During the 24-year period of repository operations this maximally exposed individual, would receive an estimated dose of about 29 millirem, resulting in an increased fatal cancer probability of 2 in 100,000.

These exposures would be well below those received from natural background radiation, would not be discernible even if corresponding doses could be measured, and would not add measurably to other impacts that an individual could incur. For comparison, the lifetime likelihood of an individual incurring a fatal cancer from all other causes is about 1 in 4.

With the exception of the heavy-haul truck scenario, the shipments would use vehicles (trucks, railcars, and barges) similar in weight, size, and operation to vehicles that transport other commodities. As a result, potential impacts on transportation infrastructure (infrastructure typically includes bridges, roadways, railroad track, switchyards, locks, navigation aids, etc.) of a vehicle used in transporting spent nuclear fuel and high-level radioactive waste across the United States would be similar to the impacts of other commercial vehicles that use the nation's transportation systems. Because there would be few vehicles transporting spent nuclear fuel and high-level radioactive waste in comparison to other vehicles using the transportation system, the impacts on transportation infrastructure of shipments to Yucca Mountain would not be discernible. In addition, because the annual number of shipments that would be made to Yucca Mountain is less than 0.001 percent of the more than 300 million annual shipments of hazardous materials in the United States, impacts on state, local, and Native American tribal law enforcement and emergency response resources would be small.

For purposes of analysis in the EIS, DOE assumed infrastructure and practices, including maintenance and enforcement of safety standards, used in transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain by rail would be comparable to that in current service (49 CFR Part 213). In this regard, the analysis of transportation accidents included the potential for accidents involving trains passing near each other on adjacent rails, while traveling in opposing directions at high speeds. DOE believes it is reasonable to expect the safety of infrastructure and practices for shipments to Yucca Mountain for the Proposed Action would be at least equivalent to that today.

National impacts estimated in the EIS use data that incorporate statistics compiled from accidents in localities across the United States. The statistics include those for accidents where transportation infrastructure was a contributing factor. Thus, potential impacts in any locality, even one having transportation infrastructure with unusual hazards, would be much less than for the entire transportation system. As a consequence, with the exception of the heavy-haul truck scenario, DOE believes existing highway and rail infrastructure, as well as its maintenance and public safety services, would be adequate for the safe transportation of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. DOE also believes the potential impacts to infrastructure and public safety services from transportation would be minimal. Because the estimates are based on present-day transportation conditions, DOE believes it would not be necessary to upgrade infrastructure to support shipments to Yucca Mountain.
As discussed in Section 6.3.3 of the EIS, heavy-haul truck transport in Nevada could affect transportation on designated roads in the State. As discussed in that section, Nevada highways along a route, including roads, bridges and culverts, would be upgraded for heavy-haul truck use, if DOE selected heavy-haul truck transport. Upgrades would include reconstruction of some highway sections, especially in areas where spring and fall thaws and freezes make highways susceptible to damage by heavy vehicles. In addition, new turnout lanes at frequent intervals along two-lane highways would be constructed to allow other traffic to pass the slower heavy-haul vehicles. The location and frequency of turnouts would be determined in consultation with State and Native American tribal jurisdictions after a specific route were selected. Highway shoulders would be widened and road surfaces would be improved in many areas. The potential impacts of these construction activities are analyzed in the EIS. Section 6.3.3.1 discusses impacts heavy-haul trucks would have on the flow of traffic on roads in Nevada. This section observes that heavy-haul trucks would interfere with the free flow of traffic, leading to queues behind trucks in some areas. It also discusses the level of service for Nevada highways, noting that for many of Nevada's rural highways the level of

service is A, which represents free-flowing traffic with few vehicles. In addition, in analyzing candidate routes for heavy-haul trucks, DOE projected traffic volumes for the routes (DIRS 154675-Ahmer 1998). DOE assumed that heavy-haul trucks would operate under permits issued by the State of Nevada and also assumed, for purposes of analysis in the EIS, that these permits would specify conditions of travel.

Cost estimates developed for highway upgrades associated with the heavy-haul truck transport implementing alternatives include cost for design and construction of road upgrades for public roads and for annual maintenance of the roads that would be used (DIRS 154765-Ahmer 1998). The estimated costs discussed in EIS Section 6.3.3 for each candidate route are based on detailed estimates, which include lane widening, truck lane and turnout construction, pavement upgrades, intersection upgrades, pavement type, and shoulder upgrades.

DOE would be responsible for making the funding available for the upgrades if it selected heavy-haul truck transport, and for working with the State of Nevada and Native American tribes to ensure funding was available for the road upgrades necessary to provide infrastructure for transporting spent nuclear fuel and high-level radioactive waste using heavy-haul trucks on Nevada roads. For purposes of analysis in the EIS, DOE assumed funding to upgrade routes in Nevada for heavy-haul truck transport would originate from a source or sources outside the State.

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using a planning grant and based on availability of funds in annual Program budgets specified by Congress. Additional Federal response capabilities, such as expert services from the Radiological Assistance Program Team, could be activated, as requested by states and tribes. See Section M.6 of the EIS for a discussion of the DOE Section 180(c) Policy and Procedures.

DOE believes that the EIS adequately analyzes transportation-related impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site was recommended and approved. See the introduction to Chapter 8 of this Comment-Response Document for more information.

8.9 (425)
Comment - EIS000103 / 0002
There are no cost estimates for the casks that will be carried on the highways or on rail. When I met Dan Ryan years ago at a transport meeting, he said they would individually cost 350,000 to 500,000 apiece and they want 10 to 11,000.

That's 50 billion dollars, so that I suggest they get in these estimates somewhere and also the cost for vitrification and other processes that they're using. This again is not explaining to the public, these enormous costs.

It would be wonderful -- and I praise DOE for this concept, because if you did real transportation studies -- and I'm sure you will such as distance between towns, topographies, number of lanes, et cetera and costs, that you will provide the upgrades for our hundreds of miles of highways, and I would love to see what those figures would be.

Response
The number of shipping casks needed would only be a small percentage of the total number of shipments made (about 11,000 rail shipments). Section 2.1.3.4 of the EIS describes the shipping cask, manufacturing, maintenance, and disposal. This section states, "The number and type of shipping casks required would depend on the predominant mode of transportation." Because the shipping casks would not be used for storage at Yucca Mountain, they would be cycled back and forth between the commercial sites and Yucca Mountain. The number of shipping casks needed would be based on the shipping logistics developed, to ensure there were a sufficient number of casks to handle the average shipping rate. For example, if one cask could make 30 trips per year, and a total of 300 shipments were made in that year, then only 10 shipping casks would be needed.

Waste vitrification and similar activities are not part of the proposed activities and thus are not analyzed in the EIS. Total life-cycle costs of the alternatives for waste acceptance, storage, and transportation are contained in *Environmental Impact Statement Cost Summary Report* (DIRS 104980-CRWMS M&O 1999).

Nevada highways would be upgraded for heavy-haul truck use, if heavy-haul truck transport was the mode selected (see Section 6.3.3.1 of the EIS). Upgrades would include reconstruction of some highway sections, especially in areas where spring and fall thaws and freezes make highways susceptible to damage by heavy vehicles. In addition, new turnout lanes at frequent intervals along two-lane highways would be constructed to allow other traffic to pass the slower heavy-haul vehicles. Highway shoulders would be widened and road surfaces would be improved in many areas.

Cost estimates developed for highway upgrades associated with heavy-haul truck transport scenarios include costs for annual maintenance of the roads used.

8.9 (2352)
Comment - EIS000707 / 0003
In regards to rail transportation there are several Intermodal Transfer Stations to be built in Nevada. I assume that the DOE would be responsible for the cost, if not who would be?

Response
If DOE selected heavy-haul truck transport, one intermodal transfer station would be necessary (see Section 6.3.3.1 of the EIS). The intermodal transfer station would not be needed if a branch rail line was constructed to the repository. If an intermodal transfer station was constructed, DOE would fund the construction activities.

8.9 (3121)
Comment - EIS000726 / 0013
There is no mention of actions to prevent, or for compensation or mitigation for increased wear and tear to our highway infrastructure, or for repair caused by accidents or incidents. In a transport 6 years ago to the low-level disposal site, there was a circus of damaged bridges and culverts left across the County, indeed, across the country. At another time, there was an incident where radiation escaped from the transport vehicle. An entire section of highway had to be dug up, containerized and shipped to the waste facility as radioactive waste. Not only is there repair to the highway, but there is marked impact to surrounding ecosystems. In particular, if there had been a riparian or spring ecosystem involved, the impact could have been tragic for endangered and threatened species. Almost all transportation routes within Clark County are through the habitat of the endangered desert tortoise. This kind of accident will indeed happen again. Using your own DOE accident and incident data, Clark County estimates that 46 such incidents of surface contamination will occur within Clark County for the Proposed Action of this DEIS, and that 3 incidents of radioactive contamination beyond the vehicle will occur. These figures are only within Clark County! The response to all such accidents and incidents must be addressed within the DEIS.

Response
If DOE selected heavy-haul truck transport, Nevada highways would be upgraded for heavy-haul truck use (see Section 6.3.3.1 of the EIS). Upgrades would include reconstruction of some highway sections, especially in areas where spring and fall thaws and freezes make highways susceptible to damage by heavy vehicles. In addition, new turnout lanes at frequent intervals would be constructed along two-lane highways to enable other traffic to pass the slower heavy-haul vehicles. Highway shoulders would be widened and road surfaces would be improved in many areas.

Cost estimates developed for highway upgrades associated with heavy-haul truck transport include annual maintenance of the roads used. The Nevada Transportation Engineering File (DIRS 154675-Ahmer 1998) includes a cost estimate for heavy-haul truck transport, including the design, construction, and management of the initial upgrades for public roads for each of the five candidate routes. DOE based the projected costs in Section 6.3.3.2 of the EIS on those detailed estimates, which include lane widening, truck lane and turnout construction, and upgrades to pavement, intersections, and shoulders.

During the 24 years of the Proposed Action, the mostly legal-weight truck national transportation scenario would involve as many as 53,000 truck shipments of spent nuclear fuel and high-level radioactive waste (see Section

J.1.4.2.3.2 of the EIS). The transportation analysis estimated that those shipments could involve as many as 66 accidents (average of 1.7 accidents per year nationally). Less than 1 percent of these accidents could generate forces capable of causing functional damage to the casks, but would have no radiological consequences. Therefore, the estimated number of accidents that could damage a cask over the 24-year period on a national basis is less than 0.5. The number of accidents that could occur in Nevada is a subset of this estimate.

Legal-weight truck shipments in Nevada to a Yucca Mountain Repository would travel over highways that cross desert tortoise habitat, but none of the routes would cross habitat that the U.S. Fish and Wildlife Service has designated as critical for recovery of this threatened species (see Section 6.3.1 of the EIS). Over the 24 years of operations under the Proposed Action and approximately 50,000 legal-weight truck shipments, vehicles probably would kill individual desert tortoises. However, under this scenario legal-weight trucks would contribute only about 1 percent to the daily volume of vehicles to and from the repository site and only about 0.15 percent of commercial truck traffic on Interstate-15 and U.S. 95 in southern Nevada. Thus, any desert tortoises killed by trucks transporting spent nuclear fuel or high-level radioactive waste probably would be only a small fraction of all desert tortoises killed on highways.

Costs from accidents during transport involving a suspected radiological release or precautionary evacuation would be covered under the Price-Anderson Act. Accidents or incidents during transport that did not involve a radiological release would be covered under the carrier's insurance.

8.9 (4918)
Comment - EIS001510 / 0003
The DEIS is problematic because it uses conservative scenarios rather than severe ones in its analysis of the costs and associated risks of transportation. In order to comprehensively estimate the risks associated with the transport of highly radioactive material from 77 sites in the U.S. for a substantial period of time, the potentiality of the "worst case scenario" must be factored into both the cost estimate and the health impact analysis. Factors such as emergency costs, decontamination costs, hospital costs, and evacuation in the event of a severe accident must be considered.

Response
As discussed in Sections 6.2.4.2 and J.1.4.2.1 of the EIS, the accident analyses included the "maximum reasonably foreseeable accident." This accident is more severe than would be likely in postulated "real" accidents, including truck crashes into bridges, train derailments followed by fires, derailments followed by immersion in a river, and similar extreme conditions. DOE selected the performance standards for casks prescribed by the Nuclear Regulatory Commission (10 CFR Part 73) to ensure that such accidents would be unlikely to result in releases of radioactivity from the cask. These standards ensure that casks would be extremely robust. The maximum reasonably foreseeable accident postulated in the EIS assumes that accident conditions would exceed the design limits of the transportation cask structure and materials. These conditions would be unlikely to occur during the 24-year transportation campaign. In addition, forces and heat would be applied to the structures and surfaces of a cask in a way that would cause the greatest damage and bring about releases of radioactive materials from the cask to the environment.

As discussed in Chapter 6 and Appendix J of the EIS, the risk of a severe accident involving a release of radioactive materials is very small, about 1 to 2 in 10 million per year. DOE is aware of the potential consequences of such an accident and has plans for training emergency responders [see the discussion on NWPA Section 180(c) in Appendix M] and systems in place to support states during emergencies, if requested (see Section M.6). In response to comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J.

Costs from accidents during transportation involving a suspected radiological release or a precautionary evacuation would be covered under the Price-Anderson Act. Costs from accidents or incidents during transportation that did not involve a radiological release would be covered under the carrier's insurance.

DOE believes that the EIS provides sufficient information on severe accidents, their potential consequences, preparations for and cleanup of potential releases, and range of costs to support current decisionmaking.

8.9 (5389)
<u>Comment</u> - EIS001887 / 0097
Other areas directly affecting the State in responding to the unprecedented spent fuel and HLW [high-level radioactive waste] shipping campaign required to implement the Proposed Action include costs and impacts associated with:

• real time vehicle tracking and the associated costs

• vehicle inspection (legal-weight trucks and heavy-haul trucks)

• equipment (initial purchase, maintenance, and replacement)

• ports of entry and vehicle inspection facilities at intermodal transfer stations

• training (initial first responder, advanced training, and ongoing training)

• accidents and incidents

• emergency response equipment and training

• private/government agency emergency response personnel

• safe havens

• designated and alternative routes

• en route repair facilities, towing of vehicles, and availability of parts to repair trucks

• security of shipping casks during en route repair of heavy-haul trucks

• possible acts of sabotage

• health exposure issues to personnel

None of these costs/impacts on the State of Nevada and local governments are addressed in the Draft EIS.

<u>Response</u>
In response to this and similar comments, DOE has provided additional information in Appendix M of the EIS on the proposed operational protocols for shipments, including planning and mobilization, en route operations, and postshipment activities. This information indicates that DOE and its Regional Servicing Contractors would perform most of the activities identified by the commenter. DOE would bear the costs for these activities. Appendix M provides additional information on emergency response planning, technical assistance and funds to states and Native American tribes as prescribed by Section 180(c) of the NWPA, physical protection of the shipments, and liability considerations from accidents.

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds for emergency response training to states and tribes that would have shipments move through their jurisdictions on the way to a repository. A percentage of these funds may be used to obtain equipment. If additional resources are required to deal with an accident, assistance can be requested from Federal agencies. See Appendix M of the EIS for additional information on Section 180(c) and emergency response.

It is the intent of Section 180(c) of the NWPA that first responders be sufficiently trained to safely respond to an incident involving the shipment of spent nuclear fuel and high-level radioactive waste. DOE has committed to providing technical and financial assistance for training as mandated by Section 180(c) of the Act approximately 4 years before shipments commenced. The *Federal Register* notices make it clear that the necessary funding would go to states and tribes. Local governments would not be eligible to receive Section 180(c) grants directly. However, states and tribes would be required to coordinate their planning with local jurisdictions, indicating in the application that the needs of local public safety officials were considered and how the training assistance would be provided to local jurisdictions and their appropriate public safety officials.

DOE recognizes that emergency preparedness capabilities and needs vary from jurisdiction to jurisdiction. To assist states and tribes to determine what their needs are and where the Section 180(c) funds and assistance can best be applied, DOE would provide a one-time planning grant to aid in making this determination.

In the event of an incident or accident involving radioactive materials, states, tribes, and local governments can request assistance from the Federal Government under the Federal Radiological Emergency Response Plan. Assistance is available from 17 different agencies. In addition, DOE maintains eight Regional Coordinating Offices across the country that are ready to provide assistance. Appendix M of the EIS provides information about these resources.

The transportation contractor would be required to provide drivers and crews with specific written procedures that clearly define detailed actions to be taken in the event of an emergency or incident. The Draft Request for Proposals, *Acquisition of Waste Acceptance and Transportation Services for the Office of Civilian Radioactive Waste Management* (DIRS 153487-DOE 1998), focuses in detail on these responsibilities, as well as on other related responsibilities. Appendix M of the EIS discusses carrier and shipper responsibilities regarding emergency situations.

8.9 (5561)
Comment - EIS001887 / 0192
Page 3-99; Section 3.2.1.3 - Barge and Heavy-Haul Truck Transportation

The Draft EIS does not address impacts to infrastructure at either end of the shipping stream (e.g., required improvements at reactor sites or highway upgrades in Nevada).

Response
Heavy-haul truck and barge transport from 19 commercial sites would be needed to move spent nuclear fuel to a railroad access for shipment to the repository. An intermodal transfer would be conducted in existing facilities (terminals and berths) that are remote from public access (see Section J.2 of the EIS).

Nevada highways would be upgraded for heavy-haul truck use, if heavy-haul truck transport was the mode selected (see Section 6.3.3.1 of the EIS). Upgrades would include reconstruction of some highway sections, especially in areas where spring and fall thaws and freezes make highways susceptible to damage by heavy vehicles. In addition, new turnout lanes at frequent intervals along two-lane highways would be constructed to allow other traffic to pass the slower heavy-haul vehicles. Highway shoulders would be widened and road surfaces would be improved in many areas.

Cost estimates developed for highway upgrades associated with heavy-haul truck transport scenarios include costs for annual maintenance of the roads used. *Cost Estimate for Heavy Haul Truck Transportation* (DIRS 154675-Ahmer 1998) includes a detailed cost estimate for the design, construction, and management of the initial road upgrades for public roads for each of the five heavy-haul truck transport routes. The estimated costs shown in Section 6.3.3 of the EIS are based on those detailed estimates, which include lane widening, truck lane and turnout construction, pavement upgrades, intersection upgrades, and shoulder upgrades.

8.9 (5733)
Comment - EIS001887 / 0341
Page 6-105; Section 6.3.3.2.1

Socioeconomics

Cost figures shown for upgrading the Caliente route are significant understatements. It is likely that the State of Nevada will require extensive lane additions and widening along most of the route in both directions between Caliente and Yucca Mountain. Without such additions, the presence of daily heavy-haul trucks coming and going along the narrow, rural highways would create hazards and cause major disruption along impacted highways. Costs for upgrading the Caliente route alone are likely to be upwards of $800 million.

The Draft EIS also fails to assess costs and impacts of upgrading an alternative to the Caliente heavy-haul truck route that can be used when the primary route is unavailable (due to weather, construction, accidents, etc.). To be functional, a heavy-haul truck transportation system must have at least two functional routes. Both routes will require extensive upgrades and improvements. Costs and impacts for both must be assessed in the EIS.

Response
Nevada highways would be upgraded for heavy-haul truck use, if heavy-haul truck transport was the mode selected (Section 6.3.3.1 of the EIS). Upgrades would include reconstruction of some highway sections, especially in areas where spring and fall thaws and freezes make highways susceptible to damage by heavy vehicles. In addition new turnout lanes at frequent intervals along two-lane highways would be constructed to allow other traffic to pass the slower heavy-haul vehicles. Highway shoulders would be widened and road surfaces would be improved in many areas.

Cost estimates developed for highway upgrades associated with heavy-haul truck transport scenarios include costs for annual maintenance of the roads used. The *Nevada Transportation Engineering File* Table of Contents/ Summary (DIRS 154695-Ahmer 1998), includes a detailed cost estimate for the design, construction, and management of the initial road upgrades for public roads for each of the five heavy-haul truck transportation routes. The estimated costs shown in Section 6.3.3.2.1 of the EIS are based on those detailed estimates, which include lane widening, truck lane and turnout construction, pavement upgrades, intersection upgrades, and shoulder upgrades. As shown in Table 2.5 of the EIS, an $800 million cost is identified; this cost estimate is based on construction of a branch rail line, should rail be selected as the transportation mode.

The transportation logistics for shipment of casks is flexible enough to ensure that any temporary conditions that cause the preferred routes to be unavailable for heavy-haul truck transport traffic would not affect the overall shipment process. Shipment logistics would be rigorously integrated between generator sites, carriers, the State of Nevada and the repository, and contingency plans would be developed for temporary stoppage of shipments anywhere in the system. Therefore, additional fully upgraded routes would not be necessary.

8.9 (5784)
Comment - EIS001887 / 0379
Page J-89; Table J-37 – Potential Road Upgrades for Caliente Route

The Draft EIS does not properly evaluate a range of costs for required infrastructure upgrades along the Caliente HHT [heavy-haul truck] route. Aside from construction of a short bypass in Beatty, the Draft EIS assumes that the Caliente HHT route will require only moderate pavement upgrade turnouts every 20 miles. (p. J-89) Preliminary analysis by NDOT [Nevada Department of Transportation] indicates that the life cycle costs of such upgrades may be $450-500 million. Additional upgrades may be necessary for safety and traffic control, as well as to reduce routine radiological exposures and perceived risk impacts. The State of Nevada has identified 13 route segments, with a total length of 92 miles, where slow lanes would likely be required on both sides of the road, at a cost of at least $100 million in addition to pavement upgrades. DOE must reexamine its minimum infrastructure upgrade assumptions and costs. A bounding analysis should estimate the cost of constructing slow traffic lanes on both sides of the road for the entire 331 mile route. DOE should also investigate the costs and benefits of constructing bypasses to avoid the U.S. 6 intersection with U.S. 95 in Tonopah and the extreme right turn on U.S. 95 in Goldfield.

Response
The Nevada Transportation Engineering File, *Cost Estimate for the Heavy Haul Truck Transport Design* (DIRS 154675-Ahmer 1998), includes a detailed cost estimate for the design, construction, and management of the initial road upgrades for public roads for each of the five heavy-haul truck transport routes. The estimated costs shown in Section 6.3.3.2.1 of the EIS are based on those detailed estimates, which include lane widening, truck lane and turnout construction, pavement upgrades, intersection upgrades, and shoulder upgrades. Cost estimates developed for highway upgrades associated with heavy-haul truck scenarios include costs for annual maintenance of the roads used.

Table J-91 in the EIS summarizes the proposed Caliente Route road upgrades. The details for the costs associated with those upgrades are identified in the *Cost Estimate for the Heavy Haul Truck Transport Design* (DIRS 154675-Ahmer 1998), which shows that the estimated total lifecycle costs for road upgrades, maintenance, and repair over the 24-year Proposed Action would be $239 million in 1998 for the Caliente heavy-haul truck route. As shown in the cost estimate:

- Truck turnouts are proposed on each side of the road at 32-kilometer (20-mile) intervals for the route segment from Caliente to Tonopah, and at 8-kilometer (5-mile) intervals for the route segment between Tonopah and Yucca Mountain. This results in 66 truck turnouts being constructed, at a length of 300 meters (1,000 feet) per turnout, for a total of 20 kilometers (12.5 miles) of four-lane sections along the route.

- More than 50 kilometers (31 miles) of truck passing lanes are proposed in addition to the turnouts.

- More than 290 kilometers (180 miles) of roadway would be widened to provide a minimum of 4.3-meter (14-foot)-wide lanes and 0.6-meter (2-foot)-wide paved shoulders.

- More than 270 kilometers (170 miles) of road would be completely reconstructed to eliminate frost restrictions for heavy-haul vehicles.

- Sixteen major box culverts and more than 280 standard culverts would be upgraded.

- Four major intersections (including the intersection at Tonopah and the curve at Goldfield) would be reconstructed to allow the heavy-haul transporters to maneuver safely and with minimal impact to other traffic.

- An alternate route through Beatty would be constructed to minimize impacts to traffic at the downtown corner of U.S. 95.

8.9 (5990)
Comment - EIS001879 / 0015
The Draft EIS does not fully or adequately address the costs and consequences of potential transportation incidents and accidents in the site county. Even without radiation release, these costs include: 1) emergency response and evacuation (by responders who have been trained and equipped to safely and effectively perform such functions); 2) site cleanup; 3) potential effects on the business and/or value of adjacent property. A revised EIS should identify and estimate the potential costs and consequences of transportation incidents and accidents in Nye County.

Response
The NWPA requires DOE to provide technical and financial assistance to states and Native American tribes for training public safety officials of appropriate units of local government through whose jurisdictions it would transport spent nuclear fuel or high-level radioactive waste [see Sections 116(c) and 180(c) of the Act]. Training would cover procedures for safe routine transportation of these materials and for dealing with emergency response situations. The Nuclear Waste Fund would be the source of funds for work performed under these provisions of the Act.

The EIS describes DOE policies for providing funding and technical assistance to eligible states and tribes for transportation training and emergency response planning (see Appendix M of the EIS for more details).

In the Final EIS, DOE has expanded the socioeconomic discussions in Chapter 3 to clarify the basis for understanding the magnitude of potential impacts described in Chapter 4. These discussions include a projection of baseline parameters through 2035 based on the most recently available information and assumptions. The EIS now provides a quantified estimate, to the extent possible, of school enrollment and changes in law enforcement and public service personnel requirements. The socioeconomic impact sections analyze impacts on businesses and community infrastructure for each alternative (see Section 6.3.3 of the EIS).

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in

predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Section 2.5.4 and Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty
- Much of the uncertainty is irreducible, and
- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

As discussed in Chapter 6 and Appendix J of the EIS, the risk of a severe accident involving the release of radioactive materials is very small, about 1 to 2 in 10 million per year. DOE is aware of the potential consequences of such an accident and has plans for training emergency responders [see the discussion on NWPA Section 180(c) in Appendix M] and has systems in place to support states during emergencies, if requested (see Appendix M). In response to public comments, DOE has included a discussion on the range of potential costs of cleanup, following a severe transportation accident, in Appendix J.

If actions compromised the integrity of the repository, mitigation activities would be funded under either the Nuclear Waste Fund or the Price-Anderson Act. The Price-Anderson Act provides liability coverage for commercial activities operating under a license from the Nuclear Regulatory Commission and for DOE activities. It establishes a system of private insurance and Federal indemnification that generally ensures that as much as $9.43 billion is available to compensate for damages suffered by the public from a nuclear incident, regardless of who causes the damage. Payment would be from Federal funds or, if public liability arose from activities funded by the Nuclear Waste Fund (for example, activities at a geologic repository), from that Fund. The liability of all responsible parties is limited to the amount of coverage provided by the Price-Anderson system. State and local governments cannot be required to provide additional compensation. DOE has revised the EIS to include more details about indemnification under the Price-Anderson Act (see Appendix M).

Costs from accidents during transportation involving a radiological release or a precautionary evacuation would be covered under the Price-Anderson Act. Costs from accidents or incidents that did not involve a radiological release would be covered under the carrier's insurance. In addition to Price-Anderson indemnification, the Motor Carrier Act of 1980 and its implementing regulations (49 CFR Part 387) require motor vehicles carrying spent nuclear fuel or high level radioactive waste to maintain financial responsibility of at least $5 million, which would be available to cover public liability from a non-nuclear incident and for environmental restoration. Federal law does not require rail, barge, or air carriers of radioactive materials to maintain liability coverage, although these carriers often voluntarily carry such insurance. Regardless of whether they had insurance, a radioactive materials incident involving these carriers would be subject to state law applicable for any other type of accident. See Appendix M of the EIS for more information.

As for mitigating accidents, the DOE Regional Servicing Contractors would be required to provide detailed written procedures for how they would respond to an incident and arrange for repair or replacement of equipment or recovery as appropriate. In accordance with ANSI N14-27 (DIRS 156289-ANSI 1987), the carrier is expected to provide appropriate resources for dealing with the consequences of an accident, isolating and cleaning up contamination, and maintaining working contact with the responsible governmental authority until the latter has declared the incident to be satisfactorily resolved and closed (see Appendix M of the EIS for more details).

8.9 (6885)
Comment - EIS001611 / 0001
Illinois may well be, I think, the only state in the country that has a cabinet level Department of Nuclear Safety. And in this instance I want to give them praise, because 15 years ago when they were formed, one of their members named John Cooper, who was formerly with NRC [Nuclear Regulatory Commission], was the one who insisted that all high level RAD [radioactive] shipments be escorted into, through and out of Illinois.

Now, those were in the days when shipments were one maybe every six to eight weeks for maybe a two- or three-month period. Now we are talking something quantitatively much greater. I just confirmed, five casks per day is orders of magnitude, almost, difference.

The concern, and this gets back to the EIS, though, is what is the cost and who bears the cost for these escort services that the Department of Nuclear Safety believes is essential to protect the public health and safety in Illinois? Well, if you take the numbers of projected shipments and over the 24-year period of the project, you have to take into account every one of those shipments will involve a minimum of seven state, federal and local agencies, including the governor's office.

I have repeatedly asked DNS if they could give me a ball park figure of what it would cost per shipment if you added all the costs. They haven't been able to come up with that yet. I hope someone will get that on the record at some point. But if you assume a $10,000 cost, which I believe is probably very low, given that seven major agencies are involved per shipment, you come out with a staggering figure of $312 million over the 24-year period of this project just for Illinois.

And if you decide that you want to give equal protection to the other 43 affected states, this gives you a maximum boundary of 13 and a half billion dollars just to escort these shipments around the country. I think this is something that the legislators, who will be taking up the Yucca Mountain Mobile Chernobyl bill tomorrow, really need to take a look at. But I do want to go on the record lauding the Department of Nuclear Safety for their escort efforts.

Response
DOE contractors would be responsible for acquiring, training, overseeing, and paying security and escort personnel. This means that DOE would ultimately bear the costs of escorts. The Department has identified this expense for those states currently requiring a permit (escort costs) for truck and rail shipments.

8.9 (8774)
Comment - EIS001816 / 0021
Cost Effectiveness: Truck transport can be more expensive than rail due to the greater number of shipments. The extent of combining rail and truck (intermodal) will affect the total cost of the program. The DEIS must define how a cost reduction to the YM [Yucca Mountain] program can be achieved with rail transport, and the projected cost to construct and operate an intermodal facility in Nevada.

Response
Section 2.1.5 of the EIS provides the estimated costs associated with the proposed action, including transportation costs in Nevada, estimated to be about $800 million. Two documents cited in the section describe transportation costs in detail:

- *Cost Estimate for the Heavy Haul Truck Transport Design* (DIRS 153442-Ahmer 1998)
- *Nevada Transportation Study Construction Cost Estimate* (for rail) (DIRS 118012-CRMWS M&O 1998)

The three mode options for transportation, mostly legal-weight truck, mostly rail to heavy-haul truck in Nevada, and mostly rail, have all been evaluated for estimated total cost. The cost comparison of mostly heavy-haul truck using an intermodal transfer in Nevada to that of a mostly rail scenario shows that the construction of an initial branch rail line to the proposed repository makes the mostly rail scenario more expensive in initial costs. However, the mostly heavy-haul truck scenario would be considerably more expensive than rail in the operations and maintenance areas. The result is that rail and heavy-haul truck transport system costs would be in the same rough order of magnitude, for similar transport lengths, over the life of the repository operation.

Construction and operations and maintenance costs for the intermodal transfer station associated with heavy-haul truck transport are included in the summaries shown in Item 1 above. The detailed cost estimate for construction and operation and maintenance of the intermodal transfer station is included in *Intermodal Transfer Station Preliminary Design* (DIRS 104849-CRWMS M&O 1997).

8.9 (8992)
Comment - EIS001040 / 0025
How will federal responsibility and funding be utilized by:

1. Carriers; on and off site during normal operations and accidents
2. State, tribal and local governments on and off site (for example 12 miles from an accident).

Response
Carriers of spent nuclear fuel and high-level radioactive waste would perform the transportation work under a contract with DOE. The carriers would have the responsibility for performing all transportation work in compliance with Federal, state, and local regulations, as applicable. As contractors to DOE, the carriers would be funded by DOE, and would be accountable to DOE for meeting all regulatory requirements (see Appendixes J and M of the EIS for more details).

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training for public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel or high-level radioactive waste. Training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. The Nuclear Waste Fund would be the source of funds for work carried out under this subsection.

Office of Civilian Radioactive Waste Management; Safe Routine Transportation and Emergency Response Training; Technical Assistance and Funding, Notice of Revised Proposed Policy and Procedures (DIRS 104741-DOE 1998) describes the DOE policies for providing funding and technical assistance to eligible states and tribes for transportation training and emergency response planning.

8.9 (9489)
Comment - EIS001888 / 0152
[Summary of comments noted by Clark County Nuclear Waste Division staff at various citizens' meetings.]

Who will pay for the maintenance and/or upgrades to roads, bridges, etc. that will be impacted by the transportation?

Response
DOE assumed (DIRS 154675-Ahmer 1998) that road upgrades and maintenance would be funded by the Nuclear Waste Fund under the NWPA. If future road upgrades were required to install additional turnouts, because of increased traffic in areas where the heavy-haul trucks would be operating, DOE would work with the State of Nevada to ensure funding for that construction.

8.9 (9602)
Comment - EIS001888 / 0277
The Full Costs of Heavy Haul Transportation

The DEIS presents misleading cost data for heavy haul transportation. The engineering analysis presented to support the cost data ignores the costs of obtaining right-of-way to build an additional travel lane on each side of the northern and western beltways. This is a particularly serious problem due to the nature of the land uses adjacent to the beltways. It is likely that acquiring right of way for additional travel lanes through expensive residential, industrial and high-density commercial land uses will be extraordinarily high. The DOE has presented a fundamentally misleading estimate of the costs of the proposed heavy haul program by failing to include the right of way costs necessary to implement the program.

The last time similar heavy haul transporters traversed the State of Nevada was in 1993 when two autoclaves were moved to a mining site. The transporters themselves moved more slowly than anticipated and caused severe damage to many bridges and culverts en route. The DEIS should consider these effects and account for the likely costs of improving Clark County's infrastructure.

Response
The assumption stated in Section 2.1.3.3 of the EIS is that the planned Las Vegas Beltway (northern, western, and southern sections) would be completed before DOE could begin transporting high-level nuclear waste by 2010. To date, Clark County has acquired all the necessary land for this Beltway. DOE's intent was to utilize the full Beltway that lies within the present acquired land. Cost estimates used by the Department for completion of the Beltway were obtained from Clark County (DIRS 103710-Clark County, 1997 estimates) and amounted to approximately $130 million not including major interchanges. A recent report prepared for the City of North Las Vegas (DIRS 155112-Berger Group 2000) estimates the cost of completing the northern section of the Las Vegas Beltway to be $525 million including two major interchanges. Using the same assumptions used in the City of North Las Vegas estimate, completion of the entire Beltway would cost about $1,250 million.

Heavy-haul truck cost estimates include the cost of upgrading existing roads. These cost estimates are contained in Section 6.3.3.1 of the EIS for each of the five implementing alternatives and are: Caliente, $120 million; Caliente/Chalk Mountain, $63 million; Caliente/Las Vegas, $93 million; Sloan/Jean, $20 million; and Apex/Dry Lake, $20 million.

The autoclave loads are not directly comparable to the cask loads in that the autoclave weights are significantly higher than cask weights (2 to 3 times heavier).

8.9 (11877)
Comment - EIS001887 / 0393
The maximum cost estimate of $800 million for Nevada rail transportation, based on an estimate for the Caliente route, is completely unrealistic unless DOE plans to sacrifice safety by constructing a rail line that barely meets the minimum Federal Railroad Administration requirements. Nevada is particularly concerned that DOE contractor studies have recommended operating the line without a state of the art computerized train control system. DOE's cost saving measures include shipping loaded rail casks in general freight trains, which will require switching cars at the connection point. DOE's proposal to routinely park loaded rail cask cars on a side track for up to 48 hours is unprecedented and will result in a separate legal challenge.

Response
Section 2.1.5 of the EIS summarizes the estimated costs of the Proposed Action based on estimates developed in the referenced EIS cost summary report. The estimated cost of Nevada transportation would be $800 million. The five rail corridors have been developed to a conceptual design level of detail. The basis for this cost estimate is derived from rail alignment analysis which contains design inputs, such as the American Railway Engineering Association, and U.S. Department of Transportation regulations using the Federal Railway Administration Track Safety Standards. It is DOE's intent to meet or exceed applicable regulatory requirements concerning rail design, construction, and operations.

The conceptual design level of detail cost estimates have been reviewed by an independent architectural engineering company as part of the Total System Life-Cycle Cost process. The review team concluded that they had a high level of confidence in the estimates based on the thoroughness of the estimating work and the methodical approach used.

DOE has gone on record, in its Draft Request for Proposals, *Acquisition of Waste Acceptance and Transportation Services for the Office of Civilian Radioactive Waste Management* (DIRS 153487-DOE 1998), that the Regional Servicing Contractor would make maximum use of special train services wherever reasonably possible.

The U.S. Department of Transportation regulation (49 CFR 174.14) addresses rail shipments in yards, transfer stations, or interchange points, and permits a maximum time limit of 48 hours, except where weekly or biweekly service is available. This period of time does not include Saturdays, Sundays, and holidays. Should general freight be chosen as the method of shipment by rail, this regulation would come into play more so than if dedicated trains were used.

The position of DOE in its Draft Request for Proposals for transportation proposes the use of special trains and advanced rail technology for shipping spent nuclear fuel and high-level radioactive waste, as long as the operator can demonstrate this option is cost-effective and lessens the potential for adverse railroad incidents.

8.10 Transportation Accidents

8.10 (54)
Comment - 7 comments summarized
Several commenters expressed concern about the validity of the accident data and statistics used in the EIS analyses and questioned why state-specific data were not used. Another commenter suggested that local transportation agencies should have been contacted rather than just the State Departments of Transportation. One commenter asked about the number of accidents per year. A commenter from Georgia demonstrated that the Draft EIS provided very little state-specific data, which the commenter stated should have been included. Another commenter suggested that accident rates for hazardous material shipments should be used rather than overall accident rates and that costs of accidents should be provided.

Response
In estimating transportation impacts, the EIS used state-specific highway and railroad accident rates for 1994 through 1996. These data were obtained from the U.S. Department of Transportation Motor Carrier Safety Information System and the Federal Railroad Administration, respectively. To supplement these data, DOE requested that the 48 contiguous states provide truck and rail transportation accident data for use in the EIS. Five states responded with highway data – Nevada, California, Illinois, Nebraska, and South Carolina. No state submitted railroad data. DOE compared the data provided by the five states to the data from the Motor Carrier Safety Information System and found that the differences were small. A detailed discussion of this evaluation is provided in Section J.1.4.2.3 of the EIS. DOE did not use local data because the Motor Carrier Safety Information System and the Federal Railroad Administration data are aggregations of local data and, therefore, include these data.

DOE did not use data for hazardous materials incidents to estimate transportation impacts because many times the criteria used for reporting incidents are not relevant to incidents that could damage a spent nuclear fuel cask. For example, gasoline tanker truck spills, which are reported as incident, are not accidents that are comparable to those that might damage a spent nuclear fuel cask. In any case, the Motor Carrier Safety Information System would include these types of incidents in the accident rate if they resulted in a fatality or injury, or if the damage to the gasoline tanker truck was severe enough to result in the gasoline tanker truck being towed away.

Special requirements imposed on the transportation of spent nuclear fuel and high-level radioactive waste, as discussed in Section M.2 of the EIS, would be expected to reduce the accident rates for shipments to Yucca Mountain to below those assumed in the EIS and those experienced by routine hazardous waste shipment.
In response to public comments, DOE has added maps of the routes analyzed in the EIS, the state-by-state number of shipments and impacts, and a discussion on the range of potential costs of cleanup following a severe transportation accident to the EIS (see Section J.4).

8.10 (68)
Comment - 14 comments summarized
Commenters stated that the EIS does not provide a description of the maximum reasonably foreseeable accident. A commenter stated that a description of other accidents and incidents that are less than the maximum reasonably foreseeable accident should be provided to determine the impact of these on emergency response systems. A commenter requested DOE to analyze specific accident scenarios in Nevada. Another commenter indicated that the EIS generalizes that the likelihood of an accident in Nevada would be less than that for the rest of the Nation. Nevada commenters stated that the EIS must consider a spent nuclear fuel and high-level radioactive waste truck colliding head-on with another truck loaded with commercial or military explosives, with a truck or rail cask involved in a massive infrastructure failure (for example, bridge collapse) and a natural disaster (for example, a flood), and a rail or truck cask involved in an accident with a military aircraft. Another commenter stated that DOE has, in its accident analysis, given credence to the virtually impossible scenario and also stated that the chances that

such a worst case accident could occur essentially is zero. Another commenter stated that the Draft EIS “tweaks” the accident figures to understate the transportation risks to the actual people who will be affected.

Response

In response to public comments, DOE has substantially revised and expanded the transportation accident analyses in the EIS. Since DOE issued the Draft EIS, Sandia National Laboratories completed a study for the Nuclear Regulatory Commission, *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). The purpose of the study was to reexamine the risks associated with the transportation of spent nuclear fuel by truck and rail and compare the results to those published in NUREG-0170 (DIRS 101892-NRC 1977) and *Shipping Container Response to Severe Highway and Railway Accident Conditions* (DIRS 101828-Fischer et al. 1987; also called the Modal Study). The Draft EIS used the techniques, assumptions and data from the Modal Study. The new study concluded that earlier studies made a number of very conservative assumptions about spent nuclear fuel and cask responses to accident conditions, which caused their estimate of accident source terms, accident frequencies, and accident consequences to be very conservative (tended to overstate the risk) (Sprung et al. 2000).

DOE has revised Section J.1.4.2 of the EIS to include a description of the maximum reasonably foreseeable accident. As in *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000), accidents are not described in terms of specific circumstances, because various accidents could lead to the same combination of cask failure mechanism, impact velocity range, and temperature range. However, detailed “event trees” are presented for truck and rail accidents, as in Figures 7.3 and 7.4 of Sprung et al. (2000). These event trees illustrate the different combinations of events that occur during an accident. This approach to accident analysis precludes the necessity for analyzing numerous specific cases involving various collisions (such as airplanes and military trucks with explosives), various natural disasters, specific locations (such as mountain passes), or various infrastructure accidents. They are all covered by the considerations of impact velocities and temperatures on a cask. Some of these accidents would result in impact velocities and temperatures that exceed the Nuclear Regulatory Commission cask performance standards in 10 CFR Part 71.

The conditions of the maximum reasonably foreseeable accident analyzed in the EIS envelop conditions reported for the Baltimore Tunnel fire (a train derailment and fire that occurred in July 2001 in a tunnel in Baltimore, Maryland). Temperatures in that fire were reported to be as high as 820ºC (1,500ºF), and the fire was reported to have burned for up to 5 days.

The text box in Section 6.3.1.3.2 of the EIS discusses the likelihood of the maximum reasonably foreseeable accident occurring in Nevada. This is an extremely unlikely accident with a likelihood of occurrence of less than 2.8 in 10 million per year for the national transportation routes. The likelihood of this accident is directly related to the total number of shipment miles during the estimated 24-year duration of the shipment campaign. Total shipment miles outside Nevada greatly exceed the total shipment miles inside the State. Therefore, the EIS is correct in stating that it is more likely that this type of accident would occur outside Nevada than inside the State, and it is unlikely that a location in Nevada “will be the most likely setting in the nation for a worst-case accident.”

The shipping casks used to transport spent nuclear fuel and high-level radioactive waste would be massive and tough with design features that complied with strict regulatory requirements that would ensure the casks performed their safety functions even when damaged. Numerous tests and extensive analyses have demonstrated that casks would provide containment and shielding even under severe accidents conditions. Based on the revised analyses in Sprung et al. (DIRS 152476-2000)., DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the more than 2,700 shipments of spent nuclear fuel over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

DOE could decide to use a dedicated train that carried only the material to be shipped to Yucca Mountain, or could elect to move the spent nuclear fuel and high-level radioactive waste in general freight. If the material was shipped as general freight, the position of the spent nuclear fuel or high-level radioactive waste car in the train would be regulated by 49 CFR 174.85. This regulation requires that railcars placarded "radioactive" must be separated from a locomotive, occupied caboose, or carload of undeveloped film by at least one nonplacarded car, and it cannot be placed next to other placarded railcars of other hazard classes.

8.10 (145)

<u>Comment</u> - 13 comments summarized

Commenters expressed concern about the impacts of contamination of surface water or groundwater from a transportation accident. Commenters expressed concern with impacts to surface-water bodies such as local rivers (for example, the Muddy and the Humboldt), major rivers (for example, the Mississippi and the Colorado), Lake Mead, and wellhead areas of public water supplies as well as groundwater systems. Other commenters expressed concern about comprehensive emergency planning and response capabilities, and their funding, and potential mitigation measures and who would implement them. Other commenters expressed concern about effects on food and natural resources affected by releases to surface- and groundwater bodies.

<u>Response</u>

The shipping casks used to transport spent nuclear fuel and high-level radioactive waste would be massive and tough with design features that complied with strict regulatory requirements that would ensure the casks performed their safety functions even when damaged. The casks would be designed to be watertight even after a severe accident. Furthermore, the high-level radioactive waste would be in a solid form that would not be easily dispersed (ceramics, metals, or glasses).

Numerous tests and extensive analyses, using the most advanced analytical methods available, have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents. Since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

The EIS does not specifically analyze a transportation accident involving contamination of surface water or groundwater. Analyses performed in previous EISs (see Section 1.5.3 and Table 1-1 of this EIS) have consistently shown that the airborne pathway has the greatest potential for exposing large numbers of people in the event of a release of radioactive materials during a severe transportation accident. An analysis of the potential importance of water pathway contamination for spent nuclear fuel transportation accident risk using a worst-case water contamination scenario (DIRS 157052-Ostmeyer 1986) showed that the impacts of the water contamination scenario were about one-fiftieth of the impacts of a comparable accident in an urban area. Thus, it is extremely unlikely that an accident that resulted in a cask falling into any body of water would result in surface-water contamination, let alone groundwater contamination.

As discussed in Section J.1.1.4, the EIS does not specifically analyze a transportation accident involving contamination of surface-water or groundwater. While small particles generated by the impact forces and driven out of the cask by a severe fire (which would be extremely unlikely because there would be no fuel to sustain an engulfing fire of the type required to release radioactive material) could ultimately end up contaminating soils and surface waters outside the cask, this would not be the dominant pathway for radiological exposure and uptake after an accident.

A state is the primary authority responsible for the health and safety of its population and therefore, generally has the primary responsibility in responding to accidents that occur in its jurisdiction. However, a state can request assistance from Federal agencies as it judges what would be appropriate and needed to effectively respond to an accident. DOE, along with other Federal agencies, has the ability to respond quickly to radiological emergencies in any state, if requested. In addition, under U.S. Department of Transportation regulations, shippers and transporters have responsibilities for emergency response and cleanup. More information on emergency response is provided in

Appendix M of the EIS. In addition, Section M.8 discusses the broad indemnification for liability of all personal injury and property damage, including costs of emergency response, evacuation, and postaccident recovery and remediation activities, under provisions of the Price-Anderson Act and state law.

8.10 (148)
Comment - 17 comments summarized
Commenters stated that emergency management impacts are a critical component of the EIS and stated that the Draft EIS was inadequate because the economic impacts of cleaning up a radioactive release that could result in roads and businesses being shut down was not estimated. Other commenters stated that cleanup activities could cost hundreds of millions or billions of dollars. Others stated that no clear description of the maximum reasonably foreseeable accident was provided; nor were the costs to mitigate or to recover from that accident evaluated. Commenters stated that the 1986 Environmental Assessment for the Yucca Mountain site (DIRS 100136-DOE 1986) developed a worst-case accident scenario that resulted in the contamination of a 110-square-kilometer (42-square-mile) area, would require 462 days and cost $620 million to clean up in 1985 dollars, and stated that the Draft EIS should have provided the same information. Other commenters stated that if the RADTRAN code was run with updated dollar inflators to 2000, the costs could range from $2.5 billion to $9.4 billion. Commenters asked if such an accident was to occur, how large an area could be affected and stated that in an urban area such as Las Vegas, the impacts would be incredible. Commenters stated there are no known statistics as to the amount of damage that would occur in the area of the accident and questioned what it would mean for a community to experience such an accident and asked how long would people have to be evacuated, would it ever be safe for people to return, and what would the resulting health impacts be?

Response
In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments, and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $9.4 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 included data compiled from case studies involving actual cleanup of radioactive contamination. The studies address consequences for releases of radioactive materials in communities.

Although the studies project high costs for cleanup following severe accidents, the accidents evaluated would be very unlikely and, as a consequence, DOE believes the economic risks of transportation accidents would be very small. The shipping casks used to transport spent nuclear fuel and high-level radioactive waste would be massive and tough with design features that complied with strict regulatory requirements that would ensure the casks performed their safety functions even when damaged. Furthermore, the high-level radioactive waste would be in a solid form that would not be easily dispersed (ceramics, metals, or glasses).

Numerous tests and extensive analyses, using the most advanced analytical methods available, have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents. Since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

DOE anticipates that the economic costs of accidents where there was no release of radioactive material would not be substantial. The health and safety consequences of a maximum reasonably foreseeable transportation accident are discussed in Section 6.2.4.2 of the EIS. The EIS analysis did not include the restorative effects of postaccident recovery, remediation, or cleanup in estimating the health and safety impacts, and would, therefore, tend to overestimate, rather than underestimate, actual radiological impacts.

DOE believes that the EIS adequately analyzes transportation-related impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site was approved. See the introduction to Chapter 8 of this Comment-Response Document for more information.

8.10 (154)
Comment - 10 comments summarized
Commenters expressed concern about military aircraft crashes into spent nuclear fuel and high-level waste storage facilities and shipping casks during transportation. In addition, commenters expressed concern about accidents involving live military ordnance (for example, heat seeking missiles) or practice weapons on storage facilities and shipping casks during transportation. Commenters indicated that most transportation routes, rail and truck, cross or approach Nellis Air Force Base or Range, Fallon Naval Air Station, or other air training and practice ranges and, therefore, mitigative measures must be considered. Commenter concerns were for an understanding of potential impacts on cargo and on people, and impacts on military operations.

Response
An aircraft crash into a spent nuclear fuel or high-level radioactive waste cask would be extremely unlikely because the probability of a crash into such a relatively small object, whether stationary or moving, is extremely remote. Nonetheless, Section J.3.3.1 of the EIS analyzes consequences of an accident in which a large commercial aircraft or of a military aircraft is hypothesized to impact directly onto a cask. The analysis showed that the heavy shield wall of a cask could not be breached by the center shaft's penetrating force. With the exception of engines, the relatively light structures of an aircraft would be much less capable of causing damage to a cask. A resulting fire would not be sustainable or able to engulf a cask long enough to breach the integrity of the cask.

System malfunctions or material failures that could result in either an accidental release of ordnance or release of a practice weapon were discussed in the *Renewal of the Nellis Air Force Range Land Withdrawal: Legislative Environmental Impact Statement* (DIRS 103472-USAF 1999), and the *Final Environmental Impact Statement, Withdrawal of Public Lands for Range Safety and Training Purposes, Naval Air Station Fallon, Nevada* (DIRS 148199-USN 1998). The *Special Nevada Report* (DIRS 153277-SAIC 1991) states that the probability of dropped ordnance resulting in injury, death, or property damage ranges from about 1 in 1 billion to 1 in 1 trillion per dropped ordnance incident, with an average of about 1 in 10 billion per dropped ordnance incident. Less than one accidentally dropped ordnance incident is estimated per year for all flight operations over the Nellis Air Force Range (now called the Nevada Test and Training Range) and Naval Air Station Fallon. All of these analyses are incorporated in this EIS by reference. Spent nuclear fuel transportation would not affect the risk from dropped ordnance or aircraft crashes. The EIS does not evaluate radiological consequences of an impact of accidentally dropped ordnance on a shipping cask because the probability of such an event (about 1 in 10 billion per year) is so extremely low that it is not reasonably foreseeable. Accordingly, the Department believes there would be no need for associated mitigation measures and no impacts on military operations.

8.10 (155)
Comment - 14 comments summarized
Commenters stated that the Draft EIS is deficient in that it does not adequately address factors that could lead to human error and effects of organizational behavior (such as not following regulations or guidelines) on the spent nuclear fuel and high-level radioactive waste transportation system. That is, it is not adequate to state, as the Draft EIS does, that utilizing trained, qualified, and aware personnel would reduce accident risk. Several recent catastrophic accidents were offered as evidence of the human error factor (for example, Three Mile Island, Chernobyl, Bhopal, and *Challenger*). Commenters stated that a detailed description of the transportation system would be necessary for an analysis of the effect of human error on transportation risk and that such a description was not in the Draft EIS. Commenters stated that the focus of human error analyses should be on the interaction between human beings and the system of equipment, facilities, procedures, and environments. Clark County commenters described, in some detail, the various categories of human and organizational behavior that must be addressed along with examples from the DOE low-level radioactive waste transportation system. Specific issues identified included individual management behavior, institutional arrangements, organizational errors and factors, operator behavior, perceptual judgement, risk taking, accident rates and mitigation, design specifications, quality assurance, equipment manufacturing, system descriptions, inexperienced drivers, and rail and highway infrastructure.

Commenters wanted answers to several questions, including: what is the contribution of human factors (for example, errors) to truck and rail accident rates? How can this contribution be mitigated? Is the effect of human factors reflected in the accident rates used in the Draft EIS? Does the DOE transportation system have a positive or negative effect on these factors? Does the design of the rail and highway infrastructure exacerbate or mitigate these effects? How do human factors play in the privatization of the DOE spent nuclear fuel and high-level radioactive waste transportation system?

Response
Section J.1.4.2.1 of the EIS discusses potential effects of human error on accident probabilities and impacts. In addition, that section discusses how effects of human factors and errors are included in the risk. For example, the truck and rail accident rates used in the EIS include accidents involving all causes, including human error. Thus, human error is factored into accident rates and ultimately transportation risk. The accident rates used in the analysis are based on national transportation statistics, although use of highly trained and qualified personnel in transporting spent nuclear fuel and high-level radioactive waste, and preferred routes for highway shipments, would tend to mitigate the number and severity of transportation accidents. Use of preferred routes for highway shipments and expeditious routing for rail shipments (see Section J.1.2.2) would result in use of a transportation infrastructure that minimized radiological risk and time in transit. The analysis of transportation impacts did not take credit for these factors. In addition, the effects of emphasizing training and qualification of personnel who would be employed by DOE and contractors to transport spent nuclear fuel and high-level radioactive waste were not given credit in the assessment. Therefore, DOE believes that the accident rates used for analyses might tend to overstate the risk.

As discussed in Section 6.2 of the EIS, national transportation of spent nuclear fuel and high-level radioactive waste would use existing highways, railroads, and waterways. Section 6.3 describes transportation in Nevada that would use a combination of legal-weight trucks and heavy-haul trucks or railroads. Section 2.1.3 present conceptual descriptions of the vehicles that would transport the casks.

In response to public comments, DOE added Appendix M to the EIS to present information intended to assist readers in understanding transportation of spent nuclear fuel and high-level radioactive waste. Section M.3 presents DOE Transportation Practices, which were developed with input from states and other stakeholders. These practices, which would be applicable to contractors who would transport spent nuclear fuel and high-level radioactive waste, address concerns regarding compliance with transportation regulations and measures to reduce the frequency and severity of transportation accidents.

The Nuclear Regulatory Commission is considering including an assessment of the importance of human factors in cask design, manufacturing, and use in its planned Package Performance Study. The planned study, which is scheduled for completion in 2004, will provide an updated evaluation of the level of safety provided by spent nuclear fuel transport packages under a variety of railway and highway accident conditions.

8.10 (156)
Comment - 14 comments summarized
Commenters expressed concern about the use of the Nuclear Regulatory Commission's *Shipping Container Response to Severe Highway and Railway Accident Conditions* (Fischer et al. 1987; also called the Modal Study) in the EIS transportation accident analyses. Commenters stated that the assumptions, data, and models of the study are outdated and that the entire discussion of the Modal Study must be revised to address both the technical and procedural implications of the reassessment of the study currently being conducted by the Nuclear Regulatory Commission. Of particular concern was the design of current casks and the statistics concerning accidents and transportation system conditions. Other commenters expressed concern that only one model and one set of data were used, which did not allow comparison of results from alternative models or data sets. One commenter stated that changing the "reasonably foreseeable" criterion of 1 in 10 million, including proper accident distribution data, including real cask response to accident conditions, and using proper estimations of accident probabilities would make some circumstances in the Modal Study "reasonably foreseeable"; therefore, they must be considered in any acceptable consequence analysis.

Response
In March 2000, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). The purpose of the study was to reexamine the risks associated with

the transport of spent nuclear fuel by truck and rail and compare the results to those published in *Final Environmental Impact Statement on the Transportation of Radioactive Material by Air and Other Modes* (DIRS 101892-NRC 1977) and *Shipping Container Response to Severe Highway and Railway Accident Conditions* (DIRS 101828-Fischer et al. 1987). The new study concluded that both NRC (1977) and Fischer et al. (1987) made a number of very conservative assumptions about spent nuclear fuel and cask response to accident conditions, which caused their estimate of accident source terms, accident frequencies, and accident consequences to be very conservative (tending to overstate the risk). The new study also concluded:

"Based on this more detailed analysis, cask leakage is found to be even less likely than the estimates of the Modal Study, and retention of particles and condensable vapors by deposition onto cask interior surfaces is found to be substantial. Accordingly, both source term probabilities and magnitudes decrease further, and consequently accident population dose risks are reduced further by factors of 10 to 100" (DIRS 152476-Sprung et al. 2000).

DOE has updated the EIS transportation impact analysis to incorporate relevant findings of the updated Nuclear Regulatory Commission analysis. Sections 6.2.4 and J.1.4 of the EIS, concerning analysis of transportation accidents, have been revised to incorporate data from Spring et al. (DIRS 152476-2000). The EIS no longer relies on the data from the Modal Study. [However, data from the Modal Study are used in Spring et al. (2000).] This report contains revised estimates of probable releases from spent nuclear fuel casks during severe transportation accidents that involve long-duration fires accompanied by high impact forces. The effect of incorporating the new analyses was lower estimates for radiological risk than those presented in the Draft EIS.

The Nuclear Regulatory Commission is conducting the Package Performance Study to assess the performance of spent nuclear fuel packages during transportation accidents and to verify assumptions used in Sprung et al. (DIRS 152476-2000). The planned study, which is scheduled for completion in 2004, will provide an updated evaluation of the level of safety provided by spent nuclear fuel transport packages under a variety of railway and highway accident conditions.

8.10 (157)
Comment - 18 comments summarized
Commenters expressed concern about cancer and other detrimental health effects as a result of a transportation accident and about direct exposure to spent nuclear fuel or high-level radioactive waste due to an accident. Various potential short-term and long-term health effects were described to accentuate the concerns.

Response
The shipping casks used to transport spent nuclear fuel and high-level radioactive waste would be massive and tough with design features that complied with strict regulatory requirements that would ensure the casks performed their safety functions even when damaged. Numerous tests and extensive analyses have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents. Since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

The study concluded that in severe accidents cask leakage would be even less likely than previous estimates, such as *Shipping Container Response to Severe Highway and Railway Accident Conditions* (DIRS 101828-Fischer et al. 1987), and retention of particles and condensable vapors by deposition onto the cask interior surfaces would be substantial. The study concluded that: "Accordingly, both source term probabilities and magnitudes decrease further, and consequently accident population dose risks are reduced further by factors of 10 to 100" (DIRS 152476-Sprung et al. 2000).

In response to public comments, DOE has updated the transportation accident impact analyses in the EIS to incorporate the findings of the updated analysis. Sections 6.2.4.2 and J.1.4 of the EIS analyze the potential health impacts of transportation accidents. The EIS evaluates the maximum consequences of such an accident if it occurred. For example, Table 6-14 provides the estimated impacts of the maximum reasonably foreseeable accident for truck transportation. The highest consequences would occur in an urbanized area with a potential for (0.55) latent cancer fatalities. The likelihood of such an accident would be very small, about 2.3 in 10 million years. Table 6-15 presents the same data for the mostly rail scenario. The maximum reasonably foreseeable accident for rail transportation would occur in an urbanized area with a potential for 5 latent cancer fatalities. Similar to the truck accident, the likelihood of such a rail accident would be very small, about 2.8 in 10 million years.

8.10 (168)
Comment - 8 comments summarized
Commenters complained that the analyses in the EIS averaged the impacts of transporting spent nuclear fuel and high-level radioactive waste across the entire Nation for 30 years, and then concluded that these impacts would be insignificant. This was viewed as misleading because it diminishes the significance of impacts in specific cities or areas. One commenter does not believe it is acceptable to average the risks over 50 million people.

Response
The impacts reported in the EIS are the estimated impacts summed over the specific routes used for analysis in the EIS over the period necessary to ship the spent nuclear fuel and high-level radioactive waste, not the average impact across the Nation. The transportation impacts in the EIS were evaluated over the entire shipping period. The total impacts to exposed populations over that period were calculated. The techniques used best reflect the actual potential for radiological exposure from the proposed activities associated with each of the alternatives. In response to comments, Appendix J of the EIS has been expanded to include additional information on the state-specific accident data, route maps, and impact data (see Section J.4).

The transportation impacts in the EIS were not averaged over the entire population of the United States, hence the calculated exposed population would not be 50 million, as asserted. Rather, the transportation impacts were integrated over the exposed population along the transportation routes analyzed in the EIS and extrapolated to 2035. As discussed in Sections 6.2.3.1 and 6.2.3.2 of the EIS, the estimated exposed population ranged from 10 million for truck shipments to 16 million for rail shipments. For perspective, the population of the United States was about 250 million in 1990 and 280 million in 2000.

8.10 (299)
Comment - EIS002232 / 0002
The transport of high-level nuclear energy through Inyo and San Bernardino and neighboring California counties creates an unacceptable risk of accidental discharge.

Response
As discussed in Appendix J.1.4 of the EIS, the release of radioactive materials during an accident would be an extremely unlikely event (the estimated probability of even a small release would be 0.01 percent). Transportation safety related to potential release of radioactive materials is primarily based on the integrity of the shipping cask. The leaking of a transportation cask could only occur if mechanical forces (impact) and heat (fire) exceeded the design limits of the transportation cask structures and materials. Additional information on the safety and testing of transportation casks is provided in Section M.4. The accidents analyzed in the EIS is believed to cover accidents from all sources including heat, mechanical impacts, sabotage, impacts from airplanes and weapons, and mountain rollovers.

Section J of the EIS contains maps of each state in which transportation shipments would originate or through which they would pass. The maps have tables that list the number of shipments involved in the state and the impacts from these shipments within the state. The radiological health and safety impacts of transporting spent nuclear fuel and high-level radioactive waste in California are listed in Table J-74. The risks in Inyo County and San Bernardino would be lower than those presented in Table J-74 for the whole State.

8.10 (632)
Comment - EIS000159 / 0005
The transport accident analysis is unclear. It is impossible to assess the draft EIS basis for impacts of transportation accidents based on the vague descriptions in the reports and appendices.

Response
EIS Section 2.4.4 provides a summary discussion of the impacts of transportation accidents. More detailed discussion is provided in Chapter 6, and an in-depth description of the methodology, models, and sources of data used in the analysis is provided in Appendix J. A new Appendix M has been added to the EIS that contains additional information on topics such as transportation regulations, cask safety and testing, emergency response, and physical protection of spent nuclear fuel casks.

8.10 (738)
Comment - EIS000195 / 0002
In the second title Occupational and Public Health and Safety, page 6-95, you discuss traffic fatalities along the heavy haul routes.

What about traffic related injuries? That should also be addressed.

Response
The transportation analyses for Nevada provided in Section 6.3 of the EIS, presents the radiological and nonradiological impacts important to comparing the impacts of the Proposed Action and the No-Action Alternative. Traffic fatalities were used as the measure of impact because they can be combined with radiation-related latent cancer fatalities to yield an estimate of the total number of fatalities for the Proposed Action and the No-Action Alternative. In contrast, combining traffic related injuries with radiation-related latent cancer fatalities or radiation detriment would not yield an easily understandable estimate of total impacts.

8.10 (773)
Comment - EIS000096 / 0003
The Draft EIS largely ignores adverse environmental impacts of rail construction and operation on Tonopah, Goldfield, and Beatty. Under certain circumstances, these three communities would be close enough to the repository rail line to require evacuation in the event of a severe accident or terrorist attack. A rail accident or incident releasing radioactive materials would threaten public health and safety and harm the local economy.

Response
The analysis of human health and safety and environmental impacts for the rail transportation implementing alternatives affecting Tonopah, Goldfield, and Beatty can be found in Section 6.3.2 of the EIS. While a specific analysis of a severe accident or terrorist attack in the vicinity of these communities was not conducted, maximum reasonably foreseeable accidents were analyzed for national transportation. These results are reported in Section 6.2.4.2. The EIS analysis assumed that an accident determined to be reasonably foreseeable for national transportation could occur in Nevada with similar results.

8.10 (817)
Comment - EIS000144 / 0002
The Day Everything Went Wrong

It is a February day on Highway 93. Temperatures are hovering at roughly -50 degrees, considering the wind chill factor. A blizzard howls as the legal limit truck, carrying plutonium, negotiates the road. Visibility is severely limited. The driver is tired and knows he can't stop in Ely, for the government, as a sop to the people, has made it illegal for such shipments to halt within the populous areas of White Pine County. The truck has almost skidded off the ice-encrusted road on several occasions. The driver is tense.

Suddenly, a herd of mustangs appears out of the white-out; one, a white stallion, bewildered, races directly toward the truck. The driver can't swerve, he can't gear down--there's no time. The truck plows into the pale horse; the horse is thrown onto the truck's hood. Screaming. Its hooves and carcass smash through the windshield. The driver loses control; the truck hits a skid. The hardened trailer topples onto its side, propelling it and the cab off the road.

His seat belt has held the driver securely. He is shaken, glass covered, with several shallow cuts, but otherwise unhurt. After a moment, in which he composes himself, he swears at the horse bleeding furiously into the cab. He gets cautiously out, being careful not to tip the cab over. It feels like it might go; it's already up on two wheels with the weight of its load and the trailer's weird angle.

The driver checks himself for injuries, then walks around the wreck. "Thank God," he thinks. "The load seems fine." He gets on his cell phone and calls 911, reporting the accident to Ely's highway patrol. Then he digs flares out of the cab and proceeds to mark off the crash site.

It is eighty miles to Ely; the highway patrol instantly contacts the Yucca Mountain site, informing them of an accident and possible breach of environmental security. It is a six hour drive--a two hour flight from Yucca Mountain to the crash site. The snow continues as the patrolman rushes as fast as the deadly-slick road permits to pick up the driver.

What no one knows is if the plutonium is secure. In fact, a crack in the container is already emitting radioactivity into the air. Particles are carried by the snow to the ground, where they freeze into the already thick layer of ice; particles remain airborne.

Shortly a car carrying a family comes along. Despite the trucker's warning to stop and not near the crash, they are impatient, afraid that they will be in too much danger, so they plow through, taking particles with them. Of course, the trucker is generally armed, but by the time he slip-slides from where he has been setting flares, the car has driven out of range, and he can't see it well anyway.

With plutonium continuing to leak, an ecological disaster is in the making.

I could go on with this insane scenario; however, you people on this panel know more than I about why you have chosen to do absolutely nothing about putting White Pine County's concerns into the EIS.

Response
This Comment-Response Document addresses the concerns raised in all comments submitted on the Draft EIS, including those from White Pine County. In many cases, comments have resulted in changes to the EIS. For example, to analyze the potential for impacts that could affect environmental resources, DOE collected and considered large amounts of information including information provided by the State of Nevada and counties in the State. For the analyses, DOE used information that it judged to be relevant and reasonable. For example, based on comments submitted during scoping hearings for the EIS, DOE added consideration of the Caliente-Chalk Mountain Corridor and Caliente/Chalk Mountain heavy-haul truck route. In response to public comments on the Draft EIS DOE used projections of population growth in Nevada provided by Clark and Nye Counties and the Nevada State Demographer for updated information presented in the Final EIS. DOE reviewed many documents produced by Lincoln County and other county and State agencies. The transportation-related information contained in those documents was considered for inclusion in the EIS. Nevada highway traffic information was collected from the Nevada Department of Transportation (DIRS 103405-NDOT 1997). DOE obtained and used accident rates for Nevada highways from the Department of Motor Vehicles and Public Safety, State of Nevada (see Section J.1.4.2.3 of the EIS). DOE also used information contained in a report prepared for the City of North Las Vegas (DIRS 155112- Berger Group 2000). The information in this report provided DOE with an estimate of the cost of advancing completion of the Las Vegas Beltway for use by heavy-haul trucks, an estimate of the populations that might live along the Beltway, and a basis for estimating the dose to a maximally exposed individual in a Nevada community from transportation of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. DOE used information contained in *The Statewide Radioactive Materials Transportation Plan, Phase II* to identify potential alternative highway routes for shipments of spent nuclear fuel and high-level radioactive waste that the State of Nevada has considered in the past (DIRS 103072-Ardila Coulson 1989).

8.10 (843)
Comment - EIS000173 / 0009
In one hour a legal, undamaged cask puts out gamma rays equivalent to 10 chest x-rays to those 6 feet away, and the surface of the cask puts out 10 times this much. Would you like to be in the car next to truck with such a shipment of casks stuck on the interstate for four to six hours like the vehicles on I-85 on October 19?

Response
As discussed in Section J.1.3 of the EIS, U.S. Department of Transportation Regulations (49 CFR 173.441) limit the dose rate from the side of a transport vehicle to 10 millirem per hour at 2 meters (6 feet). The radiation dose from standing 2 meters from a spent nuclear fuel cask for 1 hour is about equivalent to about one chest X-ray, not 10. The impacts to an individual in a traffic jam near a cask [assumed to be only 1.3 meters (4 feet) away] are listed in Table 6-9. The probability of a latent cancer fatality from this exposure is about 1 in 50,000. For perspective, the probability of a latent cancer fatality from all causes ranges from about 1 in 4 to 1 in 5.

8.10 (1069)
Comment - EIS000287 / 0002
Maintaining 77 sites is more hazardous than one. This is not taking into consideration that numerous communities along transport lines will have no protection against an accident. The DOE also asserts that this is cost efficient. Have they interpreted the costs of millions of additional cancer patients as a result of an accident or prolonged exposure due to routine shipping?

Response
Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel or high-level radioactive waste. The training of public safety officials would cover procedures required for safe routine transportation of these materials and for dealing with emergency response situations. Therefore, communities along transport routes would not be left unprotected. Section M.6 of the EIS provides more details on Section 180(c).

Neither the routine shipping or transportation accidents are expected to result in millions of additional latent cancer fatalities. For the Proposed Action, the analyses summarized in Table 2-9 of the EIS estimate that there could be about 3 latent cancer fatalities from the routine shipping of spent nuclear fuel and high-level radioactive waste over the 24-year campaign. For transportation accidents, the analyses in Section 6.2.4 estimate that there is a 2.3 to 2.8 in 10 million probability of a maximum reasonably foreseeable accident per year. Should the accident occur, the impact to the population would be about 5 latent cancer fatalities. For perspective, Section J.3.5.1 states that there would be about 220,000 cancer fatalities in a population of 1 million people along the transport routes from other causes besides the transport of spent nuclear fuel and high-level radioactive waste.

8.10 (1082)
Comment - EIS000232 / 0003
The impact on the national transportation system is further underestimated in the DEIS by the failure to include the fact that reusable shipping containers (casks) and the trucks or trains that deliver them to Yucca Mountain are going to have to return for another load. This means that Tables J-11, J-12, J-13 and much of the information extrapolated from them is going to have to be revised upwards. Table 2-7 indicates that normal traffic accident risks are very high, relative to the radiological risks (95%). Therefore, if the number of miles traveled doubles, the estimates of transportation risks will almost double without regard to the casks being empty or full.

Response
The EIS includes the mileage for empty return shipments in its calculation of traffic accident risks. For example, in Section 6.2.4.2.1 of the EIS, the subsection on Impacts from Traffic Accidents states that the fatalities would be primarily from traffic accidents; half would involve trucks transporting loaded casks to the repository and half would involve returning shipments of empty casks.

8.10 (1085)
Comment - EIS000232 / 0006
The risks listed in the DEIS throughout section J, list only fatalities as a consequence of transportation. A responsible risk assessment should also include maiming, permanent, partial and long-term disabilities, illness, lost workdays, etc., as they are surely part of the risk the nation will assume as you undertake this project.

Response
The transportation analyses for Nevada provided in Section 6.3 of the EIS presents the radiological and nonradiological impacts for comparing the Proposed Action and the No-Action Alternative. Traffic fatalities were

used as the measure of impact because they can be combined with radiation-related latent cancer fatalities to yield an estimate of the total number of fatalities for the Proposed Action and the No-Action Alternative. In contrast, combining traffic-related injuries with radiation-related latent cancer fatalities or radiation detriment would not yield an easily understandable estimate of total impacts.

8.10 (1123)
Comment - EIS000270 / 0004
DOE has inadequately characterized the impacts of transportation accidents and public health risks along designated nationwide routes. Using shipment numbers as listed in the DEIS and highway routing studies prepared by the UNLV Transportation Research Center, the State of Nevada has developed a preliminary estimate of potential legal-weight truck shipments through Colorado and Wyoming to Nevada.

Under the mostly truck scenario, there would be about 35,350 shipments through Denver over 39 years. To state this in another way, there would be an average of 2.5 truck shipments per day of highly radioactive material on I-70 through Denver every day, seven days a week, for as many as 39 years.

In 1995, Mr. Robert Halstead, a consultant for Nevada's Agency for Nuclear Projects, commented at the Scoping meeting held in Denver that "Colorado is an example of a state which would much more heavily affected by DOE's proposed multipurpose canister (MPC) base case." Mr. Halstead also stated during the 1995 hearing that Colorado reviewers of the EIS would have "No basis for evaluating the range of potential transportation impacts on unique local conditions." It was Sierra Club's concern then, as it is now, that high-level nuclear waste shipments traversing Denver and moving through the Eisenhower/Glenwood Tunnels is a dangerous, foolhardy enterprise as well as a significant public health hazard.

For this most recent hearing, Mr. Halstead has estimated that almost 9,100 rail shipments of highly radioactive material would move through Colorado and Wyoming over 39 years, an average of about 4.5 cask-shipments per week, and every week, for 39 years. Almost all of the rail shipments would follow the Union Pacific mainline from Gibbon, Nebraska to Salt Lake City through northeastern Colorado and southern Wyoming. Shipments from one reactor in Illinois would use the former Southern Pacific route through Grand Junction.

In addition, there would also be a considerable number of legal weight truck shipments through Colorado under the current capabilities scenario. Approximately 12,660 truck shipments would travel through Colorado on I-70, an average of 6.2 shipments per week, every week, for 39 years.

Sierra Club is not only concerned with radiation exposure to truckers, travelers, and those who live and work along the route, but accidents that will occur during shipment of this highly radioactive waste.

Response
Appendix J of the EIS has been revised to include maps of truck and rail routes used in the analysis, the number of shipments, and the impacts for each state through which spent nuclear fuel and high-level radioactive waste transport was analyzed. The estimated number of shipments and the radiological impacts are listed in Table J-75. These are estimates for analyzing transportation impacts in the EIS, and the actual routes, the number of shipments, and impacts for Colorado could be different depending on the actual routes chosen.

The shipping casks used to transport these materials would be massive, with design features that complied with strict regulatory requirements to ensure that the casks themselves were fault-tolerant; that is, the casks would perform their safety functions even when damaged. Numerous tests and extensive analyses, using the most advanced analytical methods available, have demonstrated that these types of shipping casks would provide containment and shielding even under the most severe kinds of accidents. Since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there could be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

8.10 (1202)
Comment - EIS000306 / 0003
Also the plan to transport the waste an average of 2,000 miles from the reactors -- the average distance of the reactors to Yucca Mountain is 2,000 miles. And I didn't realize until tonight that they're taking a northern route along routes that are subject to snow and ice. I knew that Yucca Mountain was subject to snow and ice about eight months out of the year, a winding, narrow, mountain road where the trucks could easily fall off and the casks get opened or a diesel fire.

Response
As discussed in Section 3.1.2.2 of the EIS, the winter season in the Yucca Mountain region is mild, with mean temperatures ranging from 1.11ºC (34ºF) to 10.6ºC (51ºF) and precipitation ranging from 10 to 25 centimeters (4 to 10 inches) per year. Therefore, it is unlikely that Yucca Mountain would be subject to snow and ice for 8 months of the year.

Truck shipments to Yucca Mountain probably would take U.S. 95 and Lathrop Wells Road or Jackass Flats Road (see Figure J-10 in the EIS). These roads are not winding, narrow, mountain roads. Drivers would be required to maintain contact with the carrier dispatcher at regular intervals. In addition, DOE would use the TRANSCOM satellite system to track each shipment continuously, making it possible to adjust the routes or direct the driver to a safe haven if required. Section M.3 discusses protocols for dealing with adverse weather and road conditions. For example, the Regional Servicing Contractor would get information on weather and road conditions as part of preshipment planning. If weather conditions at the time of departure were not acceptable, the shipment would be delayed. While en route, the driver would receive reports of adverse conditions from the control center.

8.10 (1261)
Comment - EIS000228 / 0005
Section 1502.22 of the NEPA [National Environmental Policy Act] calls for agencies to disclose the unavailability of information in evaluating reasonably foreseeable significant adverse effects on the human environment. The absence of safety performance data for any component of the transportation system needed to move waste from generator sites to Yucca Mountain is a major gap in available information. Historic accident rates cannot necessarily be applied to the equipment used in the proposed action because the equipment has not yet been fabricated let alone tested and deployed operationally. The DEIS describes some areas where gaps in information exist, but does not make these gaps clear. Sections of the DEIS where there are gaps in information should be highlighted and the implications these gaps have on the validity of the conclusions of the DEIS thoroughly discussed.

Response
DOE does not lack safety performance data for the proposed transportation system. Spent nuclear fuel and high-level radioactive waste could be shipped in several configurations, all of which would require shipment in a shipping cask designed to existing standards established by the Nuclear Regulatory Commission. The Commission has developed an extensive body of empirical data on the performance of shipping casks designed for the safe transport of spent nuclear fuel and high-level radioactive waste. Casks have been placed on high-speed trains and smashed into solid concrete structures, immersed in high-temperature fires, and submerged underwater to verify empirically that they meet their rigorous design standards.

DOE believes that the EIS adequately analyzes the environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytic tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

8.10 (1316)
Comment - EIS000165 / 0001
I don't have the heart to tell my son that the trains he loves so much may be carrying things that could shorten his life or even kill him. A photo was taken a few years back of a cask sitting on the track right next to our house. It sat there for several hours. There was no security protecting it. A radiation reading taken nearby showed a level of 10 background. The levels of radiation that Tendal and I would be exposed to would have a significant impact on the total amount of radiation we would be exposed to over the course of our lives. Even if an accident weren't to happen, our lives would be shortened.

Response
As discussed in Section 6.2.3 of the EIS, over the 24 years of shipments associated with the Proposed Action, the collective radiation dose to members of the public was estimated to be about 2,400 person-rem or an average of 100 person-rem per year. For the average person along a transportation route, the radiation dose from the shipments would be about 3 millirem per year, while the individual radiation dose from background radiation is about 300 millirem per year. Therefore, the radiation dose from the shipment of spent nuclear fuel and high-level radioactive waste would not appreciably increase the total amount of radiation that a person would be exposed to over a lifetime and would not be likely to shorten a person's life.

8.10 (1798)
Comment - EIS000312 / 0002
We also have some broad concerns about public health impacts associated with an accident. And given the limited time here to comment, I want to raise a particular issue. We ask that the Department of Energy address findings that are available in a report done by Dr. Ed Lyman of the Nuclear Control Institute which, as we understand, compares releases from the proposed mixed oxide fuel program in the Department of Energy, compares that to releases from the uranium fuel. And it does it in the context of an accident, and I understand that his findings related to accidents show two times more latent cancers from the release of MOX, mixed oxide fuel particles, than from regular irradiated fuel. And we've got your Department and folks, certainly, from the Aiken and Augusta area that are working very hard; and some folks in that area are inviting this program to be started at Savannah River site. So we urge you to incorporate in your assumptions what this would do in terms of the public health impacts.

Response
The report referred to by the commenter discusses severe nuclear reactor accidents involving mixed-oxide fuel, not transportation accidents. Severe nuclear reactor accidents involving mixed-oxide fuel are beyond the scope of this EIS. In addition, less than 1 percent of the shipments to the repository would consist of mixed-oxide spent nuclear fuel, so shipping it to the repository would not appreciably increase the overall risk of shipping spent nuclear fuel to the repository.

8.10 (1928)
Comment - EIS000467 / 0003
I wanted to address the lack of realistic accident scenarios. Right here in Washington, D.C. we are on the transport route of 146 rail casks projected from the North Anna Nuclear Plant on the CSXT rail line that passes right through Union Station, along the Metro stations, through Silver Spring. This was the very same tracks where the Amtrak and MARC trains collided in 1996, the deadly and fiery crash. So accidents do happen. CSXT was found partly responsible for this accident because they had removed safety sensors on the rail lines.

Response
As discussed in Appendixes J and M, most real-world accidents that have been postulated, including truck crashes into bridges, train derailments followed by fires, derailments followed by immersion of a cask in a river, and similar extreme accident conditions, would not likely result in release of radioactive materials from the shipping casks. If a spent nuclear fuel rail cask had been on the CSXT train that collided with a commuter train in 1996, the accident conditions would not have been more severe than the design standards for the cask. No release of radioactive materials from the cask would have been expected. The performance standards for the casks prescribed by the Nuclear Regulatory Commission were selected to ensure that less than 1 percent of real-world accidents would result in loss of cask integrity and release of radioactivity from the cask. These standards ensure that the casks would be extremely robust.

As stated in Section J.1.4.2.2 of the EIS, accident rates used in the EIS are state-specific rail accident involvement and fatality rates based on statistics compiled by the Federal Railroad Administration for 1994 through 1996. Rail accident rates include both mainline accidents and those occurring in railyards. Therefore, realistic accidents such as the one described by the commenter were included in the analysis. More details on transportation accident data are provided in Section J.1.4.2.3.

8.10 (1992)
Comment - EIS000516 / 0004
What is the modeling that you used to come up with your transportation prediction for safety? And why weren't armed guards taken into account for transporting nuclear waste? Why wasn't human error taken into account for transporting this waste? Human error is the most dangerous of all, the most unforeseen, and any kind of safe systems modeling will take this into account. Why is there no inspection and maintenance required for this transportation?

Response
As discussed in Section 6.2.1 of the EIS, state-of-the-art transportation routing and dose assessment computer codes were used to estimate the impacts from transporting spent nuclear fuel and high-level radioactive waste.

The CALVIN computer program was used to estimate the numbers of shipments of spent nuclear fuel from commercial sites. This program uses information on spent nuclear fuel stored at each site and an assumed scenario for picking up the spent nuclear fuel from each site. The program also uses information on the capacity of shipping casks that could be used.

The HIGHWAY computer program is a routing tool used to select existing highway routes that would satisfy U.S. Department of Transportation route selection regulations and that DOE could use to ship spent nuclear fuel and high-level radioactive waste from the 77 sites to the repository.

The INTERLINE computer program is a routing tool used to select existing rail routes that railroads would be likely to use to ship spent nuclear fuel and high-level radioactive waste from the 77 sites to the repository.

The RADTRAN 5 computer program is used to estimate the radiological dose risks to populations and transportation workers of incident-free transportation and to the general population from accident scenarios. For the analysis of incident-free transportation risks, the code uses scenarios for persons who would share transportation routes with shipments—called onlink populations, persons who live along the route of travel—offlink populations, and persons exposed at stops. For accident risks, the code evaluates the range of possible accident scenarios from high probability and low consequence to low probability and high consequence.

The RISKIND computer program is used to estimate radiological doses to maximally exposed individuals for incident-free transportation and to populations and maximally exposed individuals for accident scenarios. To estimate incident-free doses to maximally exposed individuals, RISKIND uses geometry to calculate the dose rate at specified locations that would arise from a source of radiation. RISKIND is used to calculate the radiation dose to a population and hypothetical maximally exposed individuals from releases of radioactive materials that are postulated to occur in maximum reasonably foreseeable accident scenarios.

Sections 6.2.2, 6.2.3, and 6.2.4 of the EIS discuss the impacts of loading operations, incident-free transport, and accidents, respectively, including workers, inspectors, and guards. Details of the impacts to armed guards (security escorts) were included in the transportation analysis. This is discussed in more detail in Section J.1.3.2.1.

Accidents of all causes, including accidents caused by human error, were used to estimate the impacts from transporting spent nuclear fuel and high-level radioactive waste. Therefore, human error was included in the analysis of transportation impacts. More details on transportation accident data are provided in Section J.1.4.2.3 of the EIS.

Inspections of spent nuclear fuel and high-level radioactive waste shipments would be performed. For example, trucks would have to pass the Commercial Vehicle Safety Alliance enhanced safety inspection, which includes a radiological survey and stringent examination of all driver, vehicle, and hazardous material requirements. More details on transportation regulations, including those that address inspection, can be found in Section M.2 of the EIS.

Maintenance would be required. For example, Section M.3.2.1.6 of the EIS describes a Carrier Management Plan, which includes a maintenance program.

8.10 (2266)
Comment - EIS000394 / 0003
As we have noted in the past, however, explicit treatment of post-accident protective measures, such as interdiction of contaminated properties and the embargo of contaminated crops, would make the document stronger, and would provide state and local officials and members of the public with a more complete picture of the radiological consequences of major transportation accidents. As we also have commented previously, we would like to see recovery issues, such as decontamination, re-entry, and return, explicitly addressed in the EIS.

Response
In response to public comments, DOE has included a discussion on the costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Eas (DIRS 154814-Sandquist et al. 1985), and information submitted by the State of Nevada in its public comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $270 billion. Cost data used in the studies included data compiled from case studies involving actual cleanup of radioactive materials contamination. The studies address consequences for releases of radioactive materials in communities. Although the studies project high costs for clean up following severe accidents, the accidents evaluated are very unlikely and, as a consequence, DOE believes the economic risks of transportation accidents would be very small.

8.10 (2398)
Comment - EIS000674 / 0001
The Draft Environmental Impact Statement is deficient in its treatment of the safety aspects of heavy-haul trucks.

If you use, for example, Nevada average accident rates and the projected shipment miles for DOE's top Module 2 scenario and you look at the Caliente route, you come to the conclusion that you've got a projection using those historical numbers of about 24 accidents, 12 loaded, 12 unloaded over 39 years. There could be more, there could be less.

The point is when you start doing risk analysis, you do a baseline, and if the historical trends hold into the future, you can assume there will be accidents, and that's assuming that the heavy-haul trucks are as safe as other traffic.

So I don't see any basis in the DEIS. There's no empirical evidence to support their conclusion quote that the accident risks are low for all five route alternatives.

Response
The EIS acknowledges that transportation accidents could occur during the transport of radioactive materials to the proposed Yucca Mountain Repository. In Section J.1.4.2.3.2, the EIS estimates that there could be as many as 66 accidents under the mostly legal-weight truck shipping scenario and 2 accidents could occur under the mostly rail scenario. A study recently conducted by Sandia National Laboratories concluded that only a tiny fraction of all accidents, less than 1 in 10,000, would be severe enough to result in a failure of a spent nuclear fuel shipping cask (DIRS 152476-Sprung et al. 2000). The reason for this is the rigorous design, performance, and testing requirements (see 10 CFR Part 71) for spent nuclear fuel and high-level radioactive waste shipping casks. Based on these statistics, DOE does not expect an accident to occur that would involve radiological consequences. Similarly, DOE does not expect an accidental release to occur on any of the five heavy-haul truck routes.

To place these risks in perspective, DOE compared the risks of fatalities from traffic accidents involving shipments of spent nuclear fuel and high-level radioactive waste to the expected fatalities on U.S. highways over the 24 years of the Proposed Action (see Section 6.2.4.2.1 of the EIS). Although this comparison is based on the national transportation impacts, it is illustrative of Nevada transportation impacts. The EIS states that approximately four fatalities could occur under the mostly legal-weight truck scenario during the 24 years of the Proposed Action. This can be compared to the approximately 1 million traffic fatalities projected to occur over that same period from all traffic accidents on U.S. highways. Based on this comparison and comparisons of other transportation impacts to commonly accepted risks, DOE concluded that the transportation risks would be low.

DOE used available, heavy-combination, legal-weight truck traffic accident statistics for heavy-haul truck accident rates. While DOE agrees heavy-haul truck shipments could be obstacles to traffic due to their length and slow transit speeds, special precautions would be taken improve the safety of heavy-haul truck shipments. These special precautions include restricting movement to daylight hours and requiring escort vehicles to warn other drivers of the slow-moving vehicles. In addition, DOE proposes a number of improvements to the candidate heavy-haul truck routes to improve traffic flow and safety, such as providing truck passing lanes, improving road surfaces, and widening shoulders. Based on the special precautions and the proposed improvements to heavy-haul truck routes, DOE is confident that heavy-haul trucks carrying spent nuclear fuel and high-level radioactive waste shipping casks can be operated safely.

8.10 (2849)
Comment - EIS000871 / 0001
The most important thought that comes to mind when I hear that nuclear waste being transported over the railways is derailment which we just had a coal train derail in Belleville Illinois a few days ago. How good are the rails from coast to coast? Is it even safe to transport the waste over the interstate highway systems with the many road ragers out there? In a radius of 50 to 100 miles a million or more lives may be at stake.

Response
Safety is DOE's primary concern when shipping all types of radioactive material, including spent nuclear fuel and high-level radioactive waste. Section 2.1.3.2 of the EIS states that DOE would comply with applicable regulations of the U.S. Department of Transportation and Nuclear Regulatory Commission regulations. Both agencies strictly regulate all aspects of radioactive material transportation, including packaging (casks), transporting, and handling radioactive materials for all modes of transportation, and include standards for inspection, labeling, shipping papers, placarding, loading and unloading, allowable radiation levels, and limits for contamination of packages and vehicles, among other requirements. In addition, the regulations specify training for personnel who perform handling and transport of hazardous materials, liability insurance requirements for carriers, and safety requirements for vehicles and transport operations. DOE would implement all applicable regulations, including its own, through its Regional Servicing Contracts as described in the draft Request for Proposals for these services (DIRS 153487-DOE 1998). More details on DOE and other agency transportation regulations can be found in Section M.2 of the EIS.

8.10 (3311)
Comment - EIS001085 / 0001
The potential collective long term risk from direct exposure to ground contamination and from ingestion pathways through food and soil contamination should be included in RADTRAN4 transportation accident analyses. In agricultural areas the collective risk from ingestion pathways could be substantially greater than the inhalation pathway. The input parameters such as the food transfer factors (ACCDNT (6,k)), soil transfer factors (ACCDNT (6, k)) and cleanup level (CULVL) used in RADTRAN4 calculations should be provided. The value of cleanup level should be estimated based on a comprehensive pathway analysis including all pathways of exposure, all nuclides of radiological significance and all weather conditions (all 6 or 7 meteorological categories).

Response
Appendix J of the EIS describes the exposure pathway analysis used in the calculation of transportation accident risks. The analyses performed using RADTRAN 5 included inhalation, air immersion, direct exposure to ground contamination, and ingestion pathways. Input parameters such as dose conversion factors, food transfer factors, and soil transfer factors are available on the Yucca Mountain EIS Transportation Calculation Package, which is part of the EIS Administrative Record.

8.10 (3488)
Comment - EIS000688 / 0002
You're sitting here just a few meters from the railroad tracks over which you propose to transport high-level nuclear waste.

Now, transport yourself back in time to New Year's Eve 1910. Flood waters would be twisting those railroad tracks into pretzels. Millions of tons of rock would be raining down from the hillsides on to the railroad, and you would be sitting up to your necks in mud the consistency of pancake batter.

Response
As discussed in Sections 6.2.4.2 and J.1.4.2.1 of the EIS, the accident analyses included a maximum reasonably foreseeable accident. This accident is more severe than would likely occur in real-world accidents that have been postulated, including truck crashes into bridges, train derailments followed by fires, derailments followed by immersion of a cask in a river, and similar extreme accident conditions. The performance standards for the casks prescribed by the Nuclear Regulatory Commission were selected to ensure that these real-world accidents would not likely result in release of radioactivity from the cask. These standards ensure that the casks would be extremely robust.

8.10 (3489)
Comment - EIS000719 / 0001
The Draft EIS falls shy of adequately considering the impacts of transporting the waste materials to Yucca Mountain. The DOE notes that the region of influence for public health and safety along existing transportation routes is a half mile from the center line of transportation rights-of-way for non-accident conditions, and 50 miles for accident conditions (p. 3-98).

However, the DEIS neither shows specific routes outside of Nevada to be used to transport waste materials, nor addresses the baseline conditions along those routes. In order to do a complete impact analysis, the DOE should map specific routes and establish baseline conditions along those routes, as well as clearly and honestly identify potential impacts along those routes.

One can look at a map of the current locations of radioactive waste to see that this highly irradiated waste will need to ravel through 43 states-past the homes, workplaces, and hospitals of 50 million Americans to get to Yucca Mountain. Those 50 million Americans have a right to be informed about the risk associated with transporting nuclear waste and the impacts on public health and the environment that will occur from the transportation.

The DEIS should clearly and accurately characterize the risks involved along the transportation routes, and it should use the most current information available to do so. Further, it should include site-specific data to show the effects of accidents in highly populated areas or areas where it would be difficult to retrieve a leaking cask (such as ravines and rivers).

Response
In response to public comments, DOE has included maps of the highway routes and rail lines it used for analysis in the EIS (see Section J.4). It also included potential health and safety impacts associated with shipments for each state through which shipments could pass.

Based on the results of the impact analyses presented in Chapter 6 and Appendix J of the EIS, as well as the results published in numerous other studies and environmental impact analyses cited in the EIS, DOE is confident spent nuclear fuel and high-level radioactive waste can be and would be safely transported to Yucca Mountain. DOE believes, as the EIS reports, that the potential impacts of this transportation would be so low for individuals who live and work along the routes that these individual impacts would not be discernible even if the corresponding doses could be measured. The analysis presented in the EIS factored in the characteristics of spent nuclear fuel and high-level radioactive waste, the integrity of shipping casks that would be used in transport, and the regulatory and programmatic controls that would be imposed on shipping operations (see Appendix M). The EIS analytical results are supported by numerous technical and scientific studies that have been compiled through decades of research and development by DOE and other Federal agencies of the United States, including the Nuclear Regulatory Commission and the U.S. Department of Transportation, as well as by the international community, including the International Atomic Energy Agency.

DOE believes that the EIS adequately analyzes transportation-related impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site was approved. See the introduction to Chapter 8 of this Comment-Response Document for additional information.

DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties, offers the most appropriate means to arrive at conservative estimates of transportation-related impacts.

With respect to a shipping cask falling into a river, the EIS does not specifically analyze a transportation accident involving contamination of surface water or groundwater because previous EIS analyses have consistently shown that the airborne pathway has the greatest potential for exposing large numbers of people to radioactive material in the event of a severe transportation accident. Ostmeyer (DIRS 157052-1986) analyzed the potential importance of water pathway contamination for spent nuclear fuel transportation accident risk using a worst-case water contamination scenario. The analysis showed that the impacts of the water contamination scenario would be about one-fiftieth of the impacts of a comparable accident in an urban area. A water contamination scenario could affect groundwater resources, but to much lower levels of contamination than surface water because of the delay associated with the infiltration of meteoric water to groundwater. Therefore, the results of the analysis indicate that water pathway contamination would not be a significant contributor to the radiological risks of transporting spent nuclear fuel.

With respect to recovering a shipping cask that falls into a ravine or river, the transportation carrier involved in an accident would be responsible for planning, cost, and arrangements necessary to safely recover the shipment and clean up any radioactive contamination that could occur (see Section 6.2.4.2 of the EIS). Recovery of 23-metric-ton (25-ton) truck casks or rail casks weighing 110 metric tons (120 tons) is not an easy operation, especially in areas where deploying mobile carriers is difficult. However, capability to lift such weights does exist for rail and truck modes and would be deployed as required in the unlikely event of a cask leaving the conveyance or transport vehicle.

8.10 (3608)
Comment - EIS001031 / 0013
What are you going to do when a truck or train crashes? What funding is provided to local communities for equipment and training for a high level radioactive accident/emergency? If there is an accident, how large an area could be affected?

Response
In response to public comments, DOE has provided additional information on emergency response activities following transportation accidents (see Section M.5 of the EIS). Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel or high-level radioactive waste. The costs of providing this technical assistance and training have not yet been determined but the funds would come from the Nuclear Waste Fund. According to the Notice of Revised Proposed Policy and Procedures published in the *Federal Register* (63 *FR* 23753, April 30, 1998), a one-time planning grant of $150,000 would be provided to eligible states and tribal jurisdictions for the determination of training and funding needs and for preparation of the application for funds about 4 years before shipments began.

State and local governments deal with transportation accidents involving hazardous materials on a daily basis across the United States. According to the Notice of Revised Proposed Policy and Procedures (63 *FR* 23753, April 30, 1998), DOE would provide funding and technical assistance to eligible jurisdictions along transportation routes to address incremental training requirements resulting from shipments of spent nuclear fuel and high-level radioactive waste to the repository. DOE would allow a variety of activities an applicant state or tribal jurisdiction might consider appropriate for training under the Section 180(c) program. Along a specific transportation route, it would be the applicant's decision as to who received training.

The DOE Radiation Emergency Assistance Center/Training Site has been working with state and local groups, including hospitals, to provide medical emergency response training, as well as providing treatment and medical consultation for injuries resulting from radiation exposure and contamination. Among the training courses conducted are courses in the handling of radiation accidents by emergency staff, and medical planning and care in radiation accidents.

In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments (DIRS 154814-Sandquist et al. 1985), and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $270 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 included data compiled from case studies involving actual cleanup of radioactive materials contamination. The studies address consequences for releases of radioactive materials in communities.

8.10 (3782)
Comment - EIS001244 / 0004
The DEIS must consider the real impact of an accident along the route.

What will be the response of the local health and emergency personnel?

Are the relevant personnel trained for responding to an accident involving high level nuclear waste?

Is the medical establishment trained to treat patients exposed to high level nuclear waste?

What type of emergency preparedness is required to be in place to adequately respond to an accident involving high level nuclear waste?

Who will pay the cost of formulating such a plan and training all the emergency response and health professionals?

What are the economic impacts on the local economy if an accident occurs? This question applies to all communities along the transportation routes.

What are the direct economic impacts to families and businesses in the area of the accident during the emergency response?

What type of cleanup is required in the case of an accident involving the release of high level nuclear waste?
What are the stigma effects to property owners in the area of an accident?

What are the stigma effects to Las Vegas if we have an accident here? Our economy is based on tourism. Other destinations are available to individuals who would be reluctant to bring their families to a city which has experienced a nuclear accident. How long would the stigma of a nuclear accident impact the economy of our city? What happens to all non-tourist sectors of the economy if an accident involving nuclear waste in our city seriously undermines the tourist revenue of the region?

Response
Several of the questions in this comment requested more information on emergency preparedness. Two regulations address the commenter's concern. First, Section 180(c) of the NWPA requires DOE to provide funds for training emergency response personnel in eligible jurisdictions along selected transportation routes. Sections M.5 and M.6 of the EIS discuss these requirements in detail. Second, there is a Federal Radiological Program outlined in the Federal Radiological Emergency Response Plan and the Federal Radiological Monitoring and Assessment Plan. These plans outline the policies, procedures, roles, and responsibilities of Federal, state, local, and Native American tribal agencies in planning for and responding to emergencies involving releases or suspected releases of radiological materials from government and commercial facilities or operations. Under Section 180(c), DOE will fund eligible jurisdiction planning activities to determine current capabilities and needs, and will fund training for emergency response activities.

The purpose of Section 180(c) is to ensure that first responders are sufficiently trained to respond safely to an incident involving the shipment of spent nuclear fuel and high-level radioactive waste. DOE has committed to provide technical and financial assistance for training as mandated by Section 180(c) approximately 4 years before shipments would begin. In addition, the Emergency Planning and Community Right-To-Know Act mandates the formation of emergency planning and response capability by the states. The *Federal Register* notices make it clear that the funding will go to states and tribes. Local governments would not be eligible to receive Section 180(c) grants directly. However, states and tribes would have to coordinate their planning with local jurisdictions, indicating in the application that the needs of local public safety officials have been considered and how the training assistance would be provided to local jurisdictions and their public safety officials.

DOE recognizes that emergency preparedness capabilities and needs vary from jurisdiction to jurisdiction. To assist states and tribes in determining what their needs are and where the Section 180(c) funds and assistance can best be applied, DOE will provide a one-time planning grant to aid in making this determination. Appendix M of the EIS discusses Section 180(c).

In the event of an incident or accident involving radioactive materials, states, tribes, and local governments can request assistance from the Federal Government under the Federal Radiological Emergency Response Plan. Assistance is available from 17 different agencies. In addition, DOE maintains eight Regional Coordinating Offices across the country that are ready to provide assistance. Appendix M contains information about these resources.

The Regional Servicing Contractor would have to provide specific written procedures to drivers and crews that clearly defined detailed actions in the event of an emergency or incident. The draft Request for Proposals, *Acquisition of Waste Acceptance and Transportation Services for the Office of Civilian Radioactive Waste Management* (DIRS 153487-DOE 1998), focused on these and related responsibilities. Appendix M of the EIS discusses carrier and shipper responsibilities for emergency situations.

With regard to cleanup after a transportation accident, the Price-Anderson Act establishes a system of financial protection for the public in a nuclear accident (compensation for damages, loss, or injury suffered), regardless of who causes the damage. Section M.8 of the EIS discusses the Price-Anderson Act.

DOE would not make routing decisions for some years; such decisions would in accordance with U.S. Department of Transportation routing guidelines. According to the report *Identification of Factors for Selecting Modes and Routes for Shipping High-Level Radioactive Waste and Spent Nuclear Fuel* (DIRS 103718-DOT 1998), routing evaluations should consider such parameters as emergency response capabilities; local terrain, road design, and climate characteristics as they affect accident rates; economic effects of accidents; sensitive environments exposed; and locations of special facilities such as hospitals and schools.

In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments (DIRS 154814-Sandquist et al. 1985), and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $270 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 of the EIS included data compiled from case studies involving actual cleanup of radioactive materials contamination. The studies address consequences for releases of radioactive materials in communities.

For perspective, the current insured limit of responsibility for an accident involving releases of radioactive materials to the environment is $9.43 billion. The annual cost of transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain would be about $200 million.

With respect to comments on perceived risk and stigma associated with potential transportation accidents, while stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

8.10 (3926)
Comment - EIS001287 / 0004
A single accident could have major ramifications for much of Ohio. The potential risk of a significant release of radiation, though statistically small, could be incalculably catastrophic. There are too many uncertainties with rail or highway transportation. Too many potential hazards exist: accidents, other drivers, weather problems, road or track problems, which could ultimately compromise safety.

The costs of any leaks or accidents will effect the environment we live in for thousands of years. A major accident would pose obvious risks in terms of cancer but it would also poison farmland, effect watersheds, and flora and fauna in the vicinity. And it appears that studies minimize the health effects on humans by only identifying the cancer risk, while ignoring other effects of radiation exposure. It is unconscionable to take such genetic, teratogenic, and environmental risks.

Response
The EIS contains a discussion of potential impacts from accidents in both the mostly legal-weight truck scenario and the mostly rail scenario (see Section 6.2.4.2). The accident analysis includes a description of the consequences of a severe accident that would result in a leak in a transportation cask, although that is an extremely unlikely event [an annual probability of 2.8 (rail) to 2.3 (truck) in 10 million]. The leaking of a transportation cask could only occur if mechanical forces (impact) and heat (fire) exceeded the design limits of the transportation cask structures and materials. Section M.4 contains more information on the safety and testing of transportation casks. The accident analyzed in the EIS is believed to cover accidents from all sources including heat, mechanical impacts, sabotage, impacts from airplanes and weapons, and mountain rollovers.

DOE, the U.S. Department of Transportation, and the Nuclear Regulatory Commission recognize that there are many uncertainties with rail or highway transportation. Many hazards–accidents, other drivers, weather problems, road or track problems—could compromise safety. To mitigate the potential for a release of radioactive materials caused by these uncertainties, the Federal agencies listed above have a myriad of regulation, if adequately implemented, to preclude any release of radioactive materials. These agencies take human behavior seriously and consider these factors in all that they do from selection and training of personnel to post transport evaluations (see Section J.1.4.2.1 of the EIS).

The location of the maximally exposed individual was assumed to be at the downwind distance that yielded the highest radiation dose. For analysis of the consequences of severe truck and rail accidents and acts of sabotage, the distance used was estimated using the RISKIND computer program (see Sections 6.2.4.2.1, 6.2.4.2.2, and 6.2.4.2.3 of the EIS). RISKIND calculates the atmospheric dispersion of radioactive materials downwind from the point of release and is used to estimate the downwind location where the dose would be greatest.

The risks of transportation accidents are discussed in Sections 6.2.4.2 and J.1.4.2 of the EIS. Table J-81 lists estimates of transportation risks for Ohio for the mostly truck and mostly rail transport scenarios. In estimating these risks, accidents caused by all sources, such as other drivers, weather problems, and road or track problems, were included. The analysis addressed a variety of exposure pathways for air submersion, to food consumption, to direct radiation from materials deposited on the ground. Federal agencies have concluded that the protection of humans provide sufficient protection for flora and fauna. Therefore, latent cancer fatalities is a clear measure for comparing implementing alternatives.

The EIS uses the risk of a latent cancer fatality as its primary measure of radiological impact. However, other radiation-related impacts such as the incidence of nonfatal cancers and severe genetic effects are discussed in Section F.1.1.5 of the EIS. All radiation effects are linear with latent cancer fatalities and including these other radiation-related impacts would increase the total detriment from radiation exposures by about 50 percent.

In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report (DIRS 154814-Sandquist et al. 1985) used in the 1986 Environmental Assessments, and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $270 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 included data compiled from case studies involving actual cleanup of radioactive materials contamination. The studies address consequences for releases of radioactive materials in communities.

8.10 (4057)
Comment - EIS001474 / 0006
Just a couple weeks ago a low-level waste shipment in Ohio was involved in a head-on collision and there was a big fire involved. And I'll be interested to see what kind of releases were involved in that.

Response
Greater-than Class C low-level radioactive waste could be shipped to the repository in Module 2. However, the impacts for spent nuclear fuel accidents would generally be larger than accidents involving greater-than-Class-C waste, because the amount of radioactivity contained in a spent nuclear fuel cask would be much larger.

As discussed in Appendixes J and M, most real-world accidents that have been postulated for spent nuclear fuel and high-level radioactive waste shipments, including truck crashes into bridges, train derailments followed by fires, derailments followed by immersion of a cask in a river, and similar extreme accident conditions, would not be likely to result in release of radioactive materials from the shipping casks. The performance standards for the casks prescribed by the Nuclear Regulatory Commission were selected to ensure that less than 1 percent of real-world accidents would result in loss of cask integrity and release of radioactivity from the cask. These standards ensure that the casks would be extremely robust.

8.10 (4082)
Comment - EIS001482 / 0004
And then I look in the DEIS, and this -- what do you call it -- a region of influence is only 50 miles on this thing. If you would have an accident on the highway, you would only consider it 50 miles. You know, that's ridiculous.

Response
The EIS estimates impacts from transportation accidents to the population living within 80 kilometers (50 miles) of the transportation route. Air modeling studies have shown that, in the event of a radioactive material release from a transportation accident, most of the radiation dose would go to the population within 80 kilometers. Although there could be small effects beyond 80 kilometers, the statistical uncertainty in the analytical models is too high at such distances to provide meaningful results.

8.10 (4296)
Comment - EIS001160 / 0105
Page 6-27: The assumptions underlying this section and related table are suspect. First, the assumption appears to be that the cask cannot be breached in any way, either by heat or physical forces. While the data presented here and in the supporting texts indicate the improbability of cask breach, they cannot rule it out. Rail casks, speared by a rail during accident would cause cask breach, extreme heat might damage seats, a terrorist act could breach the container, etc. Collective doses in these scenarios would be considerably higher than the data presented here. DOE should thoroughly rethink these hypotheses and present data that includes the potential for containment breach, along with the statistical probability of such an accident occurring. Second, distances from containers either during an accident or in subsequent clean up are not presented, either here or in Appendix J. It would be possible to skew data either up or down by adjusting the distance from radiation source. In other parts of this document (6.2.4.2.3 1 6, line 4-5) the assumed distance from source is 150 Meters (about 500 feet). Here again the data presented (if I understand the writer correctly) appears to disagree with data presented later on in the document on maximum exposure risks. Without knowing how this data was calculated, we cannot confirm or dispute the findings, and on the face of it, these exposure risks, associated with an accident appear artificially low.

Response
The EIS contains a discussion of potential impacts from accidents in both the mostly legal-weight truck scenario and the mostly rail scenario (see Section 6.2.4.2). The accident analysis includes a description of the consequences of a severe accident that would result in a leak in a transportation cask, although that is an extremely unlikely event [an annual probability of 1.4 (rail) to 1.9 (truck) in 10 million]. The leaking of a transportation cask could only occur if mechanical forces (impact) and heat (fire) exceeded the design limits of the transportation cask structures and materials. Additional information on the safety and test of transportation casks is provided in Section M.4. The

accident analyzed in the EIS is believed to cover accidents from all sources including heat, mechanical impacts, sabotage, impacts from airplanes and weapons, and mountain rollovers.

The location of the maximally exposed individual was assumed to be at the downwind distance that yielded the highest radiation dose. For severe truck and rail accidents, the distance used was 360 meters (1,200 feet) (see Sections 6.2.4.2.1 and 6.2.4.2.2 of the EIS). For sabotage events, the distance was 140 meters (460 feet) (see Section 6.2.4.2.3). The distances are different because different dispersion conditions would exist during severe accidents and sabotage events.

In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments (DIRS 154814-Sandquist et al. 1985), and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $270 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 included data compiled from case studies involving actual cleanup of radioactive materials contamination. The studies address consequences for releases of radioactive materials in communities.

8.10 (4302)
Comment - EIS001160 / 0111
Page 8-79, Section 8.4.1. Inventory module 1 or 2 impacts, and Table 8-59. Some of the data reflected in this table does not seem to compute correctly. Specifically, a 58 percent increase in time spent shipping material reflects nearly 90 percent increase in kilometers traveled (580 million kilometers traveled vs. 1 billion kilometers traveled) with only a 50 percent increase in fatalities (8.6 to 12.9). The fatality rate per kilometer driven actually drops in the inventory module I or 2 scenario from the proposed action by about 20 percent. This doesn't seem logical. An argument that the kind of waste being transported is a consideration is not meritorious in as much as trucks must still travel the same highways and therefore would incur the same risks as other commercial trucking and have roughly the same number of accidents.

Response
The comment compared kilometers traveled and fatalities on the Totals line of Table 8-59 of the Draft EIS and noted a 90-percent increase in kilometers traveled resulted in only a 50-percent increase in fatalities. The data in the table actually compute correctly. Comparing each category in Table 8-59 separately, there is a consistent relationship between kilometers traveled and fatalities. For example, with the Materials category, there would be a 73-percent increase in kilometers traveled [130 million versus 225 million (80 million versus 140 million miles)] and a 68-percent increase in fatalities (2.5 versus 4.2). Taking rounding error into account, these percent increases are consistent. The same consistent relationship occurs for each category listed in Table 8-59. The apparent error appears only when attempting the same comparison on the Totals line. The same comparison cannot be made on the Totals line because the percent differences for each category are not additive; each category involves transportation along a specific set of routes with their own route-specific accident and fatality rates. If the route-specific accident and fatality rates happened to be identical for each category, the percent differences in data on the Totals line would be additive.

8.10 (4384)
Comment - EIS001523 / 0003
The EIS proposes either rail truck options for transportation of waste (Moore, 1). However, the DOE does not accurately assess the potential risk or probability of environmental damage or serious accidents resulting from either option. The EIS cited that the frequency of accidents on national interstate highways is not likely to change, despite a recent speed limit increase on these highways and gives no supporting evidence for its conclusion (Resnikoff, 3). The probability of accidents was also incorrectly calculated to be less than what is actually likely. The DOE does not include the effects of increased highway use in the Las Vegas and surrounding areas as a result of projected population growth. In assessing the potential danger of rail accidents, the DOE uses incomplete data by only assessing the risk resulting from a nuclear fuel falling from a low bridge and does not consider the consequences, which could result from an accident from a tall bridge (Resnikoff, 5).

Resnikoff, Martin. Cask Safety and related issues in the draft Yucca Mountain EIS. http://www.state.nv.us/nucwaste/eis/yucca/rwmaymeis.pdf. Jan 26, 2000.

Moore, Rick. Rail Issues in the Draft EIS. http://www.state.nv.us/nucwaste/eis/yucca/moore1a.pdf. http://www.state.nv.us/nucwaste/eis/yucca/moore1b.pdf. Jan 26, 2000.

Response
DOE believes that the EIS adequately analyzes the environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

For the reasons discussed above, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada.

8.10 (4781)
Comment - EIS001519 / 0007
Transportation of the spent fuel is an extremely dangerous undertaking because of the cataclysmic destruction it would cause to the surrounding area of the crash site and the high probability of there being an accident. There were 382,030 accidents involving heavy load trucks in 1997, an average of about 1,047 per day. When taken together with the fact that it would take over 23 years to move all the spent fuel to the repository, it is difficult to accept the idea that over that long time span, there will be no accidents involving a nuclear waste Carrying truck.

Response
About 53,000 shipments are estimated for the mostly legal-weight truck scenario. Given the number of shipments, traffic accidents probably would occur, although DOE does not believe that any of the accidents would be severe enough to result in the release of radioactive material, primarily because of the structural integrity of the casks in which the material would be transported.

8.10 (4888)
Comment - EIS000337 / 0028
Pg. 6-17,18, Section 6.2, National Transportation: I understand the probability and if one goes back and examines the train wreck that spilled thousands of gallons of toxic material into the Sacramento River it probably is outside the limits for the model used by DOE. It only takes one to do significant damage. The difference between all the past accidents and one that could occur transporting nuclear waste is that past accidents were cured in one life time but the nuclear accident time to cure could extend over many life times. The reference section is again laced with adjectives that do not belong in an engineering document. If you can state it is not "likely" or "unlikely" or "very unlikely" state the probability. No place in this document did I find any comment on the nuclear waste that is imported with respect to quantity and route. Please provide the data to me.

Response
Probabilities of severe spent nuclear fuel accidents are presented in Section J.1.4.2.1 of the EIS. Over 24 years of truck shipments to Yucca Mountain there would be less than a 1-percent chance of an accident that could result in a release of radioactive material from a cask. The chance of a rail accident that would cause release from a cask would be even lower. The chance that such an accident would occur in any locale would be much less than 1 percent. Therefore, an accident such as the train derailment near the Sacramento River would not be likely to release radioactive materials from the casks into the river.

DOE would not import spent nuclear fuel or high-level radioactive waste from foreign countries for disposal in the proposed repository. However, the Department has agreed to accept certain shipments of spent nuclear fuel from foreign research reactors as discussed in *Final Environmental Impact Statement on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel* (DIRS 101812-DOE 1996). Such fuel would be shipped to an existing DOE site for interim storage before ultimate shipment to a repository. The description of DOE spent nuclear fuel in Appendix A of the EIS includes the characteristics of the foreign research reactor fuel. Figure A-1 shows the locations of the commercial and DOE sites from which materials would travel to the repository. Tables J-10 and J-11 list the highway and rail routes, respectively, that DOE analyzed for this EIS.

8.10 (4891)

Comment - EIS000337 / 0031

Pg. 6-28, block at the bottom of the page: DOE uses the argument that if the accident is not reasonable it is not analyzed. This is defined by conditions that occur more often 1 in 10 million times a year. They eliminate any conditions that occur less than that number. The public should be told of what can happen because if it can it will in the years that material is being transported.

Response

Environmental impact statements are not required to analyze worst-case accidents but they are required to analyze reasonably foreseeable accidents. DOE guidelines (DIRS 104601-DOE 1993) suggest that these include accidents with probabilities in the range of 1 in a million to 1 in 10 million per year. As discussed in Section 6.2.4.2 and J.1.4.2.1 of the EIS, the accident analyses in the EIS include these "maximum reasonably foreseeable accidents." In addition to accidents with a probability greater than 1×10^{-7} per year, the EIS presents the consequences from all accident severity categories presented in Sprung et al. (DIRS 152476-2000).

8.10 (5036)

Comment - EIS001520 / 0004

The analyses of the impacts of transportation accident should include estimates of the environmental impacts associated with cleaning up after any accidents that release radioactive materials to the environment.

The analyses of transportation accidents that result in releases of radioactive materials to the environment assume that the released materials are not cleaned up. While this assumption may provide a bounding estimate of the radiation doses that nearby residents could receive, it is unrealistic because it fails to estimate the environmental impacts of clean up (e.g., worker radiation exposure; condemnation of roads, land, or water supplies; disposal of contaminated soil and building materials). A methodology for make such estimates was presented in Transportation of Radionuclides in Urban Environs: Draft Environmental Assessment, NUREG/CR-0743; SAND 79-0369, July 1980. While somewhat dated, the cost estimates and perhaps the methodology could be updated for today's use. The Board recommends that the final EIS include estimates of the environmental impacts of clean-up after transportation accidents.

Response

In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments (DIRS 154814-Sandquist et al. 1985), and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $270 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 included data compiled from case studies involving actual cleanup of radioactive materials contamination. The studies address consequences for releases of radioactive materials in communities.

8.10 (5043)

Comment - EIS001520 / 0011

The draft EIS uses the "Modal Study" (discussed on page 6/29 of the draft EIS) in its analyses of transportation accidents. It is our understanding that this study will be updated by the U.S. Nuclear Regulatory Commission, but not in time for inclusion in the final Yucca Mountain EIS. The Board recommends that the final EIS note any efforts to update the study and discuss the DOE's plans for reviewing the results of any update to determine whether a supplement to the final EIS may be needed.

Response
Since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). DOE has concluded that the models used for analysis in the Draft EIS relied on assumptions about spent nuclear fuel and cask response to accident conditions that caused an overestimation of the resulting impacts. Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there could be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 presents consequences for accidents that could release radioactive materials.

8.10 (5294)
Comment - EIS000968 / 0011
By not identifying specific routes for shipment, key issues were not addressed in the DEIS. For example, the Cal-Nev Fuel Pipeline runs parallel to the Union Pacific Railroad from the San Bernardino area into the Las Vegas Valley. These 14" and 9" fuel lines could cause significant impact in the event of a rail accident, and they are the main supply of all motor vehicle and aircraft fuels into Southern Nevada.

Response
"Real-life conditions" that would involve various types of collisions (such as airplanes and military trucks carrying explosives), various natural disasters, specific locations (such as mountain passes or near pipelines), or various infrastructure accidents (such as track failure) in effect constitute a combination of cask failure mechanisms, impact velocities, and temperature ranges, which the EIS does evaluate. Shipping casks used to transport spent nuclear fuel and high-level radioactive waste would be massive, with design features that complied with strict regulatory requirements to ensure that the casks were fault-tolerant; that is, the casks would perform their safety functions even when damaged. Numerous tests and extensive anlyses, using the most advanced analytical methods available, have demonstrated that these types of shipping casks would provide containment and shielding even in the most severe kinds of accidents.

Since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses in this report, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in 99.99 percent of all accidents (of the thousands of shipments over the past 30 years, none has resulted in an injury due to release of radioactive materials). The analysis in the EIS used data presented by Sprung et al. (2000) and state-specific accident rates (DIRS 103455-Saricks and Tompkins 1999) to estimate the likelihood and severity of transportation accidents. The data from these studies are based on national data collected from actual accidents. The national data include accidents in which road hazards and other local conditions (such as pipeline failures) were contributing factors.

The analysis in the EIS estimated that during the approximately 53,000 truck shipments for the mostly legal-weight truck scenario there could be 66 accidents. Each of these would have less than a 0.1-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

8.10 (5708)
Comment - EIS001887 / 0323
Page 6-30; Box - Transportation Accidents

The Draft EIS incorrectly assumes that simply requiring contractors to comply with ANSI N14.27-1986-1993) will guarantee timely availability of the trained personnel and special equipment necessary for recovery and reshipment of casks damaged in severe accidents. In particular, DOE must demonstrate the economic and technical feasibility of recovering and re-shipping large (125 tons or greater loaded weight) rail casks such as those proposed for transport of civilian and naval reactor SNF [spent nuclear fuel]. The analysis must consider the possibility of significant loss of shielding and/or containment as a result of a severe accident or terrorist attack. The analysis must further consider the possibility of such incidents occurring in difficult terrain comparable to that found along potential rail routes identified in the Draft EIS, such as the Union Pacific railroad between Uvada and Elgin, and along potential HHT [heavy-haul truck] routes identified in the EIS, such as SR375 through Hancock Summit.

Response
DOE considers compliance with ANSI N14.27-1986 (DIRS 156289-ANSI 1987) to be only one element of effective emergency preparedness. There are many other elements of DOE's emergency preparedness program that help to ensure timely response to potential transportation accidents. The other elements include the accident response capabilities of DOE's eight Regional Coordinating Offices, preshipment planning, emergency response training for local first responders, satellite tracking and communications, driver training and awareness, and shipment prenotification. However, DOE is aware that risk minimization is best accomplished by preventing accidental releases in transit. The Type B accident-resistant packages that would be used to transport spent nuclear fuel and high-level radioactive waste are the key to prevention. However, should an accident occur, DOE, its contractors and carriers, and other Federal agencies would be prepared to respond. Section M.5 of the EIS provides more information about emergency preparedness for transportation accidents.

The EIS notes that the transportation carrier involved in an accident is responsible for planning, cost, and arrangements necessary to safely recover the shipment and clean up any radioactive contamination that occurred (see Section 6.2.4.2). Recovery of 23-metric-ton (25-ton) truck casks or rail casks weighing 110 metric tons (120 tons) is not an easy operation, especially in areas where deploying mobile carriers is difficult. However, capability to lift such weights does exist for rail and truck modes and would be deployed as required in the unlikely event of a cask leaving the conveyance or transport vehicle.

The Draft Request for Proposals for Waste Acceptance and Transportation Services (DIRS 153847-DOE 1998) describes Operational Protocols that the contractors would follow. These protocols are summarized in Section M.3 of the EIS. The Request for Proposals requires the transportation contractors to be responsible for providing DOE with specific written procedures that clearly define detailed actions to be taken in the event of an off-normal event. These procedures will address repair or replacement of equipment, or recovery, as appropriate. These requirements are applicable to transport by both truck and rail.

The EIS includes analyses of the public and worker health impacts of severe accidents that could result in failure of the shipping cask (see Sections 6.2.4.2 and 6.3.2). However, the specific locations of potential accidents cannot be predicted so bounding assumptions were made about the locations, such as conservative population distributions and weather conditions. An accident in difficult terrain, such as suggested by the commenter, would be unlikely to have greater health impacts than those analyzed in the EIS. This is because areas with difficult terrain would be sparsely populated in relation to the urban areas in which the maximum reasonably foreseeable accidents were assumed to occur.

8.10 (5713)
Comment - EIS001887 / 0326
Page 6-32 to 6-33; Section 6.2.4.2 .2– Impacts from Accidents – National Mostly Rail Scenario

The Draft EIS underestimates the radiological consequences of a maximum reasonably foreseeable rail accident by a least a factor 15, and by up to a factor of 40 or more. The number of latent cancer fatalities could be 1,380 or more.

Under contract with the State of Nevada, Radioactive Waste Management Associates (RWMA) prepared a bounding scenario analysis of the a accident reported in Table 6-12, using the RADTRAN and RISKIND models and a range of credible alternative assumptions about SNF [spent nuclear fuel] age and radiological characteristics, atmospheric dispersion, and population densities. Nevada is submitting the RWMA analysis as Attachment AA.

Response
The National Environmental Policy Act requires assessment of reasonably foreseeable impacts from proposed agency actions. In its various EISs, DOE has defined a reasonably foreseeable accident as one that has a frequency

of occurrence of at least once in 10 million years (1×10^{-7} per year). The concept of a maximum reasonably foreseeable accident is sometimes misinterpreted as being a “worst-case” accident. The analysis referred to by the commenter would be considered a worst-case analysis.

An example of a worst-case transportation accident would involve a shipment containing the highest possible quantity of spent nuclear fuel or high-level radioactive waste, in a highly populated area, with catastrophic failure of the shipping container, an engulfing fire lasting many hours, and stable weather conditions (very low atmospheric dispersion of plume). However, this worst-case accident scenario would not be reasonably foreseeable because it requires the simultaneous occurrence of a series of unlikely events, which, compounded, result in a likelihood of occurrence that is less than once in 10 million years. This is clearly the case with respect to the analysis referred to by the commenter, which assumed 10-year cooled spent nuclear fuel, the highest possible loading of crud on the external surfaces of fuel assemblies, population distribution equivalent to Manhattan, the highest possible release fractions, low wind speed, and stable atmospheric conditions. The analysis referred to by the commenter did not account for the probabilities of these conditions. The frequency of this specific accident scenario would be the combined frequency of any accident, the conditional probability of a severity category 6 event (as assumed by the commenter), and the probabilities of encountering the conditions discussed above (for example, low wind speed, 10-year cooled spent nuclear fuel, maximum crud source term). The frequency of this specific accident scenario would be well below the definition of maximum reasonably foreseeable. Council on Environmental Quality regulations (40 CFR 1502.22) state that analysis of accidents should avoid scenarios that are based on pure conjecture and avoid compounding conservatisms.

DOE is aware that there are uncertainties associated with the transportation impact results presented in the EIS. There are uncertainties associated with route characteristics, demographics, weather, atmospheric dispersion models, spent nuclear fuel characteristics, accident rates, release fractions, and many other elements of the risk assessments. Because one of DOE’s goals is to choose between alternatives, the consistent consideration of uncertainty among alternatives means that the relative differences in impact estimates among alternatives should not be affected. To account for uncertainties in the data, conservative assumptions were made so the impacts reported in the EIS would bound the potential impacts (that is, would produce results that are higher than the true risk). However, DOE has chosen not to use conservative assumptions in all cases, as this practice tends to produce unrealistic and improbable results. Consistent with Council on Environmental Quality regulations (40 CFR 1502.22), DOE is attempting to avoid compounding conservatisms, yielding unrealistic results, in analyzing environmental impacts. Such practices mask the real differences and would not produce suitable results to support choices among the alternatives. Thus, for example, DOE has chosen to use realistic waste characteristics information, accident rates, highway and rail distances between waste generators and the proposed repository, the number and distribution of people along the routes, and shipping cask capacities. DOE believes that the impacts presented in the EIS are bounding, yet not so conservative that the true differences among alternatives are masked. DOE does not believe it has understated the true risks of transporting spent nuclear fuel and high-level radioactive waste to the proposed Yucca Mountain Repository.

The analysis referred to by the commenter pointed out that the assumptions used in the EIS for the age and radiological characteristics of spent nuclear fuel in the maximum reasonably foreseeable accident scenarios could understate the transportation risks. It is true that DOE could ship some spent nuclear fuel that is more radioactive than the 26 year-old pressurized water reactor spent nuclear fuel analyzed in the scenario. Based on comments received and DOE’s additional review of technical documents and conduct of hazard analyses, the basis for the transportation impact analysis has been revised to consider commercial spent nuclear fuel that has median hazard. Spent nuclear fuel having median hazard would be discharged from a reactor approximately 14 years before shipment to Yucca Mountain. If any 5-year old or 10-year old spent nuclear fuel were to be shipped to the repository, it would be a small fraction of the total shipments. This is a case in which “average” data is used in the EIS as opposed to bounding assumptions. Consistent with Council on Environmental Quality regulations (40 CFR 1502.22), DOE is attempting to avoid compounding conservatisms, yielding unrealistic results, in analyzing accident scenarios. Other elements of the impact analyses (for example, radiation dose rates, atmospheric dispersion modeling, release fractions) are bounding such that the transportation impact results presented in the EIS are bounding.

8.10 (5731)
Comment - EIS001887 / 0339
Page 6-96; Section 6.3.3.1

Accidents

The Draft EIS discussion of HHT [heavy-haul truck] accidents is deficient. Because of the lack of actual experience with long distance HHT shipments, no meaningful empirical data is available to support the Draft EIS assertion that accident risks “are low for all five [route] alternatives.”(p. 6-96) HHT operations on the routes identified in the Draft EIS may experience substantially higher accident frequencies and consequences. For example, using Nevada average accident rates and projected shipment-miles for DOE’s Module 2 scenario, the expected number of HHT accidents on the Caliente route would be about 24 (12 loaded, 12 empty) over 39 years. The severity and consequences of accidents could be greater because of unique local hazards. Steep upgrades and downgrades (especially in combination with horizontal curves less than 800 feet radius) and critical side slopes and steep drop-offs (common near the summits of mountain passes) could subject casks to extreme accident impact forces and make emergency response, cask recovery, and post-accident cleanup difficult. Such conditions appear to exist near Oak Springs Summit on U.S. 93, near Hancock Summit on SR 375, and at several other locations along the Caliente HHT route.

Response
DOE recognizes the special considerations associated with heavy-haul truck shipments along the five candidate routes identified in the EIS. Road upgrades would be needed along these routes before their use to ship casks containing spent nuclear fuel and high-level radioactive waste. Tables J-36 through J-40 of the EIS summarize the road upgrades needed for the five routes. Heavy-haul truck shipments would be subject to permit conditions established by the State of Nevada, which would establish escort requirements and speed limit and other restrictions to reduce the risk of accidents associated with such shipments. Based on the restrictions placed on heavy-haul truck shipments, DOE believes that the use of Nevada average accident rates overestimates accident risks.

8.10 (5882)
Comment - EIS001900 / 0003
The DEIS does not examine the potential impact of transportation accidents in Connecticut or elsewhere. Yet, the Department of Energy has estimated that a severe accident in the transport of such waste would contaminate 42 square miles for well over one year. The State of Connecticut lacks an infrastructure to deal with such a disaster.

Response
In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments (DIRS 154814-Sandquist at al. 1985), and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $270 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 included data compiled from case studies involving actual cleanup of radioactive materials contamination. The studies address consequences for releases of radioactive materials in communities.

8.10 (6233)
Comment - EIS001560 / 0005
One of which was the estimate of the chances of an accident being one to two in 10 million, I believe that’s what was said. That sounds like a statistic and statistics are usually based on experience. Now does this mean that there have been one or two accidents already in 10 million tries, I doubt it. I think they have, somehow, come up with an estimate and made it sound like a valid statistic. Which concerns me greatly, especially because the difference between one and two in 10 million is a hundred percent difference in a statistic. So where is this estimate from?

Response
The EIS contains a discussion of potential impacts from accidents in both the mostly legal-weight truck scenario and the mostly rail scenario (see Section 6.2.4.2). The accident analysis included a description of the consequences of a severe accident that resulted in a leak in a transportation cask, although that is an extremely unlikely event [an

annual probability of 1.4 (rail) to 1.9 (truck) in 10 million]. A transportation cask could only leak if mechanical forces (impact) and heat (fire) exceeded the design limits of the transportation cask structures and materials. Section M.4 provides additional information on the safety and test of transportation casks. DOE believes the accident analyzed in the EIS covers accidents from all sources including heat, mechanical impacts, sabotage, impacts from airplanes and weapons, and mountain rollovers.

DOE, the U.S. Department of Transportation, and the Nuclear Regulatory Commission recognize that there are many uncertainties with rail or highway transportation. Many hazards exist—accidents, other drivers, weather problems, road or track problems—that could ultimately compromise safety. To mitigate the potential for a release of radioactive materials caused by these uncertainties, the Federal agencies listed above have a myriad of regulations, if adequately implemented, to preclude any release of radioactive materials. The Departments of Energy and Transportation and the Nuclear Regulatory Commission take human behavior seriously and consider this factor in all that they do, from selection and training of personnel to post transport evaluations (see Section J.1.4.2.1 of the EIS).

Factors that affect accident probability include state-specific accident rates; accidents per kilometer; the fraction of accidents that occur in rural, suburban, and urban population zones; the probability that an accident would be of a certain severity; and the annual shipping mileage in rural, suburban, and urban population zones. Weather conditions affect the probability of accident consequences because stable, worst-case, weather conditions are only about one-tenth as likely as neutral, average weather conditions.

8.10 (6332)
Comment - EIS001613 / 0002
I am not a scientist and I do not have enough information to completely dismiss the analysis and tests performed by the DOE to ensure the safe transportation of this hazardous material, but I do understand that these trucks will be driving through communities across America, and that one small release of radioactive material in a rural area would contaminate 42 square miles, require 460 days to clean and cost up to $620 million.

From your comments earlier tonight, I think we can all agree that human error is possible and, therefore, catastrophe could not be completely ruled out. I hope that your analysis is honest and not skewed to make it seem that the Department of Energy is taking responsibility for their actions.

On my way over here tonight, I was imagining the visual terror of thousands of trucks bearing the nuclear energy emblem driving through our communities as a reminder to our children that they will have to bear the burden of our actions.

Response
The EIS acknowledges that transportation accidents could occur during the transport of radioactive materials to the proposed Yucca Mountain Repository. In Section J.1.4.2.3.2, the EIS estimates that there could be as many as 66 accidents under the mostly legal-weight truck shipping scenario and 8 accidents could occur under the mostly rail scenario. A study recently conducted by the Nuclear Regulatory Commission (DIRS 152476-Sprung et al., 2000) concluded that only a tiny fraction of all accidents, less than one in 10,000, would be severe enough to result in a release of radioactivity from a spent nuclear fuel shipping cask. The reason for this is the rigorous design, performance, and testing requirements (see 10 CFR Part 71) for spent nuclear fuel and high-level radioactive waste shipping casks. Based on these statistics, DOE does not expect an accident to occur that would result in a radiological release and subsequent environmental cleanup.

Human error was considered in the EIS transportation analyses. For example, the truck and rail accident rates used in the EIS included accidents involving all causes, including those with human error as a cause. Human error in design, manufacturing, or use of transportation casks would be minimized through an aggressive quality assurance program and oversight by the Nuclear Regulatory Commission. Detailed written procedures would cover handling and loading of shipping casks at the commercial and DOE generator facilities and the proposed repository. Dry runs would familiarize operators with the shipping cask, cask handling equipment, and site-specific cask handling procedures. The transportation contractors, in addition to driver training and certification programs, would conduct detailed preshipment planning. All of these activities, and others, are designed to minimize the impacts of human errors. However, the greatest protection against human error during transportation would be the accident-resistant

Type B shipping casks used to transport spent nuclear fuel and high-level radioactive waste. A properly designed, fabricated, loaded, and maintained shipping cask would reduce vulnerabilities to all accidents, including human error, to levels that provided adequate protection to the public, workers, and environment.

In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments (DIRS 154814-Sandquist et al. 1985), and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $270 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 included data compiled from case studies involving actual cleanup of radioactive materials contamination. The studies address consequences for releases of radioactive materials in communities.

8.10 (6476)
Comment - EIS001632 / 0033
Page 3-142, Sections 3.3.2 and 3.3.3: The draft EIS briefly discusses ground and surface water impacts, but we were unable to find an assessment of ground water contamination from a surface spill. The transportation impacts analysis should consider ground water recharge zones and the proximity of transportation corridors to ground water supplies and community water systems.

Response
The EIS sections cited by this comment identify potentially affected waterways and groundwater characteristics pertaining to the 77 commercial and DOE generator sites. Sections 7.2.1.3 and 7.2.2.3 discuss the potential hydrologic impacts associated with the No-Action scenarios.

With regard to transportation, Sections 3.2.2.1.3 and 3.2.2.2.3 of the EIS provides information on hydrology related to transportation corridors within Nevada. Table 3-37 and 3-39 present surface-water resources and groundwater basins, respectively, along the candidate rail corridors. Table 3-58 and 3-59 do the same for candidate heavy-haul truck routes. For Nevada transportation, potential impacts to hydrology from construction and operations are presented throughout Chapter 6. For example, see Section 6.3.2.2.1. The analyses are based on an identification of surface-water resources within the 400-meter (0.25-mile) corridor for each alternative and outside the corridor, but within 1 kilometer (0.6 mile). Designated groundwater basins are identified.

DOE does not specifically analyze a transportation accident, such as a spill, involving contamination of surface water or groundwater because the casks are designed to be watertight and spent nuclear fuel and high-level radioactive waste are not easily dispersed in water. While small particles could be generated by the impact forces of an accident, and driven out of a shipping cask by a severe fire, the amount of contamination that could ultimately enter groundwater would be much lower than that which would initially enter surface waters. Factors such as soil sorption of radionuclides, rate of flow into recharge areas, dilution by rain water and surface water, dilution by the large volume of groundwater, and delay associated with infiltration would mitigate and greatly reduce any contamination that could occur. Therefore, water pathway contamination, including subsequent contamination of food and natural resources, would not be a significant contributor to the radiological risks of transporting spent nuclear fuel. DOE has, however, identified potential mitigation measures for surface water and groundwater from the construction and operation of transportation systems. See Sections 9.3.3.1 and 9.3.3.2 of the EIS.

8.10 (6622)
Comment - EIS000938 / 0013
The analysis that was conducted to evaluate the dust cloud created by an accident is fatally flawed. Volume 2, Page J-8, 4th paragraph states that the average meteorological conditions are the national averages for wind speed and atmospheric stability. This assumption is assured for the State of California where North winds cause natural wind tunnels. An accident in one of the passes could spread the toxic dust cloud over the entire LA [Los Angeles] basin. DOE must utilize the wind and atmospheric conditions for the area being studied for the impact of a terrorist attack.

Response
The precise location, timing, prevailing weather conditions, and other circumstances surrounding a transportation accident cannot be predicted. In addition, it would not be practical for the EIS to attempt to analyze accident

consequences for every location along the shipping route. Instead, maximum consequences were analyzed for three types of population zones: urban, suburban, and rural. For example, an accident in the Las Vegas area would be characterized by the analysis for an urban area. In addition, the analysis of maximum reasonably foreseeable accidents considered conservative 95-percent meteorological conditions (conditions that are exceeded less than 5 percent of the time). These meteorological conditions result in larger impacts than the "average" conditions referred to by the commenter. Tables 6-14 and 6-15 of the EIS provide the estimated impacts of the maximum reasonably foreseeable accident in an urbanized area for truck and rail, respectively. Table J-24 shows consequences of maximum reasonably foreseeable accidents in urbanized and rural areas.

Section 6.2.4.2.3 of the EIS discusses potential sabotage. The use of average wind speeds and neutral atmospheric conditions does not greatly affect the estimated consequence of the event, should it occur. In fact, higher wind speeds and less stable atmospheric conditions would be expected to decrease the potential dose received by individuals in the path of any the release. The analyses in the EIS estimate as many as 48 latent cancer fatalities could result from a successful sabotage attack on a spent nuclear fuel shipping cask.

8.10 (6693)
Comment - EIS001632 / 0087
Page J-8, second full paragraph: This paragraph discussed the methodology used to estimate, the radiation impact resulting from accidents. The spectrum of possible accident severity was divided into categories. Then "each category of severity received a conditional probability of occurrence." A release fraction was assigned to each category. Please provide a brief discussion of how values were assigned and a table listing the values.

Response
Section J.1.4.2.1 of the EIS contains a discussion of accident severity categories, conditional probabilities, and release fractions. Figure J-9 shows the values for pressurized-water and boiling-water reactor spent nuclear fuel, respectively.

8.10 (6700)
Comment - EIS001878 / 0064
Incidents and accidents involving military aircraft and ground transportation have occurred in Nevada in the past, and may also occur in the future. The DEIS does not specifically evaluate this risk. The FEIS for Withdrawal of Public Lands for Range Safety and Public Purposes, NAS Fallon, NV (Department of the Navy, May 1998) and the FEIS, Proposed Fallon Range Training Complex Requirements, NAS Fallon, NV (Department of the Navy and Bureau of Land Management, January 2000) address the public safety impacts and other impacts of military aircraft operations in areas that would be affected by the transportation elements of the proposed action. However, the Yucca Mountain DEIS does not adequately consider: (1) potential cumulative public safety impacts, (2) whether the transportation elements of the proposed action would adversely affect the Navy's and the BLM's [Bureau of Land Management's] risk assessments, or (3) threats from military training flights associated with the Fallon NAS to trucks and trains carrying SNF [spent nuclear fuel] and HLW [high-level radioactive waste]. See Exhibit K for a map depicting current military flight patterns, which include many thousands of annual operations according to the Navy and the BLM.

Response
System malfunctions or material failures that could result in either an accidental release of ordnance or release of a practice weapon were discussed in the Renewal of the *Nellis Air Force Range Land Withdrawal Legislative Environmental Impact Statement*, the *Final Environmental Impact Statement, Withdrawal of Public Lands for Range Safety and Training Purposes, Naval Air Station Fallon, Nevada*, and the *Final Environmental Impact Statement, Proposed Fallon Range Training Complex Requirements, Naval Air Station Fallon, Nevada*. The *Special Nevada Report* (DIRS 153277-SAIC 1991) states that the probability of dropped ordnance resulting in injury, death, or property damage ranges from about 1 in 1 billion to 1 in 1 trillion per dropped ordnance incident, with an average of about 1 in 10 billion per dropped ordnance incident. Less than one dropped ordnance incident is estimated per year for Nellis Air Force Range and Naval Air Station Fallon. Because the probability of such an accident is so low and, should an aircraft accident occur, the potential for release from such an accident is unlikely, no further analysis is presented in this EIS. In addition, considering the risk assessments presented in the Nellis Air Force Range, Naval Air Station Fallon, and this EIS, military training flights would not pose a safety threat to trucks or trains carrying

spent nuclear fuel or high-level radioactive waste nor a health risk to populations in the area. It is the Department's opinion that the EIS adequately analyzes impacts to transportation from military activities.

Bechtel-SAIC Company (DIRS 157210-BSC 2001) estimated the potential releases of radioactive materials that could result from the crash of a commercial jet airliner into a shipping cask containing spent nuclear fuel. According to the analysis, the release from a rail cask struck by a jet engine traveling 640 kilometers (400 miles) per hour and exposed to the ensuring jet-fuel fire would be no greater than the releases in a severe rail transportation accident in which the cask impacted a hard rock surface at between 48 and 97 kilometers (30 and 60 miles) per hour and was engulfed by fire for 0.5 hour. The consequences of this accident–1,300 person-rem or 0.67 latent cancer fatality–are presented in Section J.1.4.2 of the EIS. The consequences for an event in which the commercial airliner impacted a legal-weight truck cask would be about the same–1,100 person rem or 0.57 latent cancer fatality. A truck cask event that would have similar consequences would involve impact into a hard rock surface at a speed greater than 190 kilometers (120 miles) per hour followed by an engulfing fire for up to 0.5 hour.

8.10 (6769)
Comment - EIS001522 / 0010
It is even more question-begging, and even more incredible, when DOE knows neither the canister that will eventually be designed, nor the routes, nor the modes of transport, to claim that "the overall radiological accident risk ... from all accident scenarios over the 24 years of transportation activities ... would be about 0.07 latent cancer fatalities" at most (DEIS, 1999, 6-7). Obviously such fatalities depend strongly on the mode and routes of transport, so these figures appear to be mere guesses, and surely they are not science. Besides, as the state of Nevada pointed out, the DOE simplified cask design and accident scenarios, "created" data to fill the gaps, ignored human error in transport, and so on (DEIS, 1999, 6-29). Given all these problems with the DOE's using subjective data, there is no way that a reliable probability about cancer fatalities, induced by transport, could be given by the DOE. And if not, then the DEIS is not an example of science but an example of mere opinion, rhetoric, and begging the question.

Response
The transportation analysis in the EIS provides a reliable estimate of risks and impacts from shipments of spent nuclear fuel and high-level radioactive waste to the repository at a national level. At present, DOE cannot predict the actual mix of rail and legal-weight truck shipments that could occur. Therefore, the EIS analyzes two scenarios, mostly legal-weight truck and mostly train (rail), as bases for the transportation risk assessment. Using these scenarios, the analysis in the EIS describes the range of legal-weight truck and rail shipments that could occur. As a consequence, the transportation impacts that result from the actual mix of rail and legal-weight truck shipments when the repository was operational would be within the range of impacts estimated in the EIS.

The EIS contains a discussion of potential impacts from accidents in both the mostly legal-weight truck scenario and the mostly rail scenario (see Section 6.2.4.2 of the EIS). The accident analysis includes a description of the consequences of a severe accident that resulted in a leak in a transportation cask, although that is an extremely unlikely event [an annual probability of 1.4 (rail) to 1.9 (truck) in 10 million]. A transportation cask could only leak if mechanical forces (impact) and heat (fire) exceeded the design limits of the transportation cask structures and materials. Section M.4 provides additional information on the safety and test of transportation casks. DOE believes the accident analyzed in the EIS covers accidents from all sources including heat, mechanical impacts, sabotage, impacts from airplanes and weapons, and mountain rollovers.

DOE, the U.S. Department of Transportation, and the Nuclear Regulatory Commission recognize that there are many uncertainties with rail or highway transportation. Many hazards exist—accidents, other drivers, weather problems, road or track problems—that could ultimately compromise safety. To mitigate the potential for a release of radioactive materials caused by these uncertainties, the Federal agencies listed above have a myriad of regulations, if adequately implemented, to preclude any release of radioactive materials. The Departments of Energy and Transportation and the Nuclear Regulatory Commission take human behavior seriously and consider this factor in all that they do from selection and training of personnel to post-transport evaluations (see Section J.1.4.2.1 of the EIS).

The choice of canister type would not affect the transportation risk analysis because canistered and uncanistered fuel would be shipped inside Type B containers that met Nuclear Regulatory Commissions regulations for shipment of spent nuclear fuel and high-level radioactive waste.

DOE has not determined the specific routes it would use to ship spent nuclear fuel and high-level radioactive waste to the proposed repository. Nevertheless, the analysis in the EIS used current regulations governing highway shipments and historic rail industry practices to select existing highway and rail routes. This approach is consistent with previous DOE environmental impact statements that have evaluated national transportation impacts and provides a reasonable estimate of the potential environmental impacts of transportation of spent nuclear fuel and high-level radioactive waste to the proposed repository.

8.10 (6916)
Comment - EIS001784 / 0005
We need a lot more information on nuclear transport accidents that have occurred in the 2,500 “successful” shipments of similar high-level radioactive wastes that I have read have already taken place in the U.S. Where can I get this information? Will it be available to the public if the effort to upload Yucca Mountain with mega-rads goes into effect?

Response
The EIS does not refer to 2,500 successful shipments. It does use recognized analytical methods that incorporate accident experience data to estimate the likely impacts of the transportation of spent nuclear fuel and high-level radioactive waste. Besides the descriptions of transportation in this EIS (Chapter 6 and Appendix J), the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs: Final Environmental Impact Statement* (DIRS 101802-DOE 1995) contains more information. In addition, the *Idaho High-Level Waste and Facilities Disposition Draft Environmental Impact Statement* (DIRS 155100-DOE 1999) contains information on waste shipments.

The Yucca Mountain Project provides technical and project information on its Internet site (*http://www.ymp.gov*) and other media. The EIS contains revised information on the transportation of spent nuclear fuel and high-level radioactive waste.

8.10 (7083)
Comment - EIS001873 / 0032
P. 2-53. DEIS should state the maximum amount of radioactive waste that could be held at an intermodal facility and the maximum time that it could be held. These figures should be the basis for normal and accident scenario impacts including sabotage and terrorism. Security facilities connected with the intermodal sites should be identified.

Response
At this time, the heavy-haul truck alternatives for transporting spent nuclear fuel and high-level radioactive waste to the proposed repository are in conceptual stages of development. A concept for an intermodal transfer station is shown in Figure 2-28 and for a heavy-haul truck system is shown in Figure 2-29. A determination of the amount of the radioactive material and the amount of time a shipping cask would be held at the intermodal transfer station is unknown. However, if DOE decided to use heavy-haul truck transport and construct an intermodal transfer station within Nevada, it would conduct additional field surveys, state and local government consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews. The detailed information requested by the commenter would be developed as part of more detailed design and engineering studies, should DOE decide to use heavy-haul truck. In addition, detailed safety analyses of the intermodal transfer station would be conducted to evaluate more fully the final design and provide the basis for the identification of systems, structures, and components important to safety, technical specifications, safety-related controls, and safe operating procedures. For the purposes of the EIS, DOE believes it has adequately demonstrated the feasibility of the heavy-haul truck implementing alternatives, including the intermodal transfer station, and developed them sufficiently to support comparisons of alternatives and decisionmaking about transportation alternatives.

With respect to identification of security facilities, much of the security information about the intermodal transfer station would be protected as safeguards information. This would include such things as the designs and capabilities of physical protection systems, number and deployment of the protective force, locations and capabilities of intruder detection systems, etc. Information of this type is protected to prevent its disclosure to potential terrorists or saboteurs. As discussed above, additional engineering and design studies would be conducted, including development of physical security systems, if DOE decided to construct an intermodal transfer station.

8.10 (7099)

Comment - EIS000995 / 0011

During the Three Mile Island shipments, there was an accident on the very same, highly inspected and maintained train tracks, luckily not involving the TMI shipments. This accident sticks in my mind because it was in a very hard to reach area that was, also, close to highly populated communities. The accident involved train cars hanging, suspended, off of a train trestle over a river. For many hours they hung there while a high-intensity, long-duration fire blazed beneath them. It was a struggle for the emergency personnel to get to the accident site, severely delaying their response. What dangers would this type of accident present if the train cars were carrying the casks containing high-level radioactive waste from radioactive reactors nationwide?

Response

In the severe transportation accidents analyzed in the EIS, fully engulfing fires were analyzed. This means that the cask was assumed to be at the center of the fire, were the amount of heat transferred to the cask would be the greatest. At other locations, such as the cask dangling above the fire, the amount of heat transferred to the cask would be less and therefore, the amount of damage to the cask would also be less. Therefore, the consequences of the type of accident described by the commenter would be less than the consequences of the severe transportation accidents presented in the EIS.

The consequences of these severe accidents are presented in Sections 6.2.4.2.1 and 6.2.4.2.2 of the EIS for truck and rail transportation, respectively. For a severe truck accident, the probability is about 2.3 in 10 million per year. The consequences of this severe truck accident were estimated to be 0.55 latent cancer fatality. For a severe rail accident, the probability is about 2.8 in 10 million per year. The consequences of this severe rail accident were estimated to be 5 latent cancer fatalities.

8.10 (7265)

Comment - EIS001832 / 0013

DOE NEPA [National Environmental Policy Act] guidance to consider 1 in 10 million events is inconsistent with public policy elsewhere. Considering that used fuel will be transported for a relatively short period of time, the chances that such a “worst case accident” might occur is essentially zero. The chances of such a fatal accident are far less than those of loss of life due to meteor impact, which has a probability of occurrence of 1 in 100,000 years.* To find such an improbable accident to analyze, DOE had to go farther into the realm of the incredible than they will be required to do by the responsible regulatory authorities.** The extreme conservatism of going beyond what is reasonable, in postulating worst case accidents, forces DOE to consider severe transportation accident scenarios that are not credible thereby increasing the calculated environmental impacts and effects to non credible levels.

DOE’s analysis of these highly improbable severe transportation accidents also assumes no mitigation, which is misleading. In reality, a swift and comprehensive emergency response would follow any severe transportation accident. While DOE must consider the full impacts of a postulated severe transportation accident, DOE should also include the results of mitigation measures related to emergency response.

If DOE believes it is required to leave analyses in the FEIS that consider 1 in 10 million events, the FEIS should, at a minimum, also describe the effects at higher, more realistic probabilities.

*United States Atomic Energy Commission, Reactor Safety Study, WASH-1400, August 1974

**For example, NRC [Nuclear Regulatory Commission] has proposed, in updating its Reactor Safety Goal Policy Statement, requiring licensees to evaluate large early release events having a probability of 1 in 10,000 or greater.

Response

The *Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements* (DIRS 104601-DOE 1993) requires evaluation of high-consequence, low-probability accidents. This requirement is interpreted to mean accidents with at least a 1-in-10-million-per-year probability. These accidents are known as maximum reasonably foreseeable accidents. In order to provide an upper bound on potential consequences, DOE has chosen to not include the effects of mitigation, although interdiction of foodstuffs is assumed in evaluating the consequences of the maximum reasonably foreseeable accident. In the transportation risk assessment, a complete spectrum of accidents was evaluated, including accidents with higher probabilities than the maximum reasonably foreseeable accident. The radiological risks from transportation accidents were found to be very low. The analysis of accidents for national transportation of spent nuclear fuel and high-level radioactive waste to a Yucca Mountain Repository is presented in Section 6.2.4.2 of the EIS.

8.10 (7273)
Comment - EIS001832 / 0021
Because the transportation of spent nuclear fuel is a subject of considerable public concern, DOE should put the transportation risk into perspective (as suggested in Comment I) with other non-voluntary risks that might be better understood by the general public. It should be evident, and clearly identified, that the risk associated with the transport of spent fuel as part of the proposed action is small. It may also be useful to put into perspective the less than 1 in 10 million probability of the severe transportation accident evaluated in the analysis (such as comparing it to the chance of a meteor striking a person.

Response
Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less.

8.10 (7383)
Comment - EIS001887 / 0325
Impacts of Maximum Reasonably Foreseeable Accident

The Draft EIS underestimates the consequences of a maximum reasonably foreseeable accident. The consequence assessment reported in Table 6-11 considered a cask loaded with 26 year-old PWR SNF [pressurized-water reactor spent nuclear fuel]. The Draft EIS should have evaluated a range of accident scenarios, including a cask loaded with 10 year-old PWR SNF and a range of other critical assumptions, including release height, atmospheric dispersion models, and downwind population densities. Nevada believes that RADTRAN and RISKIND analyses of the same accident involving 10 year-old fuel and other credible alternative assumptions would result in latent cancer fatalities higher by a factor of 2 to a factor of 40 or more, that is, 10 to 200 latent cancer fatalities.

Further, the NRC [Nuclear Regulatory Commission] recently authorized utilities to plan for truck shipments of 5 year Cooled, high enrichment (5 percent), high-burnup (62,000 MWR/MTHM) fuel to Yucca Mountain (Addendum 1 to NUREG-1437), and the discussion at page 6-12 indicates that DOE is not only aware of, but concurs in, the NRC assessment. Therefore, a legally sufficient evaluation of the maximum reasonably foreseeable accident should include a RADTRAN and RISKIND analysis of the same accident involving a GA 4 cask loaded with SNF having the same maximum radiological characteristics approved by the NRC. The human health effects of the same accident could be hundreds of times greater than those reported in Table 6-11.

Response
Based on comments the characteristics of the spent nuclear fuel used in the transportation analyses have been revised. As discussed in Section A.2.1.5 of the EIS, the revised spent nuclear fuel characteristics are

- Pressurized-water reactor -- 15 years old, 50 gigawatt-days per metric ton of heavy metal (MTHM) of burnup, 4.5 percent enrichment

- Boiling-water reactor -- 14 years old, 40 gigawatt-days per MTHM of burnup, 3.5 percent enrichment

These characteristics were derived through a dose-based hazard index analysis using the radionuclide inventory of the assemblies and the screening models in *Screening Models for Releases of Radionuclides to Atmosphere, Surface Water, and Ground* (DIRS 101822-NCRP 1996). These screening models account for all exposure pathways.

The choice of these spent nuclear fuel assembly characteristics was based on a detailed hazards analysis that is discussed in Appendix A of the EIS. A spent nuclear fuel assembly with these characteristics has potentially higher accident consequences than more than 70 percent of the total number of spent nuclear fuel assemblies.

8.10 (7496)
Comment - EIS001576 / 0002
There is an analysis going on at the present time looking at interstates throughout the continental United States and looking at what kinds of obstacles are along the interstates. For instance, bridge abutments. On the interstate highway system a bridge abutment cannot be at 90 degrees from the roadway. It must be sloped away from the roadway and it must be tilted away from the roadway. So those kinds of things would cause glancing accidents, we've looked at those events but what is along that right of way that you could run into that might challenge the cask. So far and they haven't finished this, but they've done those stretches of roadway which were recommended as being the most likely to have these kinds of obstacles. They've come up to the conclusion that given what's alongside the highway that you could run in to, the cask would have to be traveling sideways, because it's got impact limiters on the end, which would abrogate the impact, but it had to be traveling sideways, at a speed of about 120 miles an hour in order to cause the cask to fail in some way. Not to break open, they're not egg shells, but to cause a leakage in some other part of the cask, usually the seals. I don't know about you, I've seen a lot of 18 wheelers going very fast, but I've never seen one going 120.

Response
DOE agrees that cask failure during a truck accident would be unlikely.

8.10 (7831)
Comment - EIS001595 / 0002
America's roads and rails are not reliable enough to bear this lethal load. We in Illinois remember the recent ghastly rail wreck in Bourbonnais where two steel cars compacted to a few feet thick.

Two weeks ago I was on I-80 going out to Omaha and it was littered with overturned semi's from an ice storm that had killed four professional drivers and scattered their loads onto the highway. The system proposed requires perfection and we do not have it. There is weather, there is human error and there is technical error.

Response
As discussed in Appendixes J and M, most real-world accidents that have been postulated, including truck crashes into bridges, train derailments followed by fires, derailments followed by immersion of a cask into a river, and similar extreme accident conditions, would not likely result in release of radioactive materials from the shipping casks. The performance standards for the casks prescribed by the Nuclear Regulatory Commission ensure that less than 0.01 percent of real-world accidents would result in loss of cask integrity and release of radioactivity from the cask. These standards ensure that the casks would be extremely robust.

Adequate roads, highways, rail lines, crossings, bridges, and tunnels exist to support spent nuclear fuel and high-level radioactive waste transportation, which requires no special transportation infrastructure that is not necessary for the safe transportation of commodities in the United States.

As discussed in Section M.3.2.1.4 of the EIS, highway route determination would consider weather. The accident rates used in the EIS to analyze transportation impacts included accidents of all causes, including human errors and technical errors. More details on these accident rates are contained in Section J.1.4.2.3. Risks associated with transportation of radioactive material through Illinois are presented in Table J-82 of the EIS.

8.10 (7955)
Comment - EIS001903 / 0016
Pp. J-60 to J-63. The EIS should include a qualitative discussion of the nature of the maximum reasonably foreseeable accident scenarios. The EIS should also identify the composition and amount of material at risk (i.e., what kind of fuel and how much?) and what release fractions (from Table J-21 to Table J-22) were used.

Response
Section J.1.4.2 of the EIS has been revised to include a description of the maximum reasonably foreseeable accident. As in the U.S. Nuclear Regulatory Commission report *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000), the description is in terms of cask failure mechanism, impact velocity range, and temperature range for the accident. Other accidents are described in a similar manner in Section 7.2.6 of Sprung et al. (2000). Some of these accidents result in impact velocities and temperatures that exceed the U.S. Nuclear Regulatory Commission cask performance standards in 10 CFR Part 71.

The qualitative description of the accident has been expanded and clarified.

8.10 (7966)
Comment - EIS001791 / 0002
Where I live I've heard the train whistle. I know the patterns of the train whistles as they go past my house and there have been times in the recent past where those train whistles blow constantly and constantly, and I have run up to the track to see what was wrong. The signals are off and there's people crossing the tracks without knowing there's a train approaching, so that kind of potential is possible.

Response
The rail accident data used in the EIS included accidents of all causes, including grade crossing incidents, as discussed by the commenter. More details on the rail accident data are provided in Section J.1.4.2.3 of the EIS.

8.10 (8050)
Comment - EIS002001 / 0003
What will happen to us if a truck gets into a wreck and an explosion occurs? Think of the people in it will hurt or even kill.

Response
The EIS acknowledges that transportation accidents could occur during the transport of radioactive materials to the proposed Yucca Mountain Repository. In Section J.1.4.2.3.2, the EIS estimates that there could be as many as 66 accidents under the mostly legal-weight truck shipping scenario and 8 accidents could occur under the mostly rail scenario. A study recently conducted by the Nuclear Regulatory Commission (DIRS 152476-Sprung et al. 2000) concluded that only a tiny fraction of all accidents, less than one in 10,000, would be severe enough to result in a release from a spent nuclear fuel shipping cask. The reason for this is the rigorous design, performance, and testing requirements (see 10 CFR Part 71) for spent nuclear fuel and high-level radioactive waste shipping casks. Based on these statistics, DOE does not expect an accident to occur that would result in a radiological release and subsequent environmental cleanup.

Although it is extremely unlikely that an accident would occur resulting in functional damage to the cask and a release of radioactivity, the EIS evaluates the consequences of such an accident if it occurred. For example, Table 6-14 provides the estimated impacts of the maximum reasonably foreseeable accident for truck transportation. The highest consequences would occur in an urbanized area resulting in about 0.55 latent cancer fatality. The likelihood of such an accident is very small, about 2.3 in 10 million years. Table 6-15 presents this same data for the mostly rail scenario. The maximum reasonably foreseeable accident for rail transportation would occur in an urbanized area resulting in about 5 latent cancer fatalities. Similar to the truck accident, the likelihood of such a rail accident is very small, about 2.8 in 10 million years.

8.10 (8109)
Comment - EIS001873 / 0006
One worst-case accident scenario for a transportation accident involving highly radioactive waste indicates a 40-square mile area would be contaminated. Nuclear waste accidents have a potential for extremely bad consequences, which must be weighed against their probability of occurrence. In Caliente, the probability of occurrence would appear to be much higher if a transfer depot were located near the city than if train shipments were just passing through.

Response

The EIS acknowledges that transportation accidents could occur during the transport of radioactive materials to the proposed Yucca Mountain repository. In Section J.1.4.2.3.2, the EIS estimates that there could be as many as 40 accidents under the mostly legal-weight truck shipping scenario and 2 accidents could occur under the mostly rail scenario. A study recently conducted by the Nuclear Regulatory Commission (DIRS 152476-Sprung et al. 2000) concluded that only a tiny fraction of all accidents, less than one in 10,000, would be severe enough to fail a spent nuclear fuel shipping cask. The reason for this is the rigorous design, performance, and testing requirements (see 10 CFR Part 71) for spent nuclear fuel and high-level radioactive waste shipping casks. Based on these statistics, DOE does not expect an accident to occur that would result in a radiological release and subsequent environmental cleanup.

However, in response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments (DIRS 154814-Sandquist et al. 1985), and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $270 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 included data compiled from case studies involving actual cleanup of radioactive materials contamination. The studies address consequences for releases of radioactive materials in communities.

Potential accidents at an intermodal transfer station were analyzed in Section J.3.3.1. Because the spent nuclear fuel and high-level radioactive waste would remain within the sealed transportation casks while at the intermodal transfer station, they are not very vulnerable to release from the casks. This analysis found no credible accidents with the potential for release of radioactive materials from the transportation casks being handled at the facility.

8.10 (8154)

Comment - EIS001653 / 0093

Pg 6-41 Maximum Accident-should be based upon shipment miles.

Response

DOE based the probabilities, or frequencies, of the maximum reasonably foreseeable accidents calculated in the EIS on the total shipment miles, as suggested by this comment. With the exception of Nevada, which would host the proposed repository, DOE chose to describe transportation impacts on a national rather than a regional level. The EIS indicates that because transportation impacts on the national level would be low, impacts for individual regions would be lower.

8.10 (8255)

Comment - EIS000817 / 0100

P. 4-59. No matter how you look at it, hauling waste across the country and storing it at Nevada has to bring an increase to cancer and radiation doses. Why risk this? Too many accidents are possible. Some will happen. Human error will be a big concern. This is not a perfect world.

Response

Transporting spent nuclear fuel and high-level radioactive waste across the country could result in a slight increase in radiation doses and cancer rates for people along the transport routes. In Section 6.2.3 of the EIS, DOE has estimated that there could be up to 1.6 to 2.5 latent cancer fatalities from the routine shipping of spent nuclear fuel and high-level radioactive waste by legal-weight trucks and by rail. Transportation accidents, including those caused by human error, were examined in the EIS. In Section 6.2.4, DOE estimated that there is a 2.3 in 10 million probability per year of a maximum foreseeable truck accident. Should the accident occur, there could be about 0.55 latent cancer fatality in the exposed population. For perspective, there would be about 220,000 cancer fatalities in a population on 1 million along the transport routes from other causes besides the transport of spent nuclear fuel and high-level radioactive waste.

8.10 (8291)

Comment - EIS001575 / 0001

As we try to do this plan of taking nuclear waste and moving it all across the country, it's like a standardized McDonald operation, every truck will be the same, every driver will be the same, I'm sure there won't be any variables. Well, I just wrote down a few variables. Who makes the trucks? Are they always exactly the same?

60 minutes or 20/20 just had a program that said about licensing of drivers. It said that they have no information about drivers, they don't have anything about their records, they don't have anything about their mental states, there's 10,000 variables. We see bus drivers go off the road because they have a heart condition. We see two basketball players going 100 miles an hour and one of them doesn't even have a license and one of them does. There's so many variables in this thing. What happens if weather comes, black ice? What if two kids in Lakewood, playing around with a crowbar on one of those rail tracks decide just to move one a little bit? It's just a little bit of vandalism, it isn't gonna matter at all. Poor people here in Lakewood, they thought they had it so well because Mayor White is going to eliminate the sirens through their town. It's going to be awful quiet as it goes through Lakewood in a tough density place with nuclear waste going through there. So then once the sirens are quiet, who knows what can happen.

Response

As stated in Section 2.1.3.2 of the EIS, DOE would comply with all applicable regulations of the U.S. Department of Transportation and the Nuclear Regulatory Commission. At this time, many years before shipments could begin, DOE does not know who would make the trucks used to transport spent nuclear fuel. However, all trucks would have to pass the Commercial Vehicle Safety Alliance enhanced safety inspection, which includes a radiological survey and stringent examination of all driver, vehicle, and hazardous material requirements. DOE knows how it would acquire Regional Servicing Contractors, and the protocols and processes to which these contractors would be held (see Section M.3). These protocols are based on Department of Transportation and Nuclear Regulatory Commission regulations and the successful experience achieved during the Waste Isolation Pilot Plant transportation activities.

The accident analysis includes a description of the consequences of a severe accident that would result in a leak in a transportation cask, although that is an extremely unlikely event [an annual probability of 1.4 (rail) to 1.9 (truck) in 10 million]. Transportation safety related to potential release of radioactive materials is primarily based on the integrity of shipping cask. The leaking of a transportation cask could only occur if mechanical forces (impact) and heat (fire) exceeded the design limits of the transportation cask structures and materials. Additional information on the safety and test of transportation casks is provided in Section M.4 of the EIS. The accident analyzed in the EIS is believed to cover accidents from all sources including heat, mechanical impacts, sabotage, impacts from airplanes and weapons, and mountain rollovers.

Truck drivers would have to meet physical standards, have a commercial driver's license, and successfully complete a road test. Drivers would be trained on the properties and hazards of spent nuclear fuel and high-level radioactive waste as well as on the procedures to follow in the event of an emergency. Drivers would also have training in the use of radiation detection instruments, use of communications and satellite tracking equipment, inspection procedures, and adverse weather procedures. The Nuclear Regulatory Commission regulations also address human behavior as discussed in Section J.1.4.2.1 of the EIS.

8.10 (8321)

Comment - EIS001963 / 0003

The DEIS should clearly and accurately explain the risks involved along the transportation routes. It should also use the most current information to do so. It should also include site-specific data to show the effects of accidents in populated areas.

Response

DOE believes that the EIS adequately analyzes transportation-related impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site is approved. The reader is referred to the introduction to Chapter 8 of the CRD for additional information.

At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway or rail lines would be used. For example, in the interim, state or Native American tribal governments may designate alternate preferred highway routes and new highways and rail lines could be constructed or modified. Therefore, for purposes of analysis in the EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highway, beltway or bypass, and state or tribal designated alternate route). DOE identified rail lines based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for the shipment of radioactive materials. In response to public comments, DOE has included in the EIS maps of representative highway routes and rail lines that were used for the EIS analysis (see Figures 6-11 and 6-12).

The analysis is route-specific to the extent needed to support the decisions to be made on the basis of the information contained in this EIS. For example, the analysis considered route-specific shipping distances and population data as well as state-specific truck accident rates. The most recent publicly available data was used in the analysis. The use of additional location-specific data such as the commenter suggests would not materially affect the comparisons of alternatives and decisions to be made with regard to construction and operation of the proposed repository. The requested analysis could provide useful information for identifying and quantifying differences between alternative routes; however, DOE does not intend to designate preferred routes based on the EIS. Rather, this would occur in the future, and would be conducted in accordance with U.S. Department of Transportation routing guidelines. The preferred routes would be submitted to the Nuclear Regulatory Commission for approval. DOE would consider location-specific data during the route selection process.

8.10 (8325)
Comment - EIS001572 / 0002
Living close beside an interstate in Toledo on the emergency vehicle entry route, I've noticed an increasing frequency of accidents on that interstate. I suggest a review of the -- and greater definition of the projections of future accident frequencies going into the calculation.

Response
Recent state-specific accident rates were used in the accident analyses for the EIS. In addition, accident rates were one of the primary route selection factors identified in the U.S. Department of Transportation report *Identification of Factors for Selecting Modes and Routes for Shipping High-Level Radioactive Waste and Spent Nuclear Fuel* (DIRS 103718-DOT 1998).

8.10 (8383)
Comment - EIS001873 / 0066
P. 6-96. Accident risks are not the same for the different routes, which should be obvious. Accident risks should be higher in the intermodal transfer area.

Response
The comment correctly points out that a statement in Section 6.3.3.1 of the Draft EIS that "…accident risks … would be the same among the Nevada heavy-haul truck transportation implementing alternatives…" is incorrect and not consistent with the data listed in Table 6-55. DOE has corrected this in the Final EIS.

There are no data to support the statement that "Accident risks should be higher in the intermodal transfer area." Accident risks, however, would be proportional to the number of operations and shipment miles.

8.10 (8414)
Comment - EIS001873 / 0077
P. 9-17. Having identified the potential for contamination of surface water, DOE must explain how they would clean up the Meadow Valley Wash after a worst case accident near the Caliente intermodal site and what that would cost.

Response
An accident that resulted in contamination of the Meadow Valley Wash near the Caliente intermodal site would be extremely unlikely. Spent nuclear fuel and high-level radioactive waste would be transported in very robust casks, designed to withstand the impact forces and fires that could be associated with very unlikely transportation

accidents. The forces associated with handling accidents at the intermodal site would be far less severe than the design and performance standards for the casks. Potential accidents at an intermodal transfer station are evaluated in Section J.3.3.1 of the EIS. No credible scenarios were identified that would likely result in a release from the casks.

Environmental Impact Statements are not required to analyze "worst-case" accidents. Rather, EISs analyze those accidents that are reasonably foreseeable. According to Section 6.4 of *Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements* (DIRS 104601-DOE 1993), these are accidents with probabilities in the range of 1 in a million to 1 in 10 million per year. The consequences of severe accidents are presented in Sections 6.2.4.2.1 and 6.2.4.2.2 of the EIS. For the maximum reasonably foreseeable truck accident, the probability would be about 2.3 in 10 million per year, and for a maximum reasonably foreseeable rail accident, the probability would be about 2.8 in 10 million per year. A transportation accident near Meadow Valley Wash, such as the maximum reasonably foreseeable accident accidents analyzed in Chapter 6, would not be reasonably foreseeable because its probability would be less than 1 in 10 million per year.

In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments (DIRS 154814-Sandquist et al. 1985), and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $270 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 included data compiled from case studies involving actual cleanup of radioactive materials contamination. The studies address consequences for releases of radioactive materials in communities.

8.10 (8420)
Comment - EIS001887 / 0435
Use of data from the Modal Study to estimate accident severities and probabilities of severe accidents

1.1. Use of "mid-lead" temperature as parameter determining accident severity

1.1.1 Lead (MP 621 degrees F) will stabilize the inner core temperature in the event of a fire until it is completely melted. This has the affect of insulating the inner core from temperature increases for an extended period of time. Uranium, with a much higher melting point, will not melt, resulting in an inner core temperature that will rise constantly with heat input; therefore, inner cores of newer casks are expected to have higher temperatures during a fire of a given intensity.

1.1.2. The use of mid-lead temperature results in grouping of all fires with temperature greater than 1050 degrees F into one consequence category, since lead-nickel alloying occurs here, weakening the integrity of the older casks. Since uranium and/or stainless steel will behave differently under temperature duress, new classifications based on its properties must be used for categorizing fire intensities.

1.2. Use of "reference cask" containing a water jacket neutron shield

The Modal Study models the dead air space resulting from the evaporation of the water jacket neutron shield to reduce the heat transfer rate from a fire to the cask by over 70%. Modern casks use polypropylene, not water jackets; hence the estimated heat transfer rate in fire events is a significant underestimate of the behavior or modern casks (Audin states this may result in a reduction in the time it takes to melt the lead cask from 1.09 hours to 20 minutes).

1.3. "Lead cask bias" used to select most appropriate measurement parameter

The decision to use strain on the inner cask wall as the primary measure of cask response is based on lead's tendency to "slump" when subjected to high loading, resulting in high strains on inner cask wall. However, uranium and/or stainless steel, is strong and rigid and thus will not slump. Rather, the force from impacts will be transferred to the joints and welds of the cask, likely resulting in a greater force being applied to them that those in a lead cask. The choice of strain as the sole measurement parameter for physical duress will likely lead to an underestimation of the damage caused to newer casks through picture of welds and seals in the event of an accident. Therefore, new experiments must be performed to model this behavior.

1.4. Incorrect use of “distribution” and “frequency” of velocities

The EIS states that, even though the average speed limit on national interstates has increased since the Modal Study, the distribution of accidents, and the frequency distribution of accidents, on the highways is not likely to change. However, no evidence is cited to support this statement. The National Highway Safety Traffic Administration (NHTSA 1998), along with numerous other agencies, have provided evidence that increases in speed limit lead to more accidents, more fatalities, and a greater proportion vehicles traveling at higher speeds. All of these suggest that the DOE is incorrect in claiming that increased speed limits will not affect accident severity distributions. In one study assessing the change in Interstate fatalities in states which raised the speed limit in 1995, the NHSTA discovered that “Interstate fatalities experienced a statistically significant increase in those states that raised their posted speed limits late in 1995 or early in 1996.” (NHTSA 1998) Further, the Insurance Institute for Highway Safety reported that distributions of travel velocities do indeed change with increased speed limits. For example, the Institute cited traffic statistics in New Mexico, finding that “the proportion of motorists exceeding 70 mph grew from 5 percent shortly after speed limits were raised [from 55 to 65 mph] to 36 percent.” (Institute). This shows that the EIS’s statement that traffic velocity distributions will not be affected is incorrect, which leads to the conclusion that the probabilities of severe accidents used by the EIS are also incorrect and likely to be underestimates. This provides another reason why the Modal Study is not useful or relevant to current transportation conditions.

1.5. Improper assumptions regarding the location of severe accidents

The Modal Study correlated severe accidents with high velocities, concluding that the most severe accidents will take place, both for rail and truck, in rural environments. However, most severe rail accidents take place at downgrades, which are as likely to be located in suburban areas as rural ones. Further, the probability of a severe truck fire is greater in urban and suburban environments then it is in rural ones. Refer to Resnikoff, 1993.

In determining severe accident scenarios, the EIS assumed that severe accidents had an equal probability of occurring anywhere, with the probability in each population zone being determined by the length of time each truck or train passes through it. Since trucks and trains spend less time in urban zones, some of the most severe accident scenarios are considered “not reasonably foreseeable” in urban areas. Accident data does not support the assumption that severe accidents are randomly distributed (Resnikoff, 1993). Therefore, the DOE needs to assess the consequences of these most severe accidents as occurring in urban zones.

1.6. Improper Exclusion of most severe accident scenarios

1.6.1. The Modal Study used as its “average highway conditions” a stretch of Interstate 5 in Los Angeles and Orange counties. For example, it tallied the number, height, and geographic conditions of the bridges on this stretch and used these to estimate the number of bridges of a certain height. This was then used to estimate how many tall bridges existed in the entire nation for spent fuel trucks to cross. Using this, it was determined that an accident involving a truck falling off a high bridge was not “reasonably foreseeable” and its consequences were not determined. Since this stretch of highway is dominated by urban areas, the distribution of bridge types is biased in favor of small, short bridges, like the ones that cross over other roads. This is not representative of national conditions and leads to the unnecessary exclusion of a potentially disastrous consequence.

1.6.2. The Modal Study assumes that the probability of train accidents involving the falling off of a bridge is the same as that for the highway scenario, with the geographic conditions also taken from the highway estimations. More clearly, the Study used data taken from Interstate 5 to estimate the geographic conditions of national train routes, including bridge heights. Thus, the same argument given for the highway scenario (point 1.5.1) holds here, but more so since there is no proof that highway and rail conditions are similar.

1.6.3. The method of rejecting accidents having a yearly probability less than one in 10 million is arbitrary and incorrect when performing a probabilistic risk assessment. The product of the probability and the likely consequences are what determine significance in a risk assessment.

1.6.4. DOE consistently offers estimations of health effects due to transportation without giving a range of likely effects in the event of an accident. This is based on the assumption that the effects given are “conservative.” However, the points raised here show that the studies are not conservative: unless new studies are performed, a range of possible health effects should be given.

1.6.5. If the DOE insist on using the “reasonably foreseeable” criteria of 1 in 10 million mentioned above, improper accident distribution data, unknown cask response to accident conditions, and improper estimation of accident probabilities (all mentioned above) will make some circumstances not deemed “reasonably foreseeable” in the Modal Study “reasonably foreseeable.” These events must be considered in any acceptable consequence analysis.

Response

General: At the time the Draft EIS was published, DOE considered *Shipping Container Response to Severe Highway and Railway Accident Conditions* (DIRS 101828-Fischer et al. 1987; also called the Modal Study) to contain the best available information regarding spent nuclear fuel shipping cask performance under severe accident conditions. However, the Nuclear Regulatory Commission recently published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 154276-Sprung et al. 2000), which contains additional information regarding spent nuclear fuel transportation accidents, including the use of different shipping cask designs than the representative steel-lead-steel cask used in Fischer et al. (DIRS 101828-1987). This study addresses, in part, the criticisms of the Modal Study that are summarized by the commenter. Because Sprung et al. (2000) provides more recent information and is based on the most recent shipping cask designs (including steel/lead/steel, steel/depleted uranium/steel, and solid monolithic steel designs), DOE has conducted an analysis using the information from Sprung et al. (2000). The results of this analysis are presented in Appendix J of the EIS and show that the impacts estimated in the EIS using Fischer et al. (1987) exceed the impacts estimated using Sprung et al. (2000). As a consequence, the Draft EIS overestimated the impacts of spent nuclear fuel transportation accidents and the Final EIS contains more realistic estimates.

Comments 1.1.1 and 1.1.2. These comments have been addressed by Sprung et al. (DIRS 152476-2000), which considers the performance of depleted uranium shielded and monolithic steel shipping cask designs subjected to severe fire conditions.

Comment 1.2. This comment, which is about the neutron shield material assumptions in the thermal analysis, is addressed specifically in Sprung et al. (DIRS 152476-2000). Section 6.5 of that document states that the neutron shield region was set to change instantaneously at the start of the fire from water to air in the transient thermal analysis. This causes the inner surface of the neutron shield to reach fire temperature very rapidly. If water or solid hydrogenous materials were present in the neutron shield region, it would absorb thermal energy and slow the heatup of the inner regions of the shipping cask. Thus, the assumption of an air-filled neutron shield region is conservative in relation to assuming water or solid hydrogenous materials are present in this region.

Comment 1.3. This comment has been addressed by Sprung et al. (DIRS 152476-2000), which considers the performance of depleted uranium shielded and solid monolithic steel shipping cask designs subjected to severe impact conditions.

Comment 1.4. DOE was unable to identify recent studies that could be used to quantify the effects of increased Interstate System highway speeds on traffic accident rates or severities. However, on a national basis, the fatality rate in 1999 for all motor vehicle accidents remained at historically low levels, the same as 1997 and 1998 fatality rates, and lower than the rates from 1989 to 1996. Fatality rates in 1999 were lower for all vehicles and for large trucks than they were in the early 1990s, before the Interstate Highway System speed limits were increased. This information was obtained from BTS (DIRS 148081-1999). Although there are other factors that contribute to the trends in fatality rates, such as increased use of seat belts, increased legal drinking age, and reduced blood alcohol content restrictions, the increased Interstate System highway speed limits have not had a dramatic effect on national fatality rates for all vehicles or for large trucks alone. In addition, a significant change in highway fatality rates could affect the magnitude of the impacts calculated but would not have a significant effect on the comparisons among alternatives or on identification of the preferred national or Nevada transportation alternatives.

The Nuclear Regulatory Commission is currently designing a program to further evaluate spent nuclear fuel shipping cask integrity in the "Package Performance Study." The planned study, which is scheduled for completion in 2004, will provide an updated evaluation of the level of safety provided by spent nuclear fuel transport packages under a variety of railway and highway accident conditions.

Comment 1.5. The analysis of the likelihood and consequences of maximum reasonably foreseeable accidents is presented in Section J.1.4.2.1 of the EIS. The National Environmental Policy Act requires assessment of reasonably foreseeable impacts from proposed agency actions. In its various EISs, DOE has defined a reasonably foreseeable accident as one that has a frequency of occurrence of at least once in 10 million years (1×10^{-7} per year). The concept of a maximum reasonable foreseeable accident is sometimes misinterpreted as being a "worst-case" accident. A worst-case accident would be one in which conservative assumptions were used to maximize the consequences, such as worst-case weather, 100-percent release of shipping cask contents, highest population density, etc. Such "compounded" conservatisms yield unrealistic results for an accident scenario that is not credible. Consistent with Council on Environmental Quality regulations (40 CFR 1502.22), DOE is attempting to avoid compounding conservatisms, yielding unrealistic results, in analyzing environmental impacts. Such practices mask the real differences and would not produce suitable results to support choices among the alternatives. DOE believes that the impacts presented in the EIS are bounding, yet not so conservative that the true differences among alternatives are masked.

The commenter is incorrect in asserting that the EIS did not evaluate the consequences of maximum reasonably foreseeable accidents in urban areas. In Section J.1.4.2.1 of the EIS, the consequences of maximum reasonably foreseeable accidents are listed for both urban and rural areas.

Comment 1.6.1. This comment, which is about the "average highway conditions" along potential spent nuclear fuel shipping routes, has been largely resolved by incorporating the Sprung et al. (DIRS 152476-2000) accident model into the transportation impact analysis. The analysts evaluated shipping cask performance under 190-kilometer (120-mile)-per-hour impact conditions onto an unyielding surface. A shipping cask would need to free-fall a great distance to strike a surface at 190 kilometers (120 miles) per hour. Finite element analyses of the truck cask designs did not predict with certainty that a 190-kilometer impact onto an unyielding surface would produce seal leakage. For rail cask designs, Sprung et al. (2000) predicted seal leakage to occur for 97-kilometer (60-mile)-per-hour impact events onto unyielding surfaces, equivalent to a freefall from about 37 meters (120 feet). When "real-world" surfaces are assumed, the impact velocities (and thus the approximate freefall distances) that are required to cause cask seal leakage increase substantially. For this reason, the probability that such impact velocities are achieved is extremely small leading to the conclusion that the occurrence of such an accident is not reasonably foreseeable.

Comment 1.6.2. This comment is similar to 1.6.1 above except it addresses rail casks falling from high bridges. The same response applies.

Comment 1.6.3. The National Environmental Policy Act requires assessment of reasonably foreseeable impacts from proposed agency actions. In its various EISs, DOE has defined a reasonably foreseeable accident as one that has a frequency of occurrence of at least once in 10 million years (1×10^{-7} per year).

Consistent with the National Environmental Policy Act and DOE practice, the EIS conducts two analyses of transportation accident impacts, the maximum reasonably foreseeable accident assessment and the probabilistic risk assessment. The probabilistic risk assessment, conducted using the RADTRAN 5 computer code, considers the entire spectrum of accidents, including those worst-case accidents that are less likely than once in 10 million years. The computer code evaluates the probabilities of accidents and their consequences, combines the probability and consequence information to calculate risk values, and then sums the risk values across the entire spectrum. In the probabilistic risk assessment, the once-per-10-million-year frequency criterion is not employed to truncate the analysis, as the commenter suggests. However, it is true that the extremely unlikely accident scenarios (that is, those with frequencies less than once per 10 million years, do not contribute significantly to the total integrated risk. Although the consequences of these extremely unlikely accidents would be large, their frequencies would be so small that their risk values, which are the products of their frequencies and consequences, would be small in relation to the risk of more frequent but less severe accidents.

The probabilistic risk assessment is different than the maximum reasonably foreseeable accident analysis. In the analysis of the consequences of the maximum reasonably foreseeable accident, the results are presented in terms of the maximum consequences to the population and maximally exposed individual potentially affected by the accident. Only the consequences of such accidents are presented; that is, the combining of the frequency and consequence terms to develop a risk value is not performed in the maximum reasonably foreseeable accident analysis.

In the analysis of the maximum reasonably foreseeable accident, the EIS considered accident scenarios with frequencies less than once per 10 million years. These accidents are not reasonably foreseeable, but the consequences of these accidents are listed in Tables J-22 and J-23 of the EIS.

Comment 1.6.4. DOE is aware that there are uncertainties associated with the transportation impact results presented in the EIS. There are uncertainties associated with route characteristics, demographics, weather, atmospheric dispersion models, spent nuclear fuel characteristics, accident rates, release fractions, and many other elements of the risk assessments. Because one of DOE's goals is to choose between alternatives, the consistent consideration of uncertainty among alternatives means that the relative differences in impact estimates among alternatives should not be affected. To account for uncertainties in the data, conservative assumptions were made so the impacts reported in the EIS would bound the potential impacts; would produce results that are higher than the true risk. However, DOE has chosen not to use conservative assumptions in all cases, as this practice tends to produce unrealistic and improbable results. Consistent with Council on Environmental Quality regulations (40 CFR 1502.22), DOE is attempting to avoid compounding conservatisms, yielding unrealistic results, in analyzing environmental impacts. Such practices mask the real differences and would not produce suitable results to support choices among the alternatives. Similarly, presenting ranges of impacts, as the commenter suggests, would also mask the true differences between alternatives. It would provide misleading information and lend credibility to accident scenarios that are clearly insignificant contributors to the true risks of transporting spent nuclear fuel and high-level to the proposed repository. Presentation of ranges of impacts would require complex and confusing explanations of how the ranges were calculated and their significance. This would be contrary to one purpose of an EIS, which is to provide clear and concise information to the public about the environmental impacts of proposed agency actions. Therefore, the EIS concentrates on developing point estimates with approximately equal levels of conservatism and uncertainty so valid comparisons among alternatives can be made.

Comment 1.6.5. The transportation impact analysis in the EIS, including the analysis of maximum reasonably foreseeable accidents, is consistent with National Environmental Policy Act requirements, Council on Environmental Quality Guidelines, and DOE policies and procedures. The analysis of reasonably foreseeable accidents is based on the best data available to DOE, considers the designs of current generation shipping casks, uses appropriate accident probability distributions and estimation techniques, and is more comprehensive in scope and level of detail than the transportation impact analyses in most other EISs prepared by Federal agencies. The analysis in the EIS has been revised to reflect the recently published reanalysis of spent nuclear fuel shipment risks (see DIRS 152476-Sprung et al. 2000), which updates the accident risk model developed in Fischer et al. (DIRS 101828-2000). The methods used to calculate transportation impacts are state-of-the-art. As a consequence, DOE believes the scope, level of detail, and basis for the transportation impact analysis are consistent with all National Environmental Policy Act-related requirments and that the EIS adequately analyzes potential impacts of the Proposed Action and certain aspects of transportation.

8.10 (8460)
Comment - EIS000306 / 0006
Your estimates do not suggest the temperature that a diesel fire causes, and it would burn more than the half hour that you suggest.

Response
As discussed in Appendixes J and M, most real-world accidents that have been postulated, including truck crashes into bridges, train derailments followed by fires, derailments followed by immersion of a cask into a river, and similar extreme accident conditions, would not likely result in release of radioactive materials from the shipping casks. The performance standards for the casks prescribed by the Nuclear Regulatory Commission were selected to ensure that less than one percent of real-world accidents would result in loss of cask integrity and release of radioactivity from the cask. These standards ensure that the casks would be extremely robust.

As stated in Section J.1.4.2.1 of the EIS, the temperature of the fully engulfing fire was assumed to range from 750ºC (1,350ºF) to 1,000ºC (1,800ºF). Truck fires were assumed to burn for up to 8 hours and train fires were assumed to burn for up to 11 hours. More details on fire duration and temperature can be found in the Nuclear Regulatory Commission study *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000).

8.10 (8471)
Comment - EIS000817 / 0143
P. 6-29. You are basing some of this on a 1987 study by Fischer. That is just too outdated. The Nuclear Waste Project comments are valid. It's not up to them to do your studies for you, only to comment on what you do. There should be tests to benchmark computer models. All too often this is not done correctly.

Response
The EIS has been revised to use the release fractions and conditional probabilities from *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Benchmarking of the finite element code used in the analysis is discussed in Section 5.1.5 of that study. The changes from using the data from Sprung et al. (2000) are that radiation risk for rail and truck accidents are lower, radiation impacts for incident-free truck transportation are lower, and consequences of severe accidents are higher. These results are included in Chapter 6 of the EIS.

8.10 (8607)
Comment - EIS001837 / 0009
What if the narrow railroad bridge across the Colorado River adjacent to the Federal Wildlife Preserve, collapses under the weight of the heavy high level nuclear waste shipments? Your DEIS is inadequate and deficient because it does not address the issue of reinforcing that bridge or cleaning up potential spills into the Colorado River, or how to prevent attacks on that bridge. What is the contingency plan if the train derails on the bridge or the casks fall into the Colorado River and destroys the drinking water of millions of people?

Response
Adequate national highways, rail lines, crossings, bridges, and tunnels exist to support the transportation of materials described in the EIS. The shipment of radioactive materials requires no special transportation infrastructure that is not necessary for safe transport of commodities in the United States today. The U.S. Department of Transportation is the regulatory agency responsible for establishing and enforcing the standards for the transportation infrastructure.

The precise location, timing, prevailing weather conditions, and other circumstances surrounding a transportation accident cannot be predicted. In addition, it would not be practical for the EIS to attempt to analyze accident consequences for every location along the shipping route. Instead, maximum consequences are analyzed for three types of population zones: urban, suburban, and rural. For example, an accident in the Las Vegas area would be characterized by the analysis for an urban area. Table J-24 shows consequences of maximum reasonably foreseeable truck and rail accidents in urbanized and rural areas.

In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments (DIRS 154814-Sandquist et al. 1985), and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $270 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 included data compiled from case studies involving actual cleanup of radioactive materials contamination. The studies address consequences for releases of radioactive materials in communities.

The EIS does not specifically analyze a transportation accident involving contamination of surface water or groundwater. Analyses performed in previous EISs (see Section 1.5.3 and Table 1-1 of this EIS) have consistently shown that the airborne pathway has the greatest potential for exposing large numbers of people to radioactive material in the event of a release of radioactive materials during a severe transportation accident. An analysis of the potential importance of water pathway contamination for spent nuclear fuel transportation accident risk using a worst-case water contamination scenario (DIRS 157052-Ostmeyer 1986) showed that the impacts of the water contamination scenario were about one-fiftieth of the impacts of a comparable accident in an urban area.

8.10 (8746)

Comment - EIS001907 / 0008

One area of concern in nuclear waste transportation is the exposure of waste handlers, drivers and the general public to radiation even during routine (non-accident) conditions. Even though shipping containers are shielded and designed to reduce exposures to radiation being emitted by the spent fuel or high-level waste, federal regulations allow a low level of radiation to emanate from the casks. As we all know, even low-levels of radiation have adverse health effects.

Even after ten years of cooling, spent nuclear fuel emits dangerous levels of gamma and neutron radiation. A person standing one yard away from an unshielded spent fuel assembly could receive a lethal dose of radiation in less than three minutes. The surface dose rate of spent fuel is so great (10,000 rem/hour or more), that shipping containers with enough shielding to completely contain all emissions would be too heavy to transport economically.

Federal regulations allow shipping casks to nuke the public at about 10 millirems/hour at 2 meters from the cask. What happens to the driver? Does a standard driver then get 100 millirems per ten hours driving? Routine exposures become especially problematic in situations where the transport vehicle is caught in heavy traffic with cars and other vehicles in close proximity for extended periods. Routine exposures also are of concern when the cask vehicle is stopped for repair, fueling, inspections, etc. Were the cumulative health impacts to toll booth workers taken into effect? What about gas station attendants? Were these people even notified about this hazard passing through their work areas? Does that violate Occupational Safety and Health Standards?

Response

Chapter 6 of the EIS presents DOE's evaluation of public health and safety consequences of routine, incident-free transportation of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. The analyses used the RADTRAN 5 computer program in estimating exposure of members of the public who would live near shipment routes to low-level ionizing radiation from the shipments. The estimates include impacts to maximally exposed individuals who are postulated to live or work along or near routes where shipments would pass, including a person stuck in a traffic jam next to a shipment, person at a service station, railyard crew members, inspectors, and escorts. The results of these analyses are presented in Tables 6-9 and 6-12 for the national mostly legal-weight truck and mostly rail scenarios, respectively.

The impacts to maximally exposed individuals in the general public would be very low. For comparison purposes, the rate of exposure for a chest X-ray would be about 10,000 times greater than the rate of exposure of a maximally exposed individual 6 meters (20 feet) from a cask. This individual would need to be 6 meters from a shipment for 3 hours to receive the same dose from a chest X-ray that occurs in about 1 second. These radiation doses are low and would not be expected to result in any health effects and are well within regulations promulgated by the Nuclear Regulatory Commission. The Occupational Health and Safety Administration does not have jurisdiction over radiation safety. To the maximum practical extent, DOE would ensure that transport operations were conducted to reduce dose to members of the public to levels below those permitted by regulations.

The commenter was concerned about the radiation doses to truck drivers. U.S. Department of Transportation regulations limit the radiation dose rate in normally occupied areas of the vehicles to 2 millirem per hour (see 49 CFR 173.441) unless the carriers operate under an approved radiation protection program and crews wear personal radiation dosimeters. This regulation has been in force for decades and has provided adequate protection to truck drivers from the very low levels of radiation emitted by the shipping casks. In addition, annual exposure limits are applicable to truck drivers. As stated in Table 6-6 of the EIS, crew members were assumed to be limited to an 800-millirem radiation dose. Over 24 years, this would result in an individual exposure of 12 rem, which represents a slightly increased probability (0.005) of latent cancer fatality.

With respect to the comment that low levels of radiation have adverse health effects, on average, members of the public are exposed to approximately 360 millirem per year from natural and manmade radiation sources. This amounts to about 8,640 millirem (8.6 rem) for the 24 years of operation for the proposed shipments. Approximately 80 percent of this is a result of natural sources, such as radon in homes and buildings and terrestrial radiation from rocks and soil. Figure F-1 of the EIS shows the relative contributions by radiation sources to people living in the United States. The maximum individual resident along the route of the proposed shipments would receive about 5.4 millirem (0.0054 rem) over the 24 years of operation. Thus, the increase in exposure to radiation for this person as a result of the proposed shipments would be about 0.0625 percent. This small exposure would not be expected to result in life-shortening or any other detrimental health effect. Additional background information on human health effects from exposures to radioactive and toxic materials is presented in Appendix F of the EIS.

8.10 (8822)

Comment - EIS002082 / 0003

And one thing, too with Yucca Mountain, and there's all the garbage, garbage going up to Yucca Mountain and the truck spills some kind of dirt over. They stopped the truck right there. I don't know what they done after that.

Response

DOE does not plan on shipping radiologically contaminated dirt to the proposed Yucca Mountain Repository. Chapter 6 and Appendix J of the EIS discuss accidents involving spent nuclear fuel, which does not resemble dirt.

8.10 (8956)

Comment - EIS001040 / 0005

According to DOE Document DE-ACO4-84A-25747 "These Wastes Have a Potential for Causing Great Harm." They are thermally hot (250,000 BTUS/Hour) and highly radioactive. A ruptured cask either in transport or in the dump would be a major environmental disaster that could contaminate a large area. The recent disaster in Japan would be nothing compared to a breach of containment.

Response

An accident that could rupture a cask during transport and contaminate a large area is an extremely unlikely occurrence. Since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there could be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

8.10 (8957)

Comment - EIS001040 / 0006

In the NRC's [Nuclear Regulatory Commission's] Final Environmental Statement for the Callaway Plant NUREG-75/011 Section 5-11 states that during normal transport (without an accident 601,100 people would be exposed to gamma radiation due to transport of one shipment.

Response

The exposed populations from truck and rail shipments of spent nuclear fuel and high-level radioactive waste are discussed in Sections 6.2.3.1 and 6.2.3.2 of the EIS. For legal-weight truck shipments, the exposed population within 0.8 kilometer (0.5 mile) of the roads was about 10 million and for rail shipments, the exposed population within 0.8 kilometer of the railroads was about 16 million over the 24 years of operation.

8.10 (9057)

Comment - EIS001866 / 0009

All existing casks for the transport of waste emit some level of radiation. Casks can be licensed and used if they pass required tests and do not exceed emission limits when inspected. It is assumed that exposures to individuals, at these allowable levels, will not be harmful. When dose and exposure limits are analyzed, and justification for safety decisions explained, the implication is that the exposures are single incidents. There is no consensus regarding health effects and other adverse consequences of single low dose of radiation. However it is increasingly evident that multiple exposures pose multiple risks and that cumulative exposures increase the risk burden.

Response

In the EIS transportation analyses, the typical assumption is that radiation doses are for multiple exposures, not single exposures. For example, in Table 6-9 in Section 6.2.3.1 of the EIS, the radiation dose to residents along the route, a person at a service station, and a resident near a rail stop are for exposures to multiple shipments. For cases such as exposure of a person in a traffic jam, it is unlikely that a person would be exposed more than once and the radiation dose is based on exposure to a single shipment.

DOE recognizes that, although studied extensively for over 75 years, there is still much that is not understood about effects related to exposure to low level radiation. However, the Department is not aware of any substantial, peer-reviewed literature that indicates disproportionate harm associated with exposure to low-level radiation.

Because of uncertainties in the low-dose/dose-region of the dose effect curve, DOE has selected, for use in the EIS, dose-to-risk factors recommended by the National Council on Radiation Protection and Measurements (DIRS 101856-NCRP 1993) and the International Commission on Radiological Protection (DIRS 101836-ICRP 1991) for estimating the risk of latent cancer fatality from exposure to ionizing radiation. These factors were developed based on the linear no-threshold hypothesis, which assumes that adverse health effects could occur from exposure to ionizing radiation regardless of how small the dose.

DOE, as well as national and international scientific advisory organizations such as the Federal Radiation Council, the International Commission on Radiation Protection (DIRS 147927-ICRP 1966), the National Council on Radiation Protection and Measurements (DIRS 101857-NCRP 1993), the National Academy of Sciences/National Research Council Committee on the Biological Effects of Ionizing Radiation (BEIR V) (DIRS 100473-National Research Council, 1990), and the National Academy of Sciences/National Research Council Committee on an Assessment of Centers for Disease Control Radiation Studies (DIRS 154539-National Research Council 1995), have recognized for many years that the use of dose-to-risk conversion factors based on the linear no-threshold hypothesis to estimate stochastic effects (such as latent cancer fatalities) from very low exposures to ionizing radiation can overestimate the actual risk. These organizations have been careful to point out over the years that the use of the risk factors derived using the linear no-threshold hypothesis will provide reasonable assurance the actual effect will not be underestimated. For these reasons, the linear no-threshold hypothesis has been accepted for use by Federal agencies—including DOE, the Environmental Protection Agency, and the Nuclear Regulatory Commission—for radiation protection and for estimating risk from exposure to ionizing radiation. Until such time as these advisory committees change their acceptance of the linear no-threshold hypothesis and the Federal agencies agree that these changes should be incorporated, DOE will continue to use risk factors recommended by the national and international advisory groups that are based on the linear no-threshold hypothesis.

8.10 (9452)
Comment - EIS001641 / 0004
Shipments by rail are more dangerous as there have been several catastrophic train accidents in the Cajon Pass in recent years.

Response
Chapter 6 of the EIS discusses the transportation impacts of shipping spent nuclear fuel and high-level radioactive waste to the repository. Over a 24-year shipping campaign, the EIS estimates that there could be about 17 fatalities if mostly trucks were used and about 10 fatalities if mostly trains were used. The analyses in the EIS show that the impacts of transporting spent nuclear fuel and high-level radioactive waste are low for both modes and do not provide a distinguishing basis for choosing a transport mode.

8.10 (9538)
Comment - EIS001888 / 0199
[Summary of comments noted by Clark County Nuclear Waste Division staff at various citizens' meetings.]

Hopeful that DOE would consider trucking impacts that were not really considered - "there will be accidents."

Response
The comment was not specific about trucking impacts the EIS did not consider. Chapter 6 and Appendix J of the EIS evaluate the impacts of shipping spent nuclear fuel and high-level radioactive waste by truck. Impacts of routine truck shipments would include radiological impacts from low-level radiation outside the shipping casks and nonradiological impacts from normal vehicle emissions. The EIS evaluates transportation accidents in terms of (1) radiological impacts from accidental releases of radioactivity, and (2) traffic fatalities.

8.10 (9580)
Comment - EIS001888 / 0254
This unprecedented high level of handling activity has never taken place before. Handling at an intermodal facility is just as problematic. There is no accident or incident data describing likely accidents handling spent fuel at intermodal facilities. A major cause of concern is the use of historical accident rates to describe the risks of a roadway not yet constructed. The DEIS assumes that the mostly truck alternative will use Clark County's northern and western beltways to transport spent fuel. These roads have not yet been constructed and there is no empirical data about accidents on these roadways.

Response
Appendix J of the EIS documents the methodology used for analysis of accidents that could occur during handling of spent nuclear fuel shipping casks at intermodal facilities. The analysis considered external initiating events (for example, seismic events, aircraft crash) and internal initiating events (for example, dropping a cask during transfer). Extensive empirical data exists regarding the design standards of the casks and the ability of the casks to maintain their integrity under a variety of accident conditions. The analyses performed for the EIS found no credible accidents with the potential for radioactive release at an intermodal transfer station.

The EIS uses accident rates for roadways based on state-specific rates of accidents involving interstate-registered combination trucks for 1994, 1995, and 1996. As the commenter points out, accident rates for new roadways that have not yet been constructed cannot be used in the analysis. However, new roadways would be constructed in accordance to state and U.S. Department of Transportation standards, and the accident rates for new roadways would not be expected to be greater than the rates for existing roadways.

8.10 (9722)
Comment - EIS002149 / 0002
Another issue I'd like to address is the transportation one very briefly. There are three things that are really important in this transportation problem. There's the testing we've heard about. There's real live accident scenarios, which we don't hear about too much and you don't really hear about them very much in this thing at all, and then there's the models which we hear a lot about. These three are three pieces that have to be connected, and to me and to Citizen Alert that the analysis, the risk analysis in this document, the transportation analysis is not complete unless those three concepts are connected.

How do the tests that we keep hearing about connect to real world accidents? That needs to be connected for people to understand. How do the models connect to real world accidents and the tests? That needs to be connected for people to understand the impacts. That is the responsibility of our federal agencies, the DOE and the NRC [Nuclear Regulatory Commission], and though that connection has not been made.

Response
Regulatory test conditions for Type B packages, such as spent nuclear fuel shipping casks, were developed about 40 years ago. The intent was to establish a set of laboratory test conditions that would provide consistent and reproducible results for package testing. Although they were originally derived from examining stresses from various types of severe accidents, they are not intended to simulate actual transportation accident scenarios. Rather, the package tests are intended to represent the actual stresses that could be imposed on a package during a severe accident. The logic behind this approach is that if a package is capable of withstanding the Type B package tests (see the hypothetical accident conditions defined in 10 CFR 71.73 and described in the EIS, Section M.4) without serious leakage, they could withstand most real accidents without major rupture or large release of the contents.

Part of the difficulty in designing the Type B package tests was reproducibility. The developers recognized they could not design tests that simulate real accidents because of large variability in the environment in which the accidents could occur. For example, they could have specified a test consisting of a 97-kilometer (60-mile)-per-hour impact into a real surface, such as rock or soil. However, the physical properties of rock and soil are variable from location to location, so the energy-absorbing characteristics of the surface affected by the shipping cask had to be specified for the tests to be reproducible. The test developers decided to specify an "unyielding" surface, which is easily modeled even though it does not exist in nature. The use of an unyielding surface means that all of the mechanical energy of a collision is absorbed by the shipping cask; that is, none of the energy is absorbed by the affected surface. The use of an unyielding surface results in greater package damage than a real surface, such as other vehicles, rocks, etc., because real surfaces crush and thus absorb some of the impact energy. The test developers followed similar processes to arrive at puncture, thermal, and immersion test specifications. Based on information available to the test developers, they were confident that the Type B package tests they specified would encompass the vast majority of real accidents.

Licensing (or certification) of Type B shipping casks requires the approval of the Nuclear Regulatory Commission. An applicant submits detailed designs and safety analyses of the shipping cask to the Commission in a Safety Analysis Report for Packaging (SARP). The SARP contains, among other things, an evaluation of the effects of the Type B package tests on the shipping cask. The performance of the shipping cask under the Type B package test conditions can be evaluated using detailed computer codes and models that have been developed and improved over many years. Full-scale and half- or quarter-scale testing has been conducted to validate the predictions made by the computer models. In other words, predictions of package damage made by the computer codes have been compared to the actual damage produced in scale model testing and the computer codes have been determined to accurately predict package performance. Based on this experience, DOE and the Nuclear Regulatory Commission are confident that the computer codes and models used to demonstrate compliance with the Type B packaging requirements effectively and accurately predict the performance of the shipping casks when subjected to the Type B test conditions. Furthermore, successful demonstration of package performance under the Type B test conditions provides assurance that the package is capable of withstanding the vast majority of real transportation accidents.

8.10 (9936)
Comment - EIS001732 / 0010
During the Three Mile Island shipments there was an accident on the very same highly-inspected and maintained train tracks. Luckily, the accident did not involve the TMI shipment. The accident sticks in my mind because it was in a very hard to reach area that was also close to highly populated communities. The accident involved train cars hanging suspended off of a train trestle over a river. We do have rivers in Missouri. How many hours they hung there while [a] high-intensity, long-duration fire blazed beneath them while the emergency personnel struggled to get there, which severely delayed their response time.

What dangers would this type of accident present if the train cars were carrying casks containing high-level radioactive waste from nuclear reactors nation-wide?

Response
In the severe transportation accidents analyzed in the EIS, fully engulfing fires were analyzed. This means that the cask was assumed to be at the center of the fire, were the amount of heat transferred to the cask would be the greatest. At other locations, such as the cask dangling above the fire, the amount of heat transferred to the cask would be less and therefore, the amount of damage to the cask would also be less. Therefore, the consequences of the type of accident described by the commenter would be less than the consequences of the severe transportation accidents presented in the EIS.

The consequences of these severe accidents are presented in Sections 6.2.4.2.1 and 6.2.4.2.2 of the EIS, for truck and rail transportation, respectively. For a maximum reasonably foreseeable truck accident analyzed in the EIS, the estimated probability is about 2.3 in 10 million per year. The consequences of these accidents are presented in Section 6.2.4.2.

8.10 (10022)
Comment - EIS001888 / 0516
[Clark County summary of comments it has received from the public.]

Collateral Risk is sum of risks posed by activities effecting shipment. Example, 8% of County roads undergoing construction at any one time. Accidents go up significantly around construction. Some routes have high frequency of construction must include.

Response
DOE is aware of the U.S. Department of Transportation and state transportation agencies current emphasis on reducing traffic accidents in highway work zones. A review of work zone crash data available from the U.S. Department of Transportation indicated that the number of fatalities in work zone accidents nationally have

been relatively stable since 1980. In addition, fatalities in work zones were included in the accident data used in the EIS.

Use of accident data specific to work zones such as the commenter suggests would not materially affect the comparisons of alternatives and decisions to be made with regard to construction and operation of the proposed repository. The requested information could provide useful information for identifying and quantifying differences between alternative routes; however, DOE does not intend to designate preferred routes based on the EIS. Rather, this would occur in the future, and would be conducted in accordance with U.S. Department of Transportation routing guidelines. The preferred routes would be submitted to the U.S. Nuclear Regulatory Commission for approval. DOE would consider location-specific accident data during the route selection process. Furthermore, preshipment planning activities described in Section M.3.2 of the EIS would identify work zones on preferred highway routes and they would be avoided entirely by using an alternative preferred route, if possible, be accessed at times when traffic volumes are low, or wait in a safe parking area until heavy traffic clears. This would not always be possible due to the limited routing options available but would reduce the potential for accidents in work zones involving spent nuclear fuel and high-level radioactive waste shipments to the proposed repository.

8.10 (10055)
Comment - EIS001888 / 0536
[Clark County summary of comments it has received from the public.]

Clark County is in early stages of 10 year transportation improvement project. This results in increased accident risk this must be considered.

Response
The commenter appears to be concerned about potential transportation accidents in work zones. DOE is aware of the U.S. Department of Transportation and state transportation agencies current emphasis on reducing traffic accidents in highway work zones. A review of work zone crash data available from the Department of Transportation indicated that the number of fatalities in work zone accidents nationally have been relatively stable since 1980. In addition, fatalities in work zones were included in the accident data used in the EIS.

Use of accident data specific to work zones such as the commenter suggests would not materially affect the comparisons of alternatives and decisions to be made with regard to construction and operation of the proposed repository. The requested information could provide useful information for identifying and quantifying differences between alternative routes; however, DOE does not intend to designate preferred routes based on the EIS. Rather, this would occur in the future, and would be conducted in accordance with U.S. Department of Transportation routing guidelines. The preferred routes would be submitted to the U.S. Nuclear Regulatory Commission for approval. DOE would consider location-specific accident data during the route selection process. Furthermore, preshipment planning activities described in Section M.3.2 of the EIS would identify work zones on preferred highway routes and they would be avoided entirely by using an alternative preferred route, if possible, be accessed at times when traffic volumes were low, or wait in a safe parking area until heavy traffic cleared. This would not always be possible due to the limited routing options available but would reduce the potential for accidents in work zones involving spent nuclear fuel and high-level radioactive waste shipments to the proposed repository.

The routing of shipments of spent nuclear fuel by legal-weight truck would be in accordance with U.S. Department of Transportation regulations. These regulations limit shipments of highway route controlled quantities of radioactive materials such as spent nuclear fuel to Interstate System highways whenever possible. These regulations allow a state or tribe to designate alternate routes in accordance with Department of Transportation guidelines. In the absence of the identification of an alternate route by the State of Nevada, in the EIS DOE analyzed the routes that satisfied the Department of Transportation regulations. In the Las Vegas area, use of Interstate-15 to U.S. 95 to Yucca Mountain is the only existing Interstate Highway System route. The only current alignment of Interstate-15 is through the "Spaghetti Bowl," and transportation of nuclear waste along this segment was analyzed in the EIS. However, the Beltway around Las Vegas would avoid this area. The impacts of using the Beltway were analyzed in the EIS.

8.10 (10385)
Comment - EIS001371 / 0010
The investigation into Amtrak's deadliest crash focused Thursday on a towboat operator who - 12 minutes before the crash - radioed that he was having a problem with a runaway barge.

The barge struck a railroad trestle over the foggy backwater of Bayou Canot early Wednesday just before the train plunged off the bridge into the water and exploded, killing at least 44 of the 210 people on board.

"The fact is, he was lost," said Coast Guard Capt. Michael Perkins, speaking of the pilot of the towboat Mauvilla. "While he was trying to gather up his barges, the train came along and the accident occurred."

Response
As discussed in Section J.1.4.2.3, the analyses in the EIS used current data to estimate the risks and consequences of rail and barge accidents. These data included accidents of all causes, including accidents of the type discussed by the commenter. As discussed in Appendixes J and M, most real-world accidents that have been postulated, including truck crashes into bridges, train derailments followed by fires, derailments followed by immersion of a cask into a river, and similar extreme accident conditions, would not likely result in releases of radioactive materials from the shipping casks. The performance standards for the casks prescribed by the Nuclear Regulatory Commission were selected to ensure that less than 1 percent of real-world accidents would result in loss of cask integrity and release of radioactivity from the cask. These standards ensure that the casks would be extremely robust.

8.10 (10746)
Comment - EIS002101 / 0008
So those rods are hanging in the air on the cranes. They got what they call hot cells. That's very dangerous work. They're lowering it into the dry casks. One of those welds could be wrong. Who knows what's going to happen? We're not talking about one time, five times. We're talking about 30,000 shipments. Nobody talks about how many rods that is.

Response
The characteristics of the spent nuclear fuel to be shipped to the proposed repository are described in Section 1.2 and Appendix A of the EIS. Nearly all of the spent nuclear fuel to be transported to the repository would be in the form of intact fuel assemblies, which consist of an array of fuel rods (for example, a 7-by-7 array) held together by structural components. If loose rods were shipped, for example loose rods generated during fuel consolidation demonstrations in the 1980s and early 1990s or postirradiation examinations, they would be overpacked.

In addition, canisters of vitrified high-level radioactive waste and various categories of DOE spent nuclear fuel would be shipped to the repository. DOE estimates that, for the proposed action, approximately 53,000 shipments of spent nuclear fuel and high-level radioactive waste would occur under the national mostly legal-weight truck scenario and 13,000 shipments would occur under the mostly rail scenario.

Hot cells exist at many nuclear-industry related research and operations facilities across the country. The hot cells and equipment are designed to be operated remotely using a variety of means, including remotely operated cranes, manipulators, and conveyances. Hot cells are typically heavily shielded rooms that use steel or concrete shielding and leaded glass windows to control the radiation dose rates outside the cells. In addition, the hot cells are provided with controlled ventilation and filtration systems to prevent the flow of contamination to occupied areas, contain airborne radioactive materials, and filter radioactive materials from the exhaust air prior to its discharge to the environment. A large amount of experience has been gained since the 1940s on how best to design hot cells and conduct remote operations. In addition, a large experience base exists for handling spent nuclear fuel assemblies, including both underwater and dry handling operations, that has been factored into the designs of shipping casks and development of shipping cask and fuel handling operations. Based on this experience, DOE is confident that hot cell operations, spent nuclear fuel handling, and transportation of spent nuclear fuel would be conducted safely and within regulatory limits and adequate public and worker protection would be provided.

DOE recognizes that human errors cannot be totally eliminated during the fabrication and operation of the shipping casks. Section J.1.4.2.1 of the EIS presents a discussion of the potential effects of human error, including undetected defects such as bad welds, on accident impacts. To minimize the impacts of human errors, the shipping casks would be fabricated under Nuclear Regulatory Commission-approved quality assurance programs. As indicated in the GA4/9 shipping cask Certification of Compliance, each shipping cask would be extensively tested prior to its first use, including radiographic and ultrasonic inspections of welds, load testing of lifting trunnions, pressure testing of the cask containment boundary, gamma scans of the depleted uranium shield, and other tests. Trained and qualified personnel would conduct all testing. The shipping casks would be subjected to periodic in-service testing and maintenance, such as seal replacement, visual inspections of seals and sealing surfaces, and leakage testing. In addition, all shipping cask handling, loading, unloading, testing, and maintenance operations would be conducted in accordance with detailed written procedures and by trained and qualified personnel. DOE believes these testing, maintenance, procedural, and personnel training requirements would minimize the likelihood and consequences of human errors during cask fabrication and operation.

8.10 (10905)
Comment - EIS000357 / 0024
Could corridors be designated as heavy-haul nuclear freight as a mitigating measure in order to alleviate concerns of motorists who wanted to avoid worse case scenario nuclear accidents? Wouldn't such a measure also reduce the possibility of exposure, if there was a highway accident causing a leak?

Response
Section J.3 of the EIS analyzes the impacts associated with using heavy-haul trucks. Potential heavy-haul truck routes in Nevada are highways identified by the Nevada Department of Transportation for shipments of overweight and overdimension loads. Permits that specify approved routing for heavy-haul truck shipments on Nevada highways would be issued by the Nevada Department of Transportation. Alternate routes could be designated by the State of Nevada as specified in 49 CFR 397.103. There are no regulations regarding the exclusive designation of a highway for "heavy-haul nuclear freight."

8.10 (11063)
Comment - EIS000610 / 0022
Page 6-17, 18, Section 6.21 national transportation. I understand the probability, and if one goes back and examines the train wreck that spilled thousands of gallons of toxic material into the Sacramento River, it probably is outside the limits for the model used by DOE. It only takes one to do significant damage.

The difference between all the past accidents and one that could occur transporting nuclear waste is that past accidents were cured in one lifetime, but the nuclear accident time to cure could extend over many lifetimes. The reference section is again laced with adjectives that do not belong in an engineering document.

If you can state it is not likely or very unlikely, state the probability.

Response
Probabilities of severe spent nuclear fuel accidents are presented in Section J.1.4.2.1 of the EIS. Over 24 years of truck shipments to Yucca Mountain there would be less than a 1-percent chance of an accident that could result in a release of radioactive material from a cask. The chance of a rail accident that would cause release from a cask would be even lower. The chance that such an accident would occur in any locale would be much less than 1 percent. Therefore, an accident such as the train derailment near the Sacramento River would not be likely to release radioactive materials from the casks into the river.

8.10 (11067)
Comment - EIS000610 / 0025
6-28, block at the bottom of the page. DOE uses the argument that if an accident is not reasonable, it is not analyzed. This is defined by the conditions that occur more often than one in ten million times a year. They eliminate any conditions that occurs less than that number.

The public should be told of what can happen because if it can, it will in the years that material is being transported. In other words, don't use that. I want to know outside of that, because I maintain if it can happen, it will happen during the time that you are transporting materials in this country.

Response
Environmental Impact Statements are not required to analyze worst-case accidents but they are required to analyze reasonably foreseeable accidents. DOE guidelines (DIRS 104601-DOE 1993) suggest that these include accidents with probabilities in the range of 1 in a million to 1 in 10 million per year. As discussed in Section 6.2.4.2 and J.1.4.2.1 of the EIS, the accident analyses in the EIS include these "maximum reasonably foreseeable accidents." In addition to accidents with a probability greater than 1×10^{-7} per year, the EIS presented the consequences from all accident severity categories presented in Sprung et al. (DIRS 152476-2000).

8.10 (11271)
Comment - EIS001814 / 0006
6.2 National Transportation

The potential accident scenarios detailed in the National Transportation analysis grossly underestimate the environmental and health effects that may be associated with accidents by truck or rail because it assumes that probability of any particular accident occurring is low. See 6.2.4.2. First, the DEIS merely assumes that "[r]adiological impacts of accidents on biological resources would be very small." 6.2 at 6-18. Such conclusory statements are inadequate to fulfill the agency's duties under NEPA [National Environmental Policy Act]. The project envisions nuclear waste being shipped from throughout the United States, the possibility of an accident in an area of high rainfall or at a railroad crossing over a river is wholly unexamined. Such accidents may be statistically "rare" but even a single occurrence could irreparably damage biological resources in the area in which it does occur.

Response
The EIS does not assume that the probability of any particular accident occurring is low. Rather, the EIS evaluates the probabilities and consequences for a complete spectrum of accidents, ranging from accidents with high probabilities and low consequences to accidents with low probabilities and high consequences. Generally, plants and animals are no more sensitive to radiation than are humans. Both acute and chronic radiation doses that do not adversely affect humans are not known to affect terrestrial species of plants and animals. *Effects of Ionizing Radiation on Plants and Animals at Levels Implied by Current Radiation Standards* (DIRS 103277-IAEA 1992) reports that there is no convincing evidence that indicates that the current radiological dose standards for humans would harm animal or plant populations. In other words, if humans are adequately protected, plants and animals are likely to be adequately protected. For these reasons, DOE has concluded that there would be not be significant impacts on terrestrial species of plants and animals located along the transportation corridors.

8.10 (11364)
Comment - EIS002278 / 0001
I too would like to address some of my transportation concerns. Number one is that using the 85 mile-an-hour car running into the 20 cubic-foot block wall, or whatever it was, sounds great, but that wouldn't even be close to the amount of impact that you would have running head-on to another, say, cement truck or something coming at you from a two-lane road, say along the I-20 or U.S. 27 going towards Tecopa, or whatever highway is where you have head-on collisions with two vehicles traveling maybe 65 miles an hour apiece.

Response
In the analysis of accidents, severe collisions leading to mechanical damage and functional failure of a spent nuclear fuel shipping cask are termed "initiating events." A large number of specific initiating events can be identified by review of historic transportation accidents or by the imagination. Any initiating event, including a collision with a cement truck or other vehicle as suggested by the commenter, can be characterized in terms of its mechanical forces and heat. The event can then be categorized according to the matrix shown in Figure J-9 of the EIS, which was taken from a recent study conducted by the Nuclear Regulatory Commission (DIRS 152476-Sprung et al. 2000). As a consequence, it is not necessary to analyze every possible initiating event individually because the range of accidents included in Sprung et al. (2000) encompasses all credible initiating events.

Regardless of the specific initiating event, the severity of a transportation accident can be characterized by the combination of mechanical forces and heat involved in the accident. Mechanical forces account for the severity of the crash itself, while heat accounts for the severity of a fire that could be involved in the accident. Sprung et al. (DIRS 152476-2000) concluded that only a tiny fraction of all accidents, less than one in 10,000, would be severe enough to fail a spent nuclear fuel shipping cask. The reason for this is the rigorous design, performance, and testing requirements (see 10 CFR Part 71) for spent nuclear fuel and high-level radioactive waste shipping casks. This study reaffirmed that the spent nuclear fuel transportation regulations provide adequate protection of public health and safety.

8.10 (11405)
Comment - EIS002251 / 0003
A one-in-ten-million chance of an accident is too many for me to even fathom how somebody can come up with these kind of numbers. It is unbelievable. Okay, what happens if the transportation is interrupted? If you have a bridge that fails, and you have to reroute it? I see nothing about the added effects from extended length of transportation time.

Response
The EIS acknowledges that transportation accidents could occur during the transport of radioactive materials to the proposed Yucca Mountain Repository. In Section J.1.4.2.3.2, the EIS estimates that there could be as many as 66 accidents under the mostly legal-weight truck shipping scenario and 8 accidents could occur under the mostly rail scenario. A study recently conducted by the Nuclear Regulatory Commission (DIRS 152476-Sprung et al. 2000) concluded that only a tiny fraction of all accidents, less than 1 in 10,000, would be severe enough to fail a spent nuclear fuel shipping cask. The reason for this is the rigorous design, performance, and testing requirements (see 10 CFR Part 71) for spent nuclear fuel and high-level radioactive waste shipping casks. Based on these statistics, DOE does not expect an accident to occur that would result in a radiological release and subsequent environmental cleanup.

The methods and data used to estimate the 1 in 10 million per year probability are discussed in Section J.1.4.2 of the EIS. Rerouting of shipments because of adverse weather and road conditions is discussed in Section M.3.2.1.4.

8.10 (11432)
Comment - EIS002277 / 0003
I believe that the DEIS should look at the conditions in the Cajon Pass under high-wind conditions and not under stable wind conditions.

On J-70 a small fraction -- a small fraction, whatever that means, of the accidents could generate forces capable of damaging the casks.

Let me say this: If it can happen, it will happen in 30 years. So when you use adjectives of "small fractions may have," it will happen. As the gentleman said, the Titanic wasn't supposed to sink. It was man made. We are not God, and I think we can't build things that are that positive.

[Page] J-58 atmospheric conditions called neutral or average conditions. The reason I keep raising this condition question is I keep getting the fact that it is – I don't want to see "average" when we talk about conditions in certain areas of California which have very radical atmospheric conditions compared to the rest of the country.

Atmospheric conditions called "neutral average conditions likely to prevail during a severe accident or an act of sabotage." Now, what makes people think that they won't do it under a Santa Ana wind condition? I don't understand why that – in the wintertime we have a lot of Santa Anas. So I think these are things that have to be relooked at in the transportation area. More specific figures, not adjectives.

Response
The EIS acknowledges that transportation accidents could occur during the transport of radioactive materials to the proposed Yucca Mountain Repository. In Section J.1.4.2.3.2, the EIS estimates that there could be as many as 66 accidents under the mostly legal-weight truck shipping scenario and 8 accidents could occur under the mostly rail scenario. A study recently conducted by the Nuclear Regulatory Commission (DIRS 152476-Sprung et al., 2000) concluded that only a tiny fraction of all accidents, less than 1 in 10,000, would be severe enough to fail a spent nuclear fuel shipping cask. This is the "small fraction" referred to by the commenter. The main reason that only a small fraction of accidents are severe enough to result in failure of the shipping casks is the rigorous design, performance, and testing requirements (see 10 CFR Part 71) for spent nuclear fuel and high-level radioactive waste

shipping casks. Based on these statistics, DOE does not expect an accident to occur that would involve radiological consequences.

Two sets of atmospheric conditions were used in the transportation impact analysis. These are referred to in Section J.1.4.2.1 of the EIS as “neutral or average” and “stable.” Neutral or average conditions are those that would not be exceeded more than 50 percent of the time and stable refers to conditions that would not be exceeded more than 95 percent of the time. Under stable conditions, wind speeds are usually very low [on the order 1 meter (3.3 feet) per hour]. Stable atmospheric conditions and low wind speeds result in minimal dispersion of the radioactive materials released from a potential transportation accident; that is, the plume of radioactive material would slowly move downwind and would be dispersed slowly. This means that the concentrations of radioactive material in the plume, and thus the consequences to individuals and populations in the area through which the plume passes, would be higher under stable conditions than they would be under less stable conditions with high winds. Under unstable or neutral atmospheric conditions, the plumes of released material spread out further and more rapidly than under stable, low-wind conditions. Thus, if an accidental release occurred under Santa Ana wind conditions, a lower radiation dose would be predicted than the EIS predicted in using the two sets of atmospheric conditions described above.

8.10 (11487)
Comment - EIS002253 / 0003
There has to be, I believe, almost a mile-by-mile, half-mile-by-half-mile evaluation of the tracks all the way to Yucca Mountain. And if they find these tracks deficient, in cooperation with the railroad, get them fixed. Put them at such a level that they never will be afraid of putting those casks on those trains, because they know that track won’t fail.

The failures of coming down Cajon Pass, by the way, were trains coming down. You remember the one ten years ago that ran right into a neighborhood, an out-of Control train. It was because of the train, it wasn’t the track. And it ran right into a neighborhood and obliterated a neighborhood and buried it in soda ash. And it was because it was coming down, not up.

Response
The U.S. Department of Transportation is the Federal agency responsible for establishing and enforcing the standards for the transportation infrastructure. The Department of Transportation’s Federal Railroad Administration is responsible for safety of the rail system, including track, locomotives, highway crossings, incident reporting, brake systems, etc. (see 49 CFR Parts 200 to 266). The Federal Railroad Administration provides funds to states for track and train inspectors. The Federal Railroad Administration and state inspectors conduct the track inspections suggested by the commenter. Owners of track and rights-of-way continuously perform maintenance and upgrade activities to keep railroads safe. The Federal Government would own the tracks and the rights-of-way for the branch rail line in Nevada and would be responsible for conducting maintenance and repair. Nationally, the rail companies own their tracks and rights-of-way. The rail companies are responsible for maintenance and repair of their own tracks and rights-of-way. DOE and private rail lines would conduct inspection, maintenance, and repair activities as required by the Federal Railroad Administration and the states.

In general, adequate rail lines, crossings, bridges, and tunnels exist to support the transportation of materials described in the EIS. The shipment of radioactive materials requires no special transportation infrastructure that is not necessary for safe transport of commodities in the United States today.

In spite of all the precautions to be taken to prevent accidents such as the out-of-control train mentioned by the commenter, the EIS acknowledges that transportation accidents could occur during the transport of radioactive materials to the proposed Yucca Mountain Repository. In Section J.1.4.2.3.2, the EIS estimates that there could be as many as 66 accidents under the mostly legal-weight truck shipping scenario and 8 accidents could occur under the mostly rail scenario. A study recently conducted by the Nuclear Regulatory Commission (DIRS 152476-Sprung et al. 2000) concluded that only a tiny fraction of all accidents, less than 1 in 10,000, would be severe enough to fail a spent nuclear fuel shipping cask. The reason for this is the rigorous design, performance, and testing requirements (see 10 CFR Part 71) for spent nuclear fuel and high-level waste radioactive shipping casks. Based on these statistics, DOE does not expect an accident to occur that would involve radiological consequences.

8.10 (11493)
Comment - EIS002254 / 0006
We had a big accident three weeks ago through our community, a dripping waste truck came through. So don't tell me that that's not what's going on every day here in this country. Don't tell me that lie again.

Response
DOE would not use defective or leaking casks to ship spent nuclear fuel and high-level radioactive waste. The Nuclear Regulatory Commission and the U.S. Department of Transportation regulate the design, manufacture, maintenance, and use of these casks. Specific controls include (1) independent Nuclear Regulatory Commission review of designs to ensure compliance with requirements in 10 CFR Part 71, and (2) Nuclear Regulatory Commission-approved and audited quality assurance programs for design, manufacturing, maintenance, and use of transportation packages.

8.10 (11571)
Comment - EIS002281 / 0001
The routes going through San Bernardino and Riverside counties, Inyo County – I lived in Inyo County for two years, and I can attest to what was described about Route 127 as being a paved-over wagon trail, as that is exactly what it is. I have driven that many times. It is a two-lane road, definitely not made for heavy trucks of any stretch of the imagination, yet I do know they pass over it.

If a nuclear accident happened, if something happened on that stretch of highway, who would know about it? It is not traveled that extensively, except maybe when they have the dune races out at Dumont Dunes.

It is dangerous. It crosses sacred Indian land. Any time the government decides that it's just empty land and it's just a few people out there, it smacks of environmental racism. Poor people, people of color, are always the ones who get impacted with this the most. This cannot be allowed.

It's dangerous, and again I cannot emphasize more than has already been said, coming through Cajon Pass, an accident there is catastrophic. An accident coming through Los Angeles between Orange County and San Bernardino, you can hardly tell where one city stops and the other one begins. Anything through there – and how many times do you see or hear of accidents that involve big-rig trucks? For whatever reason, somebody cuts it off, some little foreign car cuts it off, or just traveling a bit too fast and losing control on a wet highway.

Response
Presently, State Route 127 is not a preferred highway and thus could not be used for shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. However, should the State of Nevada or California designate this highway as an alternate preferred route, it could do so only in accordance with U.S. Department of Transportation guidelines. The regulations require the State to select routes in accordance with the Department of Transportation *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* or an equivalent routing analysis that adequately considers overall risk to the public. Consultation with affected states and local jurisdictions would be necessary. The affected routing authorities would consider the conditions of State Route 127, including emergency response capability, highway design and condition, population density, traffic conditions, etc., during the process of selecting and designating alternative preferred routes.

The EIS examines the issue of environmental justice in Section 6.3.4. DOE believes that there would be no disproportionately high and adverse impacts to minority or low-income populations as a result of the Proposed Action.

As discussed in Section J.1.4 of the EIS, the release of radioactive materials during an accident is an extremely unlikely event (an annual probability of 0.01 percent. Transportation safety related to potential release of radioactive materials is primarily based on the integrity of shipping casks. The leaking of a transportation cask could only occur if mechanical forces (impact) and heat (fire) exceeded the design limits of the transportation cask structures and materials. Additional information on the safety and testing of transportation casks is provided in Section M.4. Information on human behavior is included in the accident rates and discussed in Section J.1.4.2.1.

8.10 (11581)
Comment - EIS002235 / 0004
As you have heard stated previously today, last week we focused our attention on the top of the Cajon Pass with 58 cars, five big rigs, and a massive pile-up that it took hours to untangle. Not uncommon here. What many of us didn't see was that at about two o'clock on the same day a county fire employee was first on scene on Interstate 10 at another massive accident and began rendering aid to victims, our citizens, as cars continued to crash -- literally crash around him.

What that brings up is that under even DOT (sic) predictions, with an unopened cask one may receive 10 millirems per hour at 10 meters, which is approximately 5 percent of the annual average dose that one would expect naturally.

In the event of an accidental release, particulates would be borne by desert and Santa Ana wind conditions for many, many miles, and the inhalation hazard would be catastrophic.

The DOE itself claims that in an accidental release, a 42-square-mile area would be contaminated and require 460 days to decontaminate it, and cost over 620 million dollars.

Response
Sections 6.2.4.2 and J.1.4.2 of the EIS evaluate severe transportation accidents such as the one described by the commenter. A severe truck accident is an extremely unlikely event (an annual probability of 1.9 in 10 million) per year. The consequences of this accident were estimated to be 18 latent cancer fatalities. The dose to the maximally exposed individual would be about 4 rem. These consequences include the radiation doses from inhaling radioactive material released during the accident. In addition, DOE assumed that emergency response activities such as evacuation would not take place, which provides conservative estimate of potential impacts.

The allowable dose from a closed, loaded cask is 10 millirem at 2 meters (6.6 feet).

In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments (DIRS 154814-Sandquist et al. 1985), and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $270 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 included data compiled from case studies involving actual cleanup of radioactive materials contamination. The studies address consequences for releases of radioactive materials in communities.

8.10 (11906)
Comment - EIS000996 / 0001
The Mississippi River provides 70 percent of the Nation's water resources and its boundaries as a water resource begin in the East in Appalachian Mountains and in the West in the Rocky Mountain Range. Drainage to the Mississippi River to the north and south is defined within the entire range of the United States and all the way North into Canada as well. Along the drainage system are 76 and 103 operating commercial reactors. Most of the shipments of radioactive materials are designed for storage in the Yucca Mountains will pass through this water resource area. The potential devastating effects of the gases released from the fission processes of radioactive nucleotides within these used cells being transported is unknown. What is known is that these gases will get into water resources of the Mississippi River drainage system and will affect our food, our water, and that for the billions of plants and animals that depend on this water. What would happen if an accident occurred and one of the shipments might fall into the water and affect 70 percent of the nation's water resource could be even more devastating. I question the validity of the casks, which are storing radioactive materials capable of keeping fission products from escaping. What is the capacity, should these casks fall from trucks or trains carrying them to withstand physical destruction?

Response
The EIS does not specifically analyze a transportation accident involving contamination of surface water such as the Mississippi River. Analyses performed in previous EISs (see Section 1.5.3 of the EIS) have consistently shown that the airborne pathway has the greatest potential for exposing large numbers of people to radioactive material in the

event of a severe transportation accident. A paper that analyzed the potential importance of water pathway contamination for spent nuclear fuel transportation accidents using a worst-case water contamination scenario (DIRS 157052-Ostmeyer 1986) showed that the impacts of the water contamination scenario were about one-fiftieth of the impacts of a comparable accident in an urban area. Therefore, if an accident occurred and one of the shipments fell into the water, the impacts would be much less than the impacts presented for the severe transportation accidents analyzed in Chapter 6 and Appendix J of the EIS. Many studies have shown that when people are protected, animals and plants are protected.

The casks used to transport spent nuclear fuel must meet stringent standards established by the Nuclear Regulatory Commission (10 CFR Part 71). These standards include requirements for keeping fission products from escaping during normal transportation and during severe accidents. The consequences of severe transportation accidents are presented in Section 6.2.4.2 and Appendix J of the EIS. Though a severe accident that releases radioactive materials is not expected to occur during the 24-year campaign, DOE has performed an analysis of a maximum reasonably foreseeable accident. Section 6.2.4.2 presents the results of the analysis. Section J.1.4.2 presents details on the data, methods, and assumptions used to estimate these consequences. Section M.4 contains more information on the safety and testing of transportation casks.

8.10 (12031)
<u>Comment</u> - EIS001879 / 0055
A careful review of the Draft EIS was unable to identify any evaluations of the consequences of an avalanche related transportation accident or [an] accident scenario whereby a cask plummets down a steep rocky slope. While the probability of such an event is apparently included within the analyses presented in the Draft EIS (in terms of reportable traffic incidents which would include these types of events), it does not appear that the severity is accounted for adequately.

There are numerous avalanche detection monitors and rock fall fences located along the Union Pacific Railroad lines in Clover Valley, immediately east of Caliente, Nevada. Discussions with railroad employees indicate that rock falls and avalanches are a common occurrence, that train cars are often hit, and that in some cases, boulders as large as boxcars have fallen onto the railroad tracks. Other portions of rail routes through mountainous terrain probably also have similar occurrences. The Draft EIS does not contain any evaluation of the consequences of a rock fall or avalanche along transportation routes (both rail and truck) or how such events would rank in the probability/severity matrix given in Figure J-8. The EIS must be revised to include an evaluation of the consequences of a rock fall or avalanche.

The Draft EIS does not evaluate the scenario of a traffic accident that results in a cask falling down a steep rocky slope. A review of the source documentation (NUREG/CR4829, Fischer et al. 1987) indicates that only single impact scenarios were evaluated and that one of the key factors is the maximum effective strain on the containment shell of the cask. No evaluations were made of multiple impact scenarios such as a cask falling down a slope. Under a multiple impact scenario, numerous breaches could occur and much more severe breaches are likely; as a result, the release fractions from the fuel rods to the casks could be much higher than those originally estimated by Oak Ridge National Laboratory (see Lorenz et al. Fission Product Release from Highly Irradiated LWR Fuel, NUREG/CR-0722 as referenced in Fischer et al. Shipping Container Response to Severe Highway and Railway Accident Conditions, NUREG/CR-4829). The EIS must be revised to include an evaluation of multiple-impact scenarios especially with regard to release fractions from multiple impact and cask breach scenarios.

<u>Response</u>
The commenter requested analyses of specific accident scenarios involving avalanche-related accidents and shipping casks falling down a steep rocky slope. In the analysis of accidents, these events are termed “initiating events.” A large number of specific initiating events can be identified by review of historic transportation accidents or by the imagination. These include collisions with fixed objects (bridge abutments, walls, barriers, etc.); collisions with other vehicles and animals; rollovers; jackknife; derailments; and collisions at grade Crossings. Any initiating event can be characterized in terms of its mechanical forces and heat, and the event can then be categorized according to the matrix shown in Figure J-9 of the EIS, which is the transportation accident risk model used in the EIS. This model was taken from a recent study conducted by the Nuclear Regulatory Commission, *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). As a consequence, it is not necessary to analyze

every possible initiating event individually because the range of accidents included in Sprung et al. (2000) encompasses all credible initiating events.

Regardless of the specific initiating event, the severity of a transportation accident can be characterized by the combination of mechanical forces and heat involved in the accident. Mechanical forces account for the severity of the crash itself, while heat accounts for the severity of fire that could be involved in the accident. Sprung et al. (DIRS 152476-2000) concluded that only a tiny fraction of all accidents, less than 1 in 10,000, would be severe enough to fail a spent nuclear fuel shipping cask. The reason for this is the rigorous design, performance, and testing requirements (see 10 CFR Part 71) for spent nuclear fuel and high-level radioactive waste shipping casks. This study reaffirmed that the spent nuclear fuel transportation regulations provide adequate protection of public health and safety.

The massive shipping casks are designed to sustain severe damage without resulting in functional failure. In addition, the shipping casks are protected by crushable impact limiters that absorb impact energy that would otherwise be applied to the shipping cask. Furthermore, the shipping casks are attached to trailers and railcars that would absorb additional impact energy as long as the shipping casks remain attached. Finally, the actual surfaces that the shipping cask would strike in a collision event, such as the ground, rocks, or other vehicles, would absorb some of the impact energy. Therefore, although the specific initiating events suggested by the commenter might not be explicitly evaluated in the EIS or in Sprung et al. (DIRS 152476-2000), the damage to the shipping cask and its cargo is included in the accident model shown in Figures J-9 of the EIS.

8.10 (12032)
<u>Comment</u> - EIS001879 / 0056
The Draft EIS does not include information on how the judgments regarding the release fractions were made. As noted by Lorenz et al. (as cited above, page 9-23), "...the ORNL [Oak Ridge National Laboratory] test data may or may not overestimate the actual releases under high-impact conditions," and on page 9-29,..." The results of this study depend primarily on the quality of the cask response models, the radiation release models, and the probability models and distributions used in the analysis.... If the objective of this study is to precisely define spent fuel transportation risk, many improvements need to be made to these models to calculate the probability and radioactive release estimates and to quantify the uncertainties in the estimates." The EIS should state that the maximum release scenario is based upon limited tests, mathematical models that incorporate a number of simplifying assumptions, and professional judgment.

<u>Response</u>
The EIS has been revised to use the release fractions from the U.S. Nuclear Regulatory Commission study *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000) to estimate the risks and consequences of transportation accidents. The methods and data used to estimate these release fractions are summarized in Section J.1.4.2 of the EIS and are discussed in more depth in Section 7 of Sprung et al. (2000).

8.10 (12093)
<u>Comment</u> - EIS002307 / 0007
Section 6 of the DEIS is incorrect in the assessment of train accident risks because the DEIS, assuming that the highway and rail conditions will be similar, relies on data from highway conditions to compute train accident risks.

<u>Response</u>
As discussed in Section J.1.4.2.3, the EIS uses train accident data to estimate train accident risks, and does not use highway accident data to estimate train accident risks.

8.10 (12135)
<u>Comment</u> - EIS001887 / 0437
Inputs to computer models predicting exposure levels

3.1. Use of temperature and strain as independent variables
Refer to Resnikoff, 1993. In many severe accidents, high impacts are coupled with vehicle fires. In predicting probabilities of accidents of a given severity, the probability of fire of a certain severity is multiplied by the

probability of an impact of a given strain. This tends to underestimate the "true probability" of strain-fire accidents, as these two variables are not independent. This is another artifact of the Modal study needing revision.

3.2. Inconsistent assumptions made in RADTRAN4 and RISKIND

3.2.1. DOE employs RADTRAN4 for total risk, summing individual accident probabilities multiplied by consequences. RISKIND is employed to assess the maximum accident consequences. The assumptions employed should be identical, but they are not. RADTRAN4 assumes ingestion of contaminated food after an accident in rural areas in determining collective population dose; RISKIND assumes no radiological dose to populations from ingestion of contaminated food after an accident in determining maximum accident scenarios. It is unclear why these two inputs are different.

3.2.2. In calculating effects to the maximally exposed individual in an accident scenario, the EIS assumes that this person is located 360 meters (~1200 ft) from the site. In calculating effects to the maximally exposed individual in sabotage scenario, the EIS assumes this person is 140 meters (~460 ft) from the site. It is unclear where these distances came from, or why they are different.

3.3. Incident-free exposure assumptions

3.3.1. Escorts
DOE based its estimates of annual dose to escorts on regulations that we believe are insufficient to ensure the safety of the transportation vehicles. We recommend that these requirements be increased so that there is always at least one armed escort traveling in a separate vehicle from all truck shipments, and in separate rail cars for all train shipments. This will increase the estimated dose to escorts.

3.3.2. Individuals stuck in traffic
DOE assumes that individuals exposed to radiation dose due to being stuck in traffic near a transportation vehicle will occur only once per individual. However, personal driving patterns are not random, since people (especially commuters) tend to be on the same road at the same time of day. Therefore, persons being stuck in traffic near a transportation vehicle once are likely to be stuck multiple times.

3.4. Population density

The EIS uses average population densities from the 1990 Census to estimate the "worst case" accident and sabotage scenarios. This ignores time-dependent, such as daytime population densities in cities due to worker commuting (Manhattan's population doubles every day), tourist population densities, special-event and localized densities. The maximum population densities used in the RISKIND code should reflect these factors.

3.5. Characteristics of spent fuel used in accident consequence estimates

3.5.1. Age of spent fuel

Simply put, the longer a given type of fuel is removed from a reactor prior to shipment, the less radioactive it is. Fuel which has cooled for a long time has had the time to undergo decay reactions, reducing its level of radioactivity. The DOE assumes in its estimates a spent fuel age of 25.8 years, even though fuel is only required to be cooled for 5 years prior to transportation. This results in a reduced estimate of hazard. Unless the DOE can show through legal requirements that spent fuel will be aged 25.8 years prior to shipment, it is not appropriate to use this age in its exposure assessments for incident-free and accident scenarios.

A more likely scenario is that older fuel, already stored in storage casks at reactor sites or at the proposed PFS [Private Fuel Storage] storage facility in Utah, will remain stored while newer fuel, stored in fuel pools, but aged more than five years, will first be transported off the reactor site so that reactors can be decommissioned more rapidly. DOE has established an acceptance quota for reactor fuel; for utilities, the most advantageous use is to further reactor decommissioning. Further, DOE would have to pay the cost of casks and transportation of this newer fuel. Older fuel would then be shipped at a much later date.

In a 25.8–year period, important radioactive contaminants in irradiated fuel will have decayed away. For example, Co^{60}, a main contributor to radiation dose from crud spallation, has a half-life on the order of 5 years. Concentrating on 25.8-year fuel decreases the amount of Co^{60} modeled by a factor of 2^5, seriously reducing possible radiological effects in the event of a release.

Response

3.1 At the time the Draft EIS was published, DOE considered *Shipping Container Response to Severe Highway and Railway Accident Conditions* (DIRS 101828-Fischer et al. 1987; also called the Modal Study) to contain the best available information regarding spent nuclear fuel transportation accidents. However, the U.S. Nuclear Regulatory Commission has recently published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000), which contains additional information regarding spent nuclear fuel transportation accidents, including the use of different shipping cask designs than the representative steel-lead-steel cask used in the Modal Study. Because Sprung et al. (2000) provides more recent information and is based on the most recent shipping cask designs, DOE has conducted an analysis using the information from that document. The results of this analysis are presented in Appendix J of the EIS and show that the impacts estimated in the EIS using the Modal Study exceed the impacts estimated using Sprung et al. (2000). As a consequence, the Draft EIS overestimated the impacts of spent nuclear fuel transportation accidents and the Final EIS contains more realistic estimates of spent nuclear fuel transportation accident impacts.

DOE agrees with the commenter that impact and thermal conditions in transportation accidents are not independent of each other. For example, one would expect that fires are more likely to occur in high-speed impacts than in low-speed impacts. In essence, Sprung et al. (DIRS 152476-2000) assumes three general sequences of events could lead to a release. These are (1) severe collision events without fires, (2) collisions followed by fires, and (3) fire only. These variables are not treated independently, as indicated in Section 7.2.8.1 of Sprung et al. (2000), but rather the probabilities of fires are dependent on the particular accident scenario that occurs (truck accident scenarios are depicted in Figure 7-3 of that document).

3.2.1 The commenter is correct in that the integrated population risk calculation included doses from ingestion of contaminated foods for accidents in rural areas only, whereas the analysis of maximum reasonably foreseeable accidents did not include ingestion. DOE's experience with this and other EISs as well as many other radiation dose studies is that ingestion doses are small in relation to inhalation and direct external exposures. In general, the population doses from the maximum reasonably foreseeable transportation accidents would be highest in urban areas where population densities are highest. Since little agricultural production occurs in urbanized areas, ingestion of crops that have become contaminated by a release of radioactive materials would not occur. In other words, the assumed population densities have a much stronger effect on population dose consequences than does including/excluding ingestion doses. In this context, the absolute magnitudes of the results are less important than the consistent treatment of assumptions and uncertainties. Since the integrated population risks calculated by RADTRAN are not compared to the consequences of maximum reasonably foreseeable transportation accidents, differing assumptions about ingestion would not affect the comparisons among alternatives in this EIS. Therefore, DOE believes the effects of these differing assumptions are small and, in addition, would have no effect on the decisions to be made in this EIS.

3.2.2 The distance to the maximum exposed individual is a function of the prevailing atmospheric conditions at the time of a release of radioactive material and the height of the release. For example, consider an accident that involves a serious fire. If material was released from a shipping cask, the fire would initially cause the released material to be transported upward. We have all seen large fires on television news in which the cloud of smoke rises directly up from the source of the fire. As the released material gets farther from the fire, the released particles cool and the forces of gravity would begin to bring the particles back to the ground. The effects of wind and weather would cause the particles to be transported downwind. Because of the initial upward movement of the plume, the location of the highest concentrations of released material would be at some distance downwind of the accident scene, depending on the severity of the fire, wind speed, and atmospheric stability. If a release occurs that is not accompanied by a fire, the initial vertical (upward) movement does not occur or is relatively weak and the plume of released material remains close to the ground. Therefore, the maximum concentration of particles would be closer to the accident scene for a nonfire scenario than it would be for an accident that involves a fire. In a sabotage event, the released material does not have the same vertical driving force that a long-duration fire produces. Thus, the particles remain near ground level and the maximum concentrations are nearer to the release point than they would for a fire-driven release.

3.3.1 The Nuclear Regulatory Commission's regulations in 10 CFR Part 73 prescribe safeguards and security requirements for spent nuclear fuel shipments. These safeguards, which include armed escorts in urban areas, should be effective in reducing the likelihood of a successful attack to low levels. In addition to armed escorts in urban areas, the requirements include tracking, reporting, route planning and prenotification. Prenotification of the timing and routes used for shipments would be held in confidence as a matter of security, but state governors' offices would be made aware of schedules. These operational actions would be supplemented by the robust nature of the cask itself, which would make an attack that was not thwarted by the safeguards measures even more unlikely of success.

Application of the urban escorting requirements in all areas would have drawbacks without any significant increase in overall security. The drawbacks would relate to the additional radiological exposure, as stated by the commenter, and increased potential for accidents involving the escort vehicles. Armed guards would be required in heavily populated areas because the total radiological impact in such areas would be higher than in less populated areas. In neither area is it expected that doses to individuals would be markedly different or above levels that could have health effects. Thus, individuals in high, medium, and low population areas are treated equally.

DOE sees no particular need for additional security measures over and above those that would be provided as a result of applying the Nuclear Regulatory Commission safeguards requirements in place at the time of the shipments. As stated in the EIS, escorts are required in heavily populated areas. These areas are defined in a list that is provided by the Commission as part of its requirements for safeguarding spent nuclear fuel in transportation. Section M.7 of the EIS provides additional information on physical protection of spent nuclear fuel in transport.

3.3.2 A defensible basis for estimating the number of times that a person could be stuck in traffic next to a spent nuclear fuel shipment could not be established. It is extremely unlikely that even one occurrence would be experienced, given the number of vehicles on the highways in relation to the number of spent nuclear fuel shipments occurring at a given time. Approximately six shipments per day would be received at the repository over the 24-year operating period of the repository under the national mostly legal-weight truck scenario. As stated in Section 3.2.2 of the EIS, legal-weight truck shipments would represent less than 0.5 percent of commercial vehicle traffic on U.S. 95 (and an even smaller fraction of total commercial plus private vehicle traffic). Although certain people are more likely to be on a highway at a given time (for example, commuters during rush hour), the likelihood of any individual being stuck next to a shipment even one time is approximately random due to the great number of vehicles that would also be on the highway in relation to the number of spent nuclear fuel and high-level radioactive waste shipments. As stated in Section M.3.2, during preshipment planning, the Regional Servicing Contractors should consider preferred time of day travel through urban areas as part of routing determinations. The intent is to schedule departures so avoid traveling through urban areas during rush-hour periods. Real-time tracking and communications systems provide the capability to relay information to drivers on upcoming road and weather conditions. Preshipment planning and real-time tracking and communications would therefore reduce the likelihood of such an event.

3.4 The precise timing, location, and other circumstances surrounding a transportation accident cannot be predicted. In addition, it would not be practical for the EIS to attempt to analyze accident consequences for every location along the shipping route. Instead, maximum consequences were analyzed for three types of population zones: urban, suburban, and rural. For example, an accident in the Las Vegas area would be characterized by the analysis for an urban area. Tables 6-14 and 6-15 of the EIS provide the estimated impacts of the maximum reasonably foreseeable accident in an urbanized area for truck and rail, respectively. Table J-24 shows consequences of maximum reasonably foreseeable accidents in urbanized and rural areas.

The EIS does not analyze a worst-case accident, as the commenter suggests. Rather, the EIS used the concept of a maximum reasonably foreseeable accident, which is sometimes misinterpreted as being a worst-case accident. An example of a worst-case transportation accident would involve a shipment containing the highest possible quantity of spent nuclear fuel or high-level radioactive waste, in a highly populated area, with catastrophic failure of the shipping container, an engulfing fire lasting many hours, and stable weather conditions (very low atmospheric dispersion of plume). However, this worst-case accident scenario would not be reasonably foreseeable because it requires the simultaneous occurrence of a series of unlikely events, which, compounded, result in a likelihood of occurrence that is less than once in 10 million years. Council on Environmental Quality regulations (40 CFR 1502.22) state that analysis of accidents should avoid scenarios that are based on pure conjecture and avoid compounding conservatisms. The practice of compounding conservatisms produces unrealistic results that mask the real differences between alternatives and would not produce suitable results to support choices among the alternatives.

3.5 The commenter pointed out that the assumptions used in the EIS for the age and radiological characteristics of spent nuclear fuel in the maximum reasonably foreseeable accident scenarios could understate the transportation risks. It is true that DOE could ship some spent nuclear fuel that is more radioactive than the 26-year-old pressurized-water reactor spent nuclear fuel analyzed in the scenario. Based on comments received and DOE's additional review of technical documents and conduct of hazard analyses, the basis for the transportation impact analysis has been revised to consider commercial spent nuclear fuel that has median hazard. Spent nuclear fuel having median hazard would be discharged from a reactor approximately 14 years before shipment to Yucca Mountain. If any 5-year-old or 10-year-old spent nuclear fuel was to be shipped to the repository, it would be a small fraction of the total shipments. This is a case in which "average" data is used in the EIS as opposed to bounding assumptions. Consistent with Council on Environmental Quality regulations (40 CFR 1502.22), DOE is attempting to avoid compounding conservatisms, yielding unrealistic results, in analyzing accident scenarios. Other elements of the impact analyses (for example, radiation dose rates, atmospheric dispersion modeling, release fractions) are bounding such that the transportation impact results presented in the EIS are bounding, yet not so conservative that the results mask the true differences between the alternatives.

8.10 (12136)
Comment - EIS001887 / 0438
Improper attention to Intermodal Transfer Station

4.1. Crash scenarios analyzed

4.1.1. Airplane crash scenario

The airplane crash scenario assumes that the crash velocities will be those typical of takeoff and landing operations. As a worst case scenario, the potential impact of a crashing military jet traveling at 600 mph should be considered. This is likely to cause release of some radioactive material.

Response
The methodology employed in the EIS to estimate penetration characteristics of large aircraft projectiles into shipping casks was based on extensive research that is summarized in DOE-STD-3014-96, *Accident Analysis for Aircraft Crash into Hazardous Facilities* (DIRS 101810-DOE 1996). This document and its supporting studies contain the best available information on aircraft crash probabilities and the effects of aircraft crashes on systems, structures, and components. The studies include this information for commercial, general aviation, and military aircraft crashes. Consistent with Council on Environmental Quality regulations (40 CFR 1502.22), DOE is attempting to avoid compounding conservatisms, yielding unrealistic results, in analyzing environmental impacts. Such practices would provide misleading information and lend credibility to accident scenarios that are clearly insignificant contributors to the true risks of an intermodal transfer facility. If DOE decided to construct an intermodal transfer facility in Nevada, it would conduct additional aircraft hazard analyses to support nuclear facility safety analyses and designs of structures, systems, and components important to safety. DOE believes the aircraft hazard analysis summarized in the EIS would probably not be adequate to support detailed design and safety analyses of an intermodal transfer facility but is adequate for its intended purpose of informing the reader about the potential likelihood and consequences of accidents related to transportation of spent nuclear fuel and high-level radioactive waste to the proposed repository.

Bechtel-SAIC Company (DIRS 157210-BSC 2001) estimated the potential releases of radioactive materials that could result from the crash of a commercial jet airliner into a shipping cask containing spent nuclear fuel. According to the analysis, the release from a rail cask struck by a jet engine traveling 640 kilometers (400 miles) per hour and exposed to the ensuing jet-fuel fire would be no greater than the releases in a severe rail transportation accident in which the cask impacted a hard rock surface at between 48 and 97 kilometers (30 and 60 miles) per hour and was engulfed by fire for 0.5 hour. The consequences of this accident–1,300 person-rem or 0.67 latent cancer fatality–are presented in Section J.1.4.2 of the EIS. The consequences for an event in which the commercial airliner impacted a legal-weight truck cask would be about the same–1,100 person rem or 0.57 latent cancer fatality. A truck cask event that would have similar consequences would involve impact into a hard rock surface at a speed greater than 190 kilometers (120 miles) per hour followed by an engulfing fire for up to 0.5 hour.

8.10 (12193)
Comment - EIS000096 / 0006
Fourth, the Draft EIS underestimates the consequences of severe accidents and terrorist/sabotage incidents involving HHT [heavy-haul truck] shipments through Tonopah, Goldfield, and Beatty. The close proximity of the highway to hotels, casinos, retail businesses, schools, churches, and residences would increase human health effects in the event of an accident or incident involving loss of cask containment or shielding. Proximity to the route would increase the economic consequences of a HHT accident or incident, even one involving no loss of cask integrity.

Response
While a specific analysis of a severe accident or terrorist attack in the vicinity of Tonopah, Goldfield, and Beatty was not conducted, maximum reasonably foreseeable accidents were analyzed for national transportation. These results are reported in Section 6.2.4.2 and Appendix J of the EIS. The EIS analysis assumed that an accident determined to be reasonably foreseeable for national transportation could occur in Nevada with similar results. The consequences in both urbanized and rural areas were considered in determining the maximum reasonably foreseeable accident impacts.

8.10 (12262)
Comment - EIS001888 / 0598
The DEIS indicates that the DOE prepared a description of the Maximum Reasonably Foreseeable Accident (MRFA) that describes the most severe accident liable to occur to a cask being transported from a reactor to Yucca Mountain. However, none of that information is provided in the DEIS. Emergency management impacts are a critical component of the EIS. The DEIS must provide an unambiguous description of the Maximum Reasonably Foreseeable Accident as well as the likely continuum of lesser accidents that may require local emergency response assets.

Response
Since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). DOE has concluded that the models used for analysis in the Draft EIS relied on assumptions about spent nuclear fuel and cask response to accident conditions that caused an overestimation of the resulting impacts. Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there could be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Figure J-9 of the EIS provides a description of transportation accidents in terms of cask temperature and impact speed. Section J.1.4.2.1 presents consequences for accidents that could release radioactive materials.

8.10 (12419)
Comment - EIS001888 / 0558
[Clark County summary of comments it has received from the public.]

Commenters stated that a full range of transportation accidents, especially low probability/high consequence accidents should be evaluated in the EIS. Other commentators stated that the EIS should evaluate a severe, but credible, transportation accident. Some commenters offered specific transportation accidents for analysis.

Response
The transportation accident risk analysis in the EIS encompasses the full range of transportation accidents. As noted in the comment, several commenters requested analysis of specific accident scenarios, such as a crash between a

railcar and a herd of cattle, a crash involving two trucks, a crash involving a truck and a train, etc. The accident analysis referred to such events as "initiating events." A large number of specific initiating events can be identified by review of historic transportation accidents or by the imagination.

Regardless of the specific initiating event, the severity of a transportation accident can be characterized by the combination of mechanical forces and heat involved in the accident. Mechanical forces account for the severity of the crash itself, while heat accounts for the severity of fire that might be involved. The risk model used in the EIS evaluated the full range of transportation accidents based on the severity of the mechanical forces and heat. Figure J-9 of the EIS shows the range of transportation accidents based on this model. An initiating event can be characterized in terms of its mechanical forces and heat, and then according to the matrix shown in Figures J-9. As a consequence, it is not necessary to analyze every possible initiating event individually because the range of accidents encompasses all credible initiating events.

Because of the rigorous design standards for shipping casks, most accidents (more than 99 percent) would not generate forces capable of causing functional damage to the cask. Therefore, most accidents would have no radiological consequences. Although it is not likely that an accident would result in functional damage to the cask and a release of radioactivity, the EIS evaluates the consequences of such an accident if it occurred. For example, Table 6-14 lists estimated impacts of the maximum reasonably foreseeable accident for truck transportation. The highest consequences would occur in an urbanized area resulting in about five latent cancer fatalities. The likelihood of such an accident is very small, about 2 in 10 million years.

8.10 (12734)
Comment - EIS001873 / 0060
P. 6-2. The statistical presentation in this section on the incident-free and accident scenario impacts of transporting high-level waste nationally and in Nevada is probably incomprehensible to the average resident of, say, Caliente, Nevada. This chapter should be rewritten in plain English. The various tables in this section alternate between expressing risk in terms of individual doses, collective doses, numbers of cancer deaths, and probabilities of cancer death. While the information appears fairly complete, the tables are not presented in a logical order that allows the risk of the various alternatives to be compared.

This kind of statistical approach, absorbing definite risk to actual people in large, vaguely defined population numbers results in statements which are simply not credible to an ordinary person.

By analogy, it is not considered safe by anyone to discharge a shotgun on the streets of a city of a million people, even though the statistical probability that a particular individual will be hurt may be negligible. To continue the analogy, if someone were actually proposing to fire the gun anyway, it would be important to know on which street and whether it would be pointed horizontally or vertically. The DEIS totally avoids the question of who is being targeted for potentially deadly radiation bombardment. The DEIS also ignores the fact that individuals in some communities will receive a significantly higher exposure. For example residents of communities on a transportation route in Nevada, Utah, or Arizona will likely be exposed to more shipments than people on a route in California or New England.

Response
DOE believes that the EIS adequately analyzes the environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

For the reasons discussed above, DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada.

8.10 (12895)
Comment - EIS010314 / 0003
Of particular concern would be a collision that would result in a long-duration (longer than 30 minutes), high-temperature (hotter than 1475°) fire. Or a head-on or sideways collision that would result in a puncture of the cask.

Response
The Type B shipping casks DOE would use to transport spent nuclear fuel and high-level radioactive waste to the proposed Yucca Mountain Repository would be designed to withstand severe hypothetical accident conditions. The hypothetical accident conditions are described in Nuclear Regulatory Commission regulations (see 10 CFR 71.73), and include free drop, puncture, thermal, and immersion conditions. These tests are intended to simulate the effects of severe impact and long-duration fires on the shipping cask.

In the analysis of accidents, long-duration fires or punctures of the cask leading to damage and functional failure of a spent nuclear fuel shipping cask are termed "initiating events." A large number of specific initiating events can be identified by review of historic transportation accidents or by the imagination. These include collisions with fixed objects (bridge abutments, walls, barriers, etc.), collisions with other vehicles and animals, rollovers, jackknifes, derailments, and collisions at grade crossings. Any initiating event can be characterized in terms of its mechanical forces and heat, and the event can then be categorized according to the matrix shown in Figure J-9 of the EIS, which is the transportation accident risk model used in the EIS. DOE took this model from a recent Nuclear Regulatory Commission study, *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). As a consequence, it is not necessary to analyze every possible initiating event individually because the range of accidents included in the document encompasses all credible initiating events. Regardless of the specific initiating event, the severity of a transportation accident can be characterized by the combination of mechanical forces and heat involved in the accident. Mechanical forces account for the severity of the crash itself, while heat accounts for the severity of fire that might be involved in the accident. The Nuclear Regulatory Commission concludes that only a tiny fraction of all accidents, less than 1 in 10,000, would be severe enough to cause a spent nuclear fuel shipping cask to fail (Sprung et al. 2000). The reason for this is the rigorous design, performance, and testing requirements (see 10 CFR Part 71) for spent nuclear fuel and high-level radioactive waste shipping casks. This study reaffirmed that the spent nuclear fuel transportation regulations provide adequate protection of public health and safety.

8.10 (12896)
Comment - EIS010314 / 0004
Taking note of the fact that seventy-six commercial nuclear power reactors are currently operating to the east of the Mississippi River (and twenty-seven to the west), it would be highly plausible that a train or truck carrying spent fuel could derail on a Mississippi River bridge, resulting in the fuel cask's underwater submersion in the river. Or perhaps there could be an accident on a bridge over the Missouri, Meramec or other river in our state. Having watched the problems that faced the large crew of emergency workers here in St. Louis County (Webster Groves) when 14 coal cars derailed and dumped their freight on May 31, I absolutely cannot imagine how an immersed spent fuel cask could be removed from the river after falling from one of our high, heavily traveled bridges. It would seem that enough water in leakage could occur to make the fissile material in the cask subject to a criticality accident. (I would refer you to the Code of Federal Regulations, Title 10, Part 51 -- Section 52 (Table S-4) and Part 71 regarding the packaging and transport of radioactive materials.)

Response
As discussed in Appendixes J and M of the EIS, most real-world accidents that have been postulated, including truck crashes into bridges, train derailments followed by fires, derailments followed by immersion of a cask into a river, and similar extreme accident conditions, would not be likely to result in release of radioactive materials from the shipping casks. Spent nuclear fuel casks are much more robust than the coal cars. If a spent nuclear fuel rail cask had been on the train that derailed and crashed into the river, the accident conditions would not have been more severe than the design standards for the cask. No release of radioactive materials from the cask would have been expected. The performance standards for the casks prescribed by the Nuclear Regulatory Commission were selected to ensure that the chance that a real-world accident would result in loss of cask integrity and release of radioactivity from the cask is extremely remote. These standards ensure that the casks would be extremely robust.

Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there could be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low.

8.10.1 SABOTAGE

8.10.1 (62)
Comment - 16 comments summarized
A number of commenters expressed concern over terrorism and sabotage against shipments of spent nuclear fuel and high-level radioactive waste. Commenters summarized the State of Nevada's petition to the Nuclear Regulatory Commission to modify 10 CFR Part 73 to increase the level of security for these shipments. One commenter noted that neither the Draft EIS nor the supporting Sandia National Laboratories report acknowledges Nevada's petition for rulemaking. The commenters asked if spent nuclear fuel and high-level radioactive waste shipments would have armed escorts along the entire shipment route rather than just while they were in urban or high-population areas. The commenters recommended that armed escorts be required for the entire route and that DOE go beyond Commission regulations that prescribe safeguards for fuel shipments. Several commenters mentioned the shipment of plutonium and commented that this material would be a particularly attractive target for terrorists.

Response
Nuclear Regulatory Commission regulations (10 CFR Part 73) prescribe safeguards and security measures for spent nuclear fuel shipments. These measures are required to reduce the likelihood of a successful sabotage attack. DOE shipments to a repository would comply with these safeguards and security regulations.

Regulations in 10 CFR Part 73 require armed guards in heavily populated areas. Escorts, but not armed guards, are required in areas not considered heavily populated. The State of Nevada's petition to the Nuclear Regulatory Commission (PRM-73-10) requests that such a distinction based on population density be eliminated from the regulations. DOE is aware of the petition and, in its January 27, 2000, comments to the Commission, expressed the opinion that the current performance-based regulations are more than sufficient to permit consideration of all appropriate threat scenarios. However, if the regulations for safeguards and security measures that apply to spent nuclear fuel transportation were revised, DOE would comply with the revised regulations for shipments to a repository. Similarly, for shipments other than spent nuclear fuel, which are addressed in 10 CFR 73.37, DOE would comply with all applicable Nuclear Regulatory Commission safeguards and security requirements.

Recent terrorist attacks have involved high-profile symbols of the United States and produced a large number of immediate fatalities. Sabotage of a spent nuclear fuel shipment would not achieve this result. Even a successful sabotage attempt would not likely release significant quantities of radioactive materials. Casks would be designed and built to prevent release of their contents in all but the most severe accidents.

8.10.1 (133)
Comment - 40 comments summarized
Several commenters expressed concern that the shipments of spent nuclear fuel and high-level radioactive waste would present an attractive target for saboteurs and terrorist actions. Media stories related to terrorism events frequently were cited for the concern. In addition, the fact that shipments would be frequent and would involve a known destination is seen as suggesting that they would be an attractive target. Commenters questioned protecting shipments at stopping points in the transportation cycle. The assertion was made that protection is likely to be inadequate compared to in-transit safeguards. Specifically, commenters stated that the Draft EIS does not address potential acts of sabotage at intermodal transfer stations. Concern was expressed about the increased risk of sabotage in Utah because of the large number of shipments going through the state and the Private Fuel Storage facility proposed in Skull Valley. In addition, one commenter requested DOE maintain efforts to test the latest potential sabotage devices against casks.

Response
Recent terrorist attacks have involved high-profile symbols of the United States and produced a number of immediate fatalities. Sabotage of a spent nuclear fuel shipment would not achieve this result. Even a successful sabotage attempt would not be likely to release significant quantities of radioactive materials. Nevertheless, the

Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection and safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the physical protection and safeguards regulation are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons. The cask safety features that provide containment, shielding, and thermal protection also provide protection against sabotage. The casks would be massive. The spent nuclear fuel in a cask would typically be only about 10 percent of the gross weight; the remaining 90 percent would be shielding and structure. Additional information on the physical protection of spent nuclear fuel and high-level radioactive waste during transportation can be found in Section M.7 of the EIS.

It is not possible to predict whether sabotage events would occur, and if they did the nature of such events, nevertheless, DOE examined various accidents, including an aircraft crash into a transportation cask. The consequences of both the maximum reasonably foreseeable accident and the aircraft crash are presented in the EIS for the mostly truck and mostly rail transportation scenarios and can provide an approximation of the types of consequences that could occur from a sabotage event. In addition, DOE analyzed the potential consequences of sabotage on a truck or rail cask (see Section 6.2.4.2.3 of the EIS). The results of this analysis indicate that the risk of the maximally exposed individual incurring a fatal cancer would increase from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the terrorist attack of September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

As suggested in some comments, some types of anti-armor weapons can penetrate a cask (as shown in Section 6.2.4.2.3 of the EIS), but it should not be assumed that an attack would be easy or that a significant release would result even if a cask was penetrated. Sandia National Laboratories conducted an analysis that estimated maximum releases of radioactive material from the action of a high-energy density device when used against a shipping cask containing spent nuclear fuel (DIRS 104918-Luna, Neuhauser, and Vigil 1999). The devices evaluated by Sandia for analysis were chosen because they represent devices that are potentially available, could be carried by a person, and are highly effective at producing damage for their device category. The results of potential sabotage are discussed in Section 6.2.4.2.3.

8.10.1 (166)
Comment - 20 comments summarized
A number of comments reflected a disbelief of the Draft EIS projected sabotage consequence saying it was at least a factor of 10 too small. The commenters traced this underestimate to a recent Sandia study (DIRS 104918-Luna, Neuhauser, and Vigil 1999). The critique of the Sandia study centered on a number of aspects of the analysis which include failure to consider multiple devices, incendiary devices, modern attack devices, commercial devices or modern military anti-armor weapons. Other criticism included failure to assume full penetration, use of the “swept volume” method, failure to consider fuel oxidation, lack of testing, the use of the SCAP computer program for penetration prediction, and the use of RADTRAN and RISKIND for risk and consequence analysis. A commenter stated that the Draft EIS is silent on any impacts other than human health effects from sabotage.

Response
The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection and safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the physical protection and safeguards regulation are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons. The cask safety features that provide containment, shielding, and thermal protection also provide protection against sabotage. The casks would be massive. The spent nuclear fuel in a cask would typically be only about 10 percent of the gross weight; the remaining 90 percent would be shielding and structure. Additional information on the physical protection of spent nuclear fuel and high-level radioactive waste during transportation can be found in Section M.7 of the EIS.

It is not possible to predict whether sabotage events would occur, and if they did the nature of such events, nevertheless, DOE examined various accidents, including an aircraft crash into a transportation cask. The consequences of both the maximum reasonably foreseeable accident and the aircraft crash are presented in the EIS for the mostly truck and mostly rail transportation scenarios and can provide an approximation of the types of consequences that could occur from a sabotage event. In addition, DOE analyzed the potential consequences of sabotage on a truck or rail cask (see Section 6.2.4.2.3 of the EIS). The results of this analysis indicate that the risk of the maximally exposed individual incurring a fatal cancer would increase from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the terrorist attack of September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

The Sandia analysis estimated maximum releases of radioactive material from sabotage against a shipping cask containing spent nuclear fuel. Sandia considered 15 devices and chose two for detailed analyses. Incendiary devices, which are most effective when there are combustibles present, were not considered because there would be no combustibles in a cask. Therefore, the effect of an incendiary device on a cask or its contents would be small compared to an initial release caused by the action of a high-energy density device. Fuel oxidation was not considered as a mechanism to create more particulates for release because it takes considerable time to occur and would not be a contributor to the direct release of spent nuclear fuel materials.

The Sandia scientists used the SCAP computer program, which has been benchmarked against experiments for estimating depth of penetration produced by the action of high-energy density devices. As indicated in the Sandia report (DIRS 104918-Luna, Neuhauser, and Vigil 1999), SCAP was tested against several experiments involving device interactions with material configurations not unlike spent nuclear fuel casks. Although the SCAP program's ability to estimate the depth of penetration through dense materials was demonstrated by benchmarks, the program underestimates the volumes of materials that would be destroyed by the action of a high-energy density device. Recognizing this, Sandia scientists developed a method for correcting the estimates provided by SCAP of destructed, or swept, volume. Although incorrectly described in an equation in the analysis report, swept volume was explicitly defined in the Sandia analysis.

DOE used the RISKIND computer program and the results of the Sandia analysis to estimate the human health consequences of releases of radioactive materials that could result from an act of sabotage. The RISKIND code has been used widely and is generally accepted as appropriate for estimating the consequences of radioactive material transportation accidents that could release radioactive materials. Releases of radioactive materials in a sabotage event would be comparable to releases in maximum reasonably foreseeable accidents analyzed in the EIS using RISKIND. DOE did not use the RADTRAN computer program in estimating consequences of an act of sabotage.

DOE believes the analysis provides realistic, but conservative, estimates of releases of radioactive material that could result from sabotage against a cask transporting spent nuclear fuel, and the consequences of these releases.

In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments (DIRS 154814-Sandquist et al. 1985), and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $9.4 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 included data compiled from case studies involving actual cleanup of radioactive materials contamination. The studies address consequences for releases of radioactive materials in communities.

8.10.1 (167)

Comment - 4 comments summarized

Several commenters stated that, based on state policy, law enforcement agencies would provide armed escorts while the spent nuclear fuel and high-level radioactive waste shipments were within the state's boundaries. The commenters questioned who would pay for the escorts and emergency management equipment. The commenters stated that the costs of security measures should have been delineated, along with the responsible parties, in the EIS. One commenter asked for the definition of "heavy-populated" areas in the context of armed security requirements.

Response
DOE would comply with the Nuclear Regulatory Commission safeguards requirements in place at the time of the shipments. The costs associated with meeting the safeguards requirements, including those for escorts, would be borne by DOE. If states or tribes determined that they wished to provide escorts in addition to those provided by DOE, the cost of these additional escorts would have to be borne by the state or tribe. As stated in the EIS, armed escorts would be required in heavily populated areas. A heavily populated area is defined by the Nuclear Regulatory Commission as follows: "Certain areas within United States territory are designated as heavily populated for the purposes of regulation of spent nuclear fuel shipments. Heavily populated areas are characterized in terms of urbanized areas, as defined by the Bureau of the Census, having total populations of one hundred thousand persons or more" (DIRS 154766-NRC 1980). Response to an emergency that could occur involving a shipment of spent nuclear fuel would come initially from local response personnel, as it would for a shipment of any other commodity.

In response to public comments, DOE added Appendix M to the EIS, which describes Section 180(c) of the NWPA (see Section M.6). Section 180(c) requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using a planning grant and based on availability of funds in annual Program budgets specified by Congress. Additional Federal response capabilities, such as expert services from the Radiological Assistance Program Team, could be activated, as requested by states and tribes. The schedule in the proposed policy and procedures for implementation of Section 180(c) of the NWPA is designed to provide adequate time for training of first responders in advance of the first shipments. If there was a decision to proceed with the development of a repository at Yucca Mountain, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. DOE published a Notice of Revised Proposed Policy and Procedures (63 *FR* 23753, April 30, 1998) that sets forth the proposed mechanisms for implementing the requirements of Section 180(c). As part of this program, eligible jurisdictions would receive a one-time planning grant to assess their training needs. In accordance with the Draft Policy and Procedures, jurisdictions may use a certain percentage of their financial assistance to purchase equipment that can be used for training and for emergency response.

8.10.1 (1028)
Comment - EIS000209 / 0003
At present time, Nevada believes the DEIS sabotage analysis before the end of the formal comment period. The [A] Sandia report significantly underestimates the amount of spent nuclear fuel released from the cask(s) and they may also underestimate the fraction of the release, which is a respirable aerosol. The DEIS failed to consider any impacts other than direct human health effects. Nevada will also evaluate the adequacy of the RISKIND model for this type of analysis, particularly RISKIND's ability to accurately simulate near field (within 100 to 1,000 meters of the attack site) particulate dispersal and deposition, with and without fire effects.

Response
The Sandia report (DIRS 104918-Luna, Neuhauser, and Vigil 1999) estimated the average and maximum releases of radioactive material from sabotage against a shipping cask containing spent nuclear fuel. Luna, Neuhauser, and Vigil considered 15 devices and chose two for detailed analyses. Incendiary devices, which are most effective when there are combustibles present, were not considered because there are no combustibles within a cask. Therefore, the effect of an incendiary device on a cask or its contents would be small compared to an initial release caused by the action of a high-energy density device.

The SCAP computer code was used to estimate the depth of penetration produced by the action of the high-energy-density-devices. SCAP was benchmarked against several experiments involving device interactions with material configurations not unlike spent nuclear fuel casks (DIRS 104918-Luna, Neuhauser, and Vigil 1999).

DOE used the RISKIND computer code and the results from Luna, Neuhauser, and Vigil (DIRS 101836-1999) to estimate the human health consequences of releases of radioactive materials that might result from an act of sabotage. The RISKIND computer code has been used widely and is generally accepted within the health physics community as appropriate for estimating the consequences of radioactive material transportation accidents that could release radioactive materials. Releases of radioactive materials in a sabotage event would be comparable to releases in maximum reasonably foreseeable accidents analyzed in the EIS using RISKIND. DOE did not use the RADTRAN computer program in estimating consequences of an act of sabotage.

DOE believes the EIS analysis provides realistic, but conservative, estimates of releases of radioactive material that could result from sabotage against a cask transporting spent nuclear fuel or high-level radioactive waste, and the consequences of these releases.

The EIS uses the risk of a latent cancer fatality as its primary measure of radiological impact. However, other radiation-related impacts such as the incidence of nonfatal cancers and severe genetic effects are discussed in Section F.1.1.5 of the EIS. All radiation effects are linear with latent cancer fatalities and including these other radiation-related impacts would increase the total detriment from radiation exposures by about 50 percent.

In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments (DIRS 154814-Sandquist et al. 1985), and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $270 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 included data compiled from case studies involving actual cleanup of radioactive materials contamination. Section J.1.4.2.5 discusses ecological restoration after a release of radioactive material.

8.10.1 (1035)
Comment - EIS000209 / 0005
Increased vulnerability of shipping casks results from changes in the capabilities and availability of high-energy explosive devices and from changes in cask designs. Portable antitank weapons have become more powerful, more reliable, and more available worldwide since the early1980s. Many of these weapons are capable of penetrating 20 to 40 inches of armor plate steel. Commercial shaped charges and detonation systems developed for applications in the construction and petroleum industries are widely available. Numerous “off the shelf” military and commercial shaped charges weighing around one kilogram are capable of penetrating 10 to 20 inches of steel. It is probable that even more powerful and efficient explosives will become available during the next four decades when repository shipments are under way.

The new shipping casks assumed in the DEIS appear to be highly vulnerable to attacks using currently available high-energy explosive devices. The new General Atomics GA-4 and GA-9 legal-weight truck casks have a side-to-side width of 35 to 37 inches, with walls containing about 2 inches of stainless steel and 2.6 inches of depleted uranium. The DEIS provides less specific details about the new rail cask designs. The largest new rail casks will likely have designs similar to the Nuclear Assurance Corporation NAC-TSC, the Holtec HI-STAR 100, or DOE large MPC Rail Transporter. These casks have diameters of 85 to 96 inches, with walls containing 4 to 7 inches of stainless steel and 2 to 4 inches of carbon steel or lead and depleted uranium.

Response
Luna, Neuhauser, and Vigil (DIRS 104918-1999) estimated the average and maximum releases of radioactive material from the action of sabotage against a shipping cask containing spent nuclear fuel. Luna, Neuhauser, and Vigil considered 15 devices and chose two for detailed analyses. Incendiary devices, which are most effective when there are combustibles present, were not considered because there are no combustibles within a cask. See Section 6.2.4.2.3 of the EIS for additional information.

8.10.1 (1773)
Comment - EIS000605 / 0001
Now item 1, security. Nowhere have I seen any document stating truck drivers and railroad personnel are required to have [a] special government clearance. Not in the RFP, request for proposal draft dated 1998, nor in the EIS or even in the DOT regulations.

Actually, imagine 70,000 tons of high level nuclear hazardous waste has arrived at Yucca Mountain. The entire world has been watching and waiting. After all, we are making history. Various tragedies have occurred as this material traveled through 43 states to its final destination.

According to Volume 1, paragraph 1.2.4, 55 tons of weapons usable plutonium has arrived. According to geologist John T. Rosenthal, he works for [Booz] Allen and Hamilton, he says about security:

"If Yucca Mountain becomes a high level waste storage site, Energy Department plans call for either closing it up as early as 10 years after the last waste canisters are buried, or keeping it open for hundreds of years. If the Department elects to close the mountain it would seal all the shafts, ramps, exploratory bore holes and other underground openings to further discourage any intruders."

We're like a bunch of idiots here.

"Permanent warning markers and monuments would be put up around the site."

Now this is what Rosenthal says.

"The Department is not worried about sabotage. In its recent Environmental Impact Statement, it says that the site's remote location and the area's low population density makes it an unattractive target. In addition, it tends to have extra security measures in place. At one of the alcoves a fixed spaghetti of cable snakes from the walls to an array of sophisticated monitoring equipment and electronic board the size of a large screen TV records the total power used, as well as the total power cost and the current rock temperature."

Now, my final statement. Hypothetically, 70,000 tons -- did I read this already? Okay. Now please close your eyes just for two minutes and imagine, 75 to a hundred miles away, nowhere near the security measures referred to by John Rosenthal. Instead, John Q. Tourist trained by Kadafy is about to launch one missile using his sophisticated electronic equipment. Or this same scenario could happen somewhere on route to Yucca Mountain.

Response
The EIS discusses sabotage during transportation in Section 6.2.4.2.3. Although it is not possible to predict the types of potential sabotage events with certainty, DOE has examined various accident scenarios, which can provide a sense of the consequences that could occur in such events. In addition, DOE has specifically analyzed the potential consequences of sabotage against a truck or rail cask. The results of this analysis indicate that the maximally exposed individual would increase the risk of incurring a fatal cancer from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (1922)
Comment - EIS000477 / 0002
Another issue I have is the transportation of the waste. If as the DOE studies demonstrate, an accident during the shipment process (1:343 ratio) happens in a populated area, who will accept personal responsibility, you? I've seen the infocommercials back in 1991 showing a locomotive smashing into the stainless steel waste container -- I wasn't convinced. If the waste travels by rail, it makes sense that it will pass through the heart of Las Vegas and North Las Vegas, not to mention Nellis Air Force Base. What additional safeguards are being discussed to prevent any accidental leakage of radioactivity. It would be very easy for local governments or individuals to block rail routes. Remember the Shoshone-Bannock Tribe in Fort Hall, Idaho, using their police force to prevent a nuclear shipment in 1995? What if a terrorist group did that? How secure are these shipments going to be?

Response
The safety and security of spent nuclear fuel shipments is the responsibility of DOE. DOE would ensure that the contractors making the shipments followed DOE and Nuclear Regulatory Commission safeguards requirements. In response to comments, additional information on safeguards requirements is included in Section M.7 of the EIS.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons.

8.10.1 (2718)
Comment - EIS000440 / 0001
But, today we address the vulnerability of repository shipments to terrorism and sabotage, specifically the consequences of attacks on shipping cask utilizing high-energy explosive devices. You are not going to hear much applause from the State of Nevada for the Draft EIS by the DOE, but there is one issue on which we will applaud them this morning, and that is their decision to address the issues of terrorism and the consequences of sabotage, radiologic sabotage, forthrightly in this document.

We're heartened to see that for the first time in the 20 years that I have been reviewing Department of Energy EIS there's at least a willingness on their part to acknowledge the vulnerability of shipping casks to such attacks.

Response
The EIS discusses sabotage during transportation in Section 6.2.4.2.3. Although it is not possible to predict the types of potential sabotage events with certainty, DOE has examined various accident scenarios, which can provide a sense of the consequences that could occur in such events. In addition, DOE has specifically analyzed the potential consequences of sabotage against a truck or rail cask. The results of this analysis indicate that the maximally exposed individual would increase the risk of incurring a fatal cancer from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (2732)
Comment - EIS000709 / 0006
The DOE, in No Action Scenario 1, states that storage at the present sites has the disadvantage of increased risks of sabotage and materials diversion. They do not, however, use that same reasoning when it comes to the 49,500 shipments from across the country to Yucca Mountain. Even without detailed analysis, it is obvious that a shipment of radioactive material, even under military guard, is much more vulnerable to attack than that same material in a secured storage area within a secured nuclear power facility.

Response
The EIS discusses sabotage during transportation in Section 6.2.4.2.3. Although it is not possible to predict the types of potential sabotage events with certainty, DOE has examined various accident scenarios, which can provide a sense of the consequences that could occur in such events. In addition, DOE has specifically analyzed the potential consequences of sabotage against a truck or rail cask. The results of this analysis indicate that the maximally exposed individual would increase the risk of incurring a fatal cancer from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (3251)
Comment - EIS000949 / 0002
On transportation, a terrorist attack on high level nuclear waste carriers is potentially the most serious. The federal government should fund engineers during the next ten to twenty years to design the protective shipping containers to withstand any terrorist attack, including bombing the trucks and trains with high explosive bombs. The Department of Energy must assure us that the containers will not break open and let nuclear waste escape, even in the worst conditions. It is further suggested that sabotage and terrorism should be addressed in the Nuclear Regulatory Commission design study that is responsive to these concerns.

Response
Cask safety features that provide containment, shielding, and thermal protection also provide protection against sabotage. The casks would be massive. The spent nuclear fuel in a cask would typically be only about 10 percent of the gross weight; the remaining 90 percent would be shielding and structure.

Although it is not possible to predict the types of potential sabotage events with certainty, DOE has examined various accident scenarios, which can provide a sense of the consequences that could occur in such events. In addition, DOE has specifically analyzed the potential consequences of sabotage against a truck or rail cask. The results of this analysis indicate that the maximally exposed individual would increase the risk of incurring a fatal cancer from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (3437)
Comment - EIS000973 / 0001
I would like to know the explosive power in TNT [tri-nitro toluene, or dynamite] units that a [cask] carrying nuclear waste can tolerate.

Response
The details of the results of specific tests related to sabotage of spent nuclear fuel casks are not provided in public documents such as this EIS.

8.10.1 (3645)
Comment - EIS000816 / 0002
No type of packaging will be entirely safe from structural damage if an accident or an event involving an act of sabotage occurs. Each of these scenarios foresees breach of cask and an insuring radiation release. Depending on type of material being transported and location of the release, this could result in not only immediate and numerous losses of life, but latent ongoing health concerns and unspecified danger for the immediate environment and all its inhabitants in perpetuity.

Response
Cask safety features that provide containment, shielding, and thermal protection also provide protection against sabotage. The casks would be massive. The spent nuclear fuel in a cask would typically be only about 10 percent of the gross weight; the remaining 90 percent would be shielding and structure.

Although it is not possible to predict the types of potential sabotage events with certainty, DOE has examined various accident scenarios, which can provide a sense of the consequences that could occur in such events. In addition, DOE has specifically analyzed the potential consequences of sabotage against a truck or rail cask. The results of this analysis indicate that the maximally exposed individual would increase the risk of incurring a fatal cancer from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (3700)

Comment - EIS000980 / 0002

How about sabotage or terrorist attacks? Terrorist would love to steal our plutonium to manufacture their own bombs. Or they might just want to demand millions of dollars or other terrorist" release from jail in exchange for not blowing up a high-level radioactive waste transport. With such frequency of shipment, it couldn't be too hard for terrorists to figure out when and where these materials are enroute. If a bomb landed on one of these vehicles, or a suicide bomber decided to ram one, we're talking about life-threatening pollution, not just to the surrounding area, but to the entire city. In the DOE's Draft Summary Environmental Impact Statement, in a chart of Estimated National Transportation Impacts for 24 years of operations (p. S-53), latent cancer fatalities from maximum reasonably foreseeable accidents are 5 for mostly truck scenarios and 31 for mostly rail scenarios. These estimates could not possibly have included potential terrorist attacks. Apparently, there is some concern about such attacks, as the Nuclear Regulatory Commission will require two armed escorts for every shipment of irradiated fuel rods. Such guards might have been able to save the stagecoaches of days past, but I have little hope that they could overpower modern terrorists.

Response

Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health.

Although it is not possible to predict the types of potential sabotage events with certainty, DOE has examined various accident scenarios, which can provide a sense of the consequences that could occur in such events. In addition, DOE has specifically analyzed the potential consequences of sabotage against a truck or rail cask. The results of this analysis indicate that the maximally exposed individual would increase the risk of incurring a fatal cancer from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (4054)

Comment - EIS001474 / 0004

The question of terrorism as a danger for these shipments, it's been said that these shipments are not. If you listen to the Department of Energy and as well to the Nuclear Regulatory Commission, these shipments are very safe, nothing could ever go wrong with these shipments. But they contain some of the deadliest materials on earth. If they're breached and the materials are released into the environment, that is a catastrophe to that local environment. And it's very difficult to clean up radionuclides that get into the environment, and Chernobyl shows that. A huge percentage of the national budget of the countries over there is being devoted to Chernobyl cleanup. And right at the reactor itself, which was the showcase of the cleanup efforts, the readings are still very high right there. So it's very difficult to clean the stuff up once it gets out.

And it's interesting that we just had a court case in Kalamazoo where we were trying to get an injunction against a Department of Energy shipment of plutonium experimental fuel through Michigan, and we had a person who's worked for the State of Nevada who's done reports of danger of terrorism to high-level waste shipments, and he was one of the expert witnesses who testified that this plutonium shipment was a high-profile federal project, that there was concern, and that it hadn't been addressed by the Department of Energy in its environmental assessment for that project.

And one of the arguments that the U.S. attorneys representing the Department of Energy made was that this single shipment of plutonium was not equal to Yucca Mountain and all those shipments, so how could we ask the judge to put an injunction on this one shipment when Yucca Mountain just dwarfed it.

So I thought that was really interesting that that argument was floated. And I imagine they didn't think that anybody involved with Yucca Mountain would ever hear those words. So it was an admission that terrorism is a significant situation that wasn't addressed adequately at all in this document.

Response
Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health.

The EIS discusses sabotage in Section 6.2.4.2.3. Although it is not possible to predict the types of potential sabotage events with certainty, DOE has examined various accident scenarios, which can provide a sense of the consequences that could occur in such events. In addition, DOE has specifically analyzed the potential consequences of sabotage against a truck or rail cask. The results of this analysis indicate that the maximally exposed individual would increase the risk of incurring a fatal cancer from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments (DIRS 154814-Sandquist et al. 1985), and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $270 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 included data compiled from case studies involving actual cleanup of radioactive materials contamination. Section J.1.4.2.5 discusses ecological restoration after a release of radioactive material.

8.10.1 (4331)
Comment - EIS001209 / 0002
The Commonwealth of Virginia also reviewed the *Federal Register* Notice published by the Nuclear Regulatory Commission pertaining to a petition filed by the State of Nevada to amend NRC's [Nuclear Regulatory Commission's] regulations governing safeguards for shipment of spent nuclear fuel against sabotage and terrorism. As stated in our November 29, 1999 response to the NRC, Virginia is supportive of any precautionary measures, which serve to protect its citizens, environment, and natural resources against potential danger associated with spent nuclear fuel shipment and storage. Therefore, the Department of Emergency Services, Brian Iverson at (804) 674-2400, and the appropriate localities should be notified prior to the transportation of hazardous materials from or through Virginia. Also, we agree with the recommendation of reviewers that a periodic review of threat levels and an evaluation of tactical response measures may be appropriate.

Response
DOE would follow the Nuclear Regulatory Commission requirements on prenotification in effect at the time of shipment. Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (4427)

Comment - EIS000992 / 0002

One specific issue that has been raised in recent years by those in opposition to nuclear power is terrorist assault or acts of sabotage directed against used nuclear fuel and high-level radioactive waste shipments. Although this country has been sensitized to the terrorist potential ever since the World Trade Center bombing, I am convinced that used nuclear fuel and high-level waste shipments are a remote target for such acts. Having said that, if for some rare reason a shipment might be singled out for assault I am confident that the design basis of the package (cask) and the nature of the contained radioactive material would make the attack either unsuccessful or in the worst case a limited, manageable event. Clearly not one postulated by the preposterous “Mobile Chernobyl” term that the anti-nuclear factions have incorrectly used to characterize the shipping of these materials.

From the design point of view, the Federally mandated accident conditions bound the conditions that would be expected in an assault such as those in Oklahoma City, New York City, Atlanta, and a few other locations. These have been “homemade” large explosive devices that are effective against structures such as buildings, or against people. However, the blast effects and even the objects propelled by such blasts may dislocate a cask and its transporter (e.g., overturn) but in my judgment are bounded by the design conditions for the package. That is, package integrity will be maintained.

Our opponents cite high-energy weapons such as anti-tank missiles as having the ability to penetrate a cask wall. I cannot quarrel with this, since such was demonstrated by the NRC [Nuclear Regulatory Commission] and the DOE in the 70’s and 80’s in a comprehensive testing program. [It is worth noting that there have been no terrorist assaults in this country where such weaponry has been used.] But the significance of the earlier testing program and the update of that program performed by Sandia in support of the YMP [Yucca Mountain Project]/EIS (SAND99-0963) is that even with a penetration of the cask the amount of material released is a small fraction of the total cask contents. Estimates range from 0.0003% to 0.01% depending on the size of the cask. Of this amount roughly 0.5% of it is estimated to be of aerosol size capable of being dispersed beyond the immediate vicinity. Regardless of cask size, this is a small amount of material. It will result in a highly localized contamination event with limited effects outside the immediate area. Both are quite manageable.

Of course the radiological consequences, as manageable as they are projected to be, can only occur if one accepts the assertion of the anti-nuclear activists that these shipments are a likely target. I am convinced that just the opposite is true.

Those dedicated to terrorism are making a statement through their acts. Such a statement demands a successful outcome of the assault, something that is highly unlikely when used nuclear fuel or high-level radioactive waste shipments are the target. Indeed, a failed attempt is essentially a confirmation of the safety that is inherent in the cask design and the shipment of these commodities, a strong deterrent in itself. There are many factors that make attempts likely to fail.

Initially, there are Federal regulations in 10 CFR 73 that address in-transit security. These speak to the security of shipping information, transport personnel qualifications, escort requirements, communications requirements, and transportation equipment features. Shipments will be continuously tracked via satellite thus assuring constant monitoring of shipment parameters.

Additionally, there is the issue of a successful assault. As stated previously, a large explosive device is not going to be successful in disrupting cask integrity, even though it may result in dislocation of the transport system. An attack using some form of high-energy penetrating weapon has a number of associated problems as outlined in the recent Sandia report. These include: weapon portability, training, targeting, weapon functioning, cask construction features, transporter speed, and meteorological conditions. These all contribute to the high likelihood of an unsuccessful attempt.

Realistically there are countless targets through which a terrorist can make a statement with reasonable confidence of a successful assault. A used nuclear fuel or high-level radioactive waste shipment, in my opinion, is not one of them. Even an anti-nuclear terrorist would select a target with greater assurance of success.

Federal regulations and the planned operations of the transportation system together with the rugged design of the shipping casks and the success uncertainty of any assault makes terrorist attacks or acts of sabotage against used fuel or high-level waste shipments extremely unlikely. And, in the event of a successful, assault, the effects are projected to be acceptable low.

Response
Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons. Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

It is the Department's opinion that the EIS adequately analyzes the potential environmental impacts of spent nuclear fuel and high-level radioactive waste accidents, including sabotage.

8.10.1 (5293)
Comment - EIS000968 / 0010
The State [of Nevada] is responsible for providing for the security and safety of the proposed shipments. The DEIS dos not address minimum security requirements, proper escort staffing, or inspection of vehicles entering the State.

Response
Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. More detailed information is provided in Section M.7 of the EIS.

8.10.1 (5307)
Comment - EIS001887 / 0043
The Draft underestimates the consequences of severe accidents and terrorism/sabotage incidents, especially with respect to heavy-haul transportation. The Draft EIS fails to appropriately recognize human initiated events as risk factors associated with the loading, transportation, and unloading of radioactive waste shipments. The Draft reflects an overriding "denial" philosophy that is evidenced in the lack of critical or even anecdotal discussion of sabotage and terrorism within Section 6 and Appendix J of the Draft EIS.

The Draft EIS must acknowledge the existence of credible and realistic risks from sabotage and terrorism. The symbolic value of repository shipments as targets and the regularity, frequency, and duration of shipments substantially increase the risks of human initiated events.

Spent fuel loading, transfer, and unloading activities should have been recognized as vulnerable to sabotage and terrorism attacks. These risks should have been addressed in the Draft EIS together with the implications of new regulations needed to limit the effects of human initiated events on the overall repository shipment program.

The complete point-to-point shipment process needs to be re-analyzed using updated assumptions about terrorist/ sabotage technology and more realistic expectations of the potential for sabotage and terrorism attacks. The State of Nevada has begun this process by publishing several relevant documents on target types and risks associated with potential adversaries. Recognition of these concerns and an adequate analysis of the risks associated with potential terrorism/sabotage must be incorporated within the final EIS.

Response
Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear

fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons.

Although it is not possible to predict the types of potential sabotage events with certainty, DOE has examined various accident scenarios, which can provide a sense of the consequences that could occur in such events. Because the heavy-haul truck implementing alternative would be like moving a rail cask on a truck, the analysis of the consequences of an accident to a rail cask is applicable. In addition, DOE has specifically analyzed the potential consequences of sabotage against a truck or rail cask. The results of this analysis indicate that the maximally exposed individual would increase the risk of incurring a fatal cancer from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Spent nuclear fuel loading, transfer, and unloading activities would occur in fixed facilities. These facilities would have to meet the requirements in U.S. Nuclear Regulatory Commission physical protection or safeguards regulations. For example, 10 CFR 63.21 requires a repository at Yucca Mountain to have physical protection consistent with 10 CFR 73.51. This regulation specifies a performance objective, which provides “high assurance that activities involving spent nuclear fuel and high-level radioactive waste do not constitute an unreasonable risk to public health and safety.” The regulation requires that spent nuclear fuel and high-level radioactive waste be stored in a protected area such that:

- Access to the material would require passage through or penetration of two physical barriers. The outer barrier would have isolation zones on each side to facilitate observation and threat assessment, would be continually monitored, and would be protected by an active alarm system.

- Adequate illumination would be provided for observation and threat assessment.

- The area would be monitored by random patrol.

- Access would be controlled by a lock system and personnel identification would be used to limit access to authorized persons.

A trained, equipped, and qualified security force would be required to conduct surveillance, assessment, access control, and communications to ensure adequate response to any security threat. Liaison with a response force would be required to permit timely response to unauthorized entry or activities.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments and key facilities. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (5469)
<u>Comment</u> - EIS001660 / 0015
The DEIS inadequately provides information about terrorist/extremist threats, and used old data to provide this information. The DEIS must use current data and involve new experiments concerning modem cask response to sabotage events. The Memo to Mr. R. Halstead from “Radioactive Waste Management Associates” which has been included in Mineral County’s comments for record are referenced - “2. Deficient Treatment of Sabotage”. pp. 6-19, see Attachment G. [Following is text of reference.]

Deficient Treatment of Sabotage

There are a number of points of contention with the current treatment of sabotage by the DOE in the Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada (DOE/EIS-0250D, 1999) and referenced documents. In order to establish the need for a reevaluation of the analysis of sabotage used by DOE in preparation of the EIS most clearly, only the most significant problems will be addressed. The final conclusion of this section is that the

DOE does not adequately address the threat of sabotage, nor does it prove that concerns about the affects of such an event are unwarranted.

Inadequate selection of Reference Weapons and Reference Cask

The type of shaped charge used in the Sandoval experiments and cited in Luna as the device offering the maximum impact of a sabotage attack is the M3A1 military shaped charge. This charge, when tested against a full-scale GE IF-200 cask, was capable of penetrating one cask wall, penetrating 42 cm (16.5 inches) into the cask, damaging 50% of the spent fuel rods, and releasing more than 1% of the total fuel. Sandoval also says that a survey of attack devices was performed in this study, with the devices selected based on their availability to the perpetrator and their potential to breach truck casks. The details of this evaluation are classified.

In order to better understand exactly what devices were considered for possible use as the reference weapon, it is necessary to understand the restrictions placed on this analysis. In 10 CFR 73.1.a.1, "radiological sabotage" is defined as:

(i): a determined violent external assault, attack by stealth, or deceptive actions, of several persons with the following attributes, assistance, and equipment:

a. well-trained (including military) and dedicated individuals

b. inside assistance, passive or active

c. suitable weapons, up to and including hand-held automatic weapons, equipped with silencers and having effective long-range accuracy

d. hand carried equipment, including incapacitating agents and explosives for use as tools of entry or for otherwise destroying reactor, facility, transporter, or container integrity or features of the safeguard system.

e. four-wheel drive land vehicle used for transporting personnel and their hand Carried equipment to the proximity of vital areas

(ii): an internal threat of an insider, including an employee

(iii): a four-wheel drive land vehicle bomb

This provides the parameters by which the assessment of possible weapons was made. The definition of "hand Carried equipment" is unclear. It appears that such anti-tank artillery as the Milan Anti-Tank Missile and the US TOW 2 Anti- Tank missile, reported to have armor-penetrating capabilities of greater than 1000mm (39.4 inches) and greater than 700mm (28.5 inches), respectively, have not been considered as plausible sabotage weapons. In contrast, the M3A1 is reported as having armor-penetrating capabilities of at least 20 inches. This means that either of the anti-tank missiles will penetrate deeper into a spent fuel cask, likely completely through, drastically increasing the amount of material released. Anti-tank missiles of this sort must be analyzed in a credible sabotage analysis. Both devices can be transported by a few persons, or a vehicle, and thus should be considered "hand Carried."

Failure to consider arson coupled with missile strike as credible reference weapon and reference attack

A very significant factor to note when analyzing the results of the Luna report is that missile strikes accompanied by fires have not been considered. In section 3, the following statement is made:

"[U]nlike tanks and other typical targets of armor-piercing weapons, nuclear waste casks contain no explosive or combustible materials that could be touched off by the HEDD penetration, so little secondary damage is expected. In other words, only penetration and swept volume of spent fuel disrupted determine the magnitude of the damage that can be inflicted by an attack on a cask, not penetration depth per se."

This shows a hidden assumption in the assessment of sabotage. The Luna study assumes that there will be no fire coupled to a missile strike in the event of sabotage. Luna makes this assumption noting that the casks themselves are not combustible. However, this does not account for the potential of saboteurs to deliberately set a fire, or for the fact that the casks will be in proximity to combustible materials while being transported. Shipping casks are designed for transport on trucks or trains that are powered by highly flammable, combustible materials. These casks are also very likely to spend a significant portion of their travel in proximity to other trucks, rail cars, pipelines, etc. containing combustible or explosive materials. Further, potential saboteurs must be assumed to have knowledge that engulfing a target in flames in addition to striking it with a missile will be very likely to cause extensive damage. All of these factors lead to the conclusion that "secondary damage" cannot be ignored, as it has in this study.

Heat input to a cask will weaken the areal density of the metal shielding layers. If potential saboteurs were to first weaken the shipping casks via thermal input before missile strike, this could significantly increase the damage caused by such an event. In a series of experiments testing resistance of shipping containers to puncture conducted for the NRC by Lawrence Livermore National Laboratory and published in 1980, the impact of increasing temperature on cask strength was addressed (NUREG/CR-0930). One experiment in this study concentrated on the effect of temperature on the ultimate "punch force" required to completely penetrate a shipping cask wall. From this test it was determined that "the force at failure decreases with increasing temperature," (NUREG/CR0930, p. 32). This study used three temperatures for this determination: room temperature, 200°F, and 400°F. Since this study shows there is a correlation between the force required to penetrate a shipping cask wall and the temperature of the cask, it is very important that these effects be considered in a proper evaluation of sabotage scenarios. Further, the temperatures involved in deliberately set, engulfing fires will be able to raise the cask outer wall temperature to levels much beyond this range. In the Modal Study, it is commented that the rail and truck casks used in their analysis "can be exposed to a regulatory fire (1475°F, engulfing) for over 1 hour" (6-43) before the temperature at the mid-lead thickness of the cask wall reaches 500°F. ... What this statement does show is an acknowledgement that the regulatory fire will raise the temperature of a shipping cask wall over the 400°F temperature estimate used in NUREG/CR-0930. This leads to the conclusion that in extreme fire situations, such as those deliberately set as part of a sabotage attempt, the temperature of the shipping cask will rise. This will lessen the force required to completely penetrate the shipping cask wall, as was discovered in NUREG/CR-0930, resulting in greater damage to a fuel cask in the event of a subsequent missile attack.

In addition, not addressing the effects of heat input on spent fuel respirable release in the event of a breach ignores the ability of temperature to increase the percentage of spent fuel released in respirable form. For example, the conversion of $U0_2$ to U_30_8 is exothermic at slightly elevated temperatures, and results in the formation of a fine powder of respirable size (Aronson). Coupling a fire with a cask breach will expose the spent fuel inside the cask to elevated temperatures, resulting in thermodynamically favorable conditions for the above reaction. The importance of this term needs to be addressed in an assessment of sabotage consequences.

By failing to include thermal effects in its assessment of sabotage, the DOE has provided an insufficient treatment of sabotage consequences in the Yucca Mountain EIS. This needs to be remedied before the true impact of a successful event can be analyzed.

Improper extrapolation of previous experiments to current cask designs

Swept Volume

In the Luna report, it is acknowledged that the cask design used in the 1980-1981 tests examined in the Sandoval report is outdated, and an attempt is made then to correlate the data collected in these experiments to a computer simulation of a newer-design cask impact by two HEDD devices. In particular, Luna suggests an "alternative" means of analyzing the test results in the Sandoval report which "enables evaluation of the magnitude of the potential source term in other situations based on calculated hole volumes." (Luna 2.2.6)

To do this, Luna attempts to correlate the experimentally determined ratio of respirable aerosol produced to the mass of fuel released in an event to a calculated ratio based on the mass of swept fuel. The equation is (Luna 2.2.6):

MS =(π/) x NP x NL x NR x PL x PD

NP:
An estimate of the amount of fuel assumed to be affected longitudinally in the pin at the center of the hole. Assumed to be the number of pellets in the missing length rounded up to the next whole pellet. Operationally defined as L/L_p, the missing length of pin divided by the pellet length [unitless].

NL:
An estimate of the affected number of pins laterally. Assumed to be the number of pins within the hole diameter rounded up to the next integer. Operationally defined as L/PP, rounded to the next integer, giving it units of [length^2]

NR:
Defined by Luna as "number of rows of pins along the disruption path/PP," thereby giving it units of [length].

PL:
Depth of penetration of pin disruption. Operationally defined by Luna as NR/PP, giving it units of [length^2]

PD = pellet density, giving it units of [mass/length^3]

Thus according to Luna, the equation works out to be:

MS[mass] =(π/4)[unitless] x NP [unitless] x NL [length^2] x NR [length] x PL [length^2] x PD [mass/length^3],

[mass] = [mass*length^2]

The inconsistent units definitely need explanation by the Sandia researchers responsible for the report. The numerical values obtained using this equation were duplicated by independent calculations, assuming that the number of rows of pins along the disruption path was 6 for the full-scale test... This suggests that either the units are listed incorrectly in the document, or that the equation used to estimate swept mass is invalid. Until this discrepancy is addressed, the DOE's use of the Luna report in the Yucca Mountain EIS is suspect.

Even if the unit discrepancy is a mere typographical error, equating the mass of swept fuel with the respirable release fraction fails to consider such factors as number of holes of penetration (2 for full penetration) and differences in thermal properties of HEDD devices. First, it was assumed that, because the Sandoval full-scale test and the computer modeled test in Luna predicted shaped charges to penetrate only one side of a shipping container, the amount of released respirable material could be described as proportional to the "swept volume" of the fuel pins. However, it was also acknowledged that having multiple holes (for example, an exit and entry hole, or multiple entry holes caused by multiple device strikes) would significantly increase the fraction of respirable material released, since multiple holes will allow outside air to flow through the cask. Because the DOE assumes that a terrorist strike will result in only one hole into a shipping container, it is assumed that this air flow will not be generated, thus leading to the correlation between affected mass and respirable release.

However, it is necessary to consider the event of a full cask penetration (or multiplehole penetration) event. Under these circumstances, there will be a continual supply of oxygen provided to the inner core of the cask. This oxygen will then react with the uranium dioxide spent fuel, oxidizing it to U_30_8. This process is exothermic at slightly elevated temperatures, and results in the formation of a fine powder of respirable size. Further, this air flow, when coupled with elevated temperatures resulting from fire (as would be reasonable in the event of a crash or deliberate arson) would heat the core of the cask without having to first heat its surrounding shields. This will result in a quick elevation of the spent fuel temperature, providing more oxidation and thus more respirable aerosol production. Because the DOE assumed that all sabotage events would at most penetrate a shipping cask with one hole, this mechanism was ignored.

In review of the testing performed at Sandia and Batelle laboratories in the 1980s, it is stated that the M3A1 charge used would completely penetrate certain shipping casks such as the NFS-4 (Dietrich & Walters, 1983 pg. 5). If this type of cask were used in destructive testing, the benchmark forming the basis for the Luna results could be drastically different. This shows the need to consider the effects of a complete penetration event. In the case of a complete penetration, according to the review cited above, "the entrainment of particles in the jet's wake would enhance release at the jet exit hole. Further, two holes should vent more rapidly than one and perhaps capture higher initial concentrations in the efflux" (5). By referencing a flawed computer evaluation of cask resistance to HEDD impact, the EIS has improperly limited the discussion of impacts associated with sabotage events to single-hole, incomplete penetrations. This results in an incomplete estimate of the true effects of a successful sabotage event.

The Luna report acknowledges that the existence of multiple holes results in significant increases in aerosol release fractions. In section 2.2.5, the report states that "the total effect of a full penetration event may be to increase aerosol release by approximately 10 times the aerosol release fraction from partial penetration." If we use this factor of 10 to figure out a new % respirable release and account for the difference between spent fuel and surrogate fuel, the % respirable release is greater than 1%. Below is outlined the % respirable release fractions assuming 10x greater release than was estimated in the Sandoval tests. Also, three different spent fuel-surrogate fuel correction factors are used (see section 2.2.3) to show how they affect the results.

	Release fraction from Sandoval test	**New release fraction, assuming 10x Sandoval result**
Aerosolized fraction of surrogate fuel mass released from pins	0.000537	0.00531
% aerosolized fraction of spent fuel mass released from pins, using SRF of 3	0.1611%	1.611 %
% aerosolized fraction of spent fuel mass released from ph% using SFR of 5.6	0.300%	3.00%
% aerosolized fraction of spent fuel mass released from pins, using SFR of 12	0.644%	6.44%

More analysis needs to be performed before a swept fuel mass can be used as a correlation factor predicting masses of respirable fuel released in the event of a high-energy impact.

In using Swept Volume as a surrogate for respirable release, the analysis is making the assumption that all potential devices used in a terrorist attack will behave the same as the M3A1 charge. Its conclusion rests on the assumption that, given a certain swept volume size, a certain respirable mass fraction will be released, regardless of other factors, such as differences in thermal heat evolution. Further, the computer code used to estimate release fractions of other casks was calibrated using only two test results. When it was found that the code underestimated the hole size by a factor of two, the calibration simply multiplied by 2 to obtain a correlation. Without an, experimental validation of the ability of the SCAP code to effectively model the newer-generation casks, this approach is unacceptable.

Respirable Aerosol Production

Luna addressed a mechanism for additional respirable aerosol release due to the pressurized nature of actual spent fuel rods which was not addressed by the Sandoval tests using unpressurized rods. The report states that in the Sandoval experiments there was a "significant amount of surrogate fuel aerosol created within the cask by the HEDD that remained inside and was ultimately deposited on the inner surfaces of the cask." Some or all of the unaccounted material in the Sandoval tests (which Sandoval concluded "could not have been respirable") is likely to be made up of this material. Luna states that, given a mechanism to create flow of gas out of the cask, this could become an additional respirable aerosol source.

The Luna study addresses the fact that real fuel rods are pressurized, and that rupture of these rods allows gas to escape, producing a flow that will carry aerosol into the environment. In every test subjecting shipping casks (real or modeled) to a HEDD explosion, the fuel rods used were not pressurized, and there was never a direct measurement of the actual quantity of respirable aerosol within the cask that would comprise this contribution from "blowdown." Luna then attempts to estimate the amount of respirable material generated via this pathway by using a brittle fracture study conducted at Argonne National Laboratory (Jardine et al, 1982. "Final Report of Experimental Laboratory-Scale Brittle Fracture Studies of Glasses and Ceramics," Report No. ANL-82-39, Argonne National Laboratory, Argonne, IL.)

Jardine developed experimental data on the amount and size distribution of particulate material produced by calibrated hammer impacts on brittle materials. His work developed a linear relationship between energy density in the material from the impact of a calibrated hammer on brittle materials and the mass of particulate material with geometric diameter less than 10µM over 2 orders of magnitude in energy. Important to note is that Jardine used materials that were sufficiently refractory to ensure that melting and vaporization were not a factor. Thus, one problem with correlating this study for use in tests involving high density devices is that thermal properties are not considered. This is incorrect for missile penetrations, especially when they are coupled with fire (deliberate or otherwise).

Next, Luna takes the relationship found by Jardine for particles of 10µm geometric size and says that this analysis is not interested in these particles. Luna states that "of interest to this study is the quantity of particles that are of respirable sizes. For uranium dioxide pellets with a density of 10.5 g/cm^3, this corresponds to a geometric size of about 3µm." The use of 3µm particle size is unsubstantiated, since particles of size 10µm are airborne and will contribute to overall dose in the event of an explosion. Further, 10µm particles are generally considered the maximum size for respirable aerosols. Therefore, this is the size that should be used in determining the aerosol fraction released in sabotage tests.

Particles of size in the range of 10µm are small enough to be dispersed quite far from an implosion scene. In addition, they can be deposited in the nasal region of the respiratory tract. While it is rare that particles of this size penetrate into the lungs, they will contribute to overall radiological dose. In addition, many of the particles deposited in the nasal region will be ingested, contributing to continued dose inside of the body. Ignoring particles greater than 3µm thus leads to an underestimate of the true radiological health effects of a postulated terrorist event.

To estimate the impact energies expected from HEDD1, Luna takes the estimated HEDD1 kinetic energy and divides it by the estimated swept volume of the disrupted fuel. Luna then makes two estimates: "the highest energy represents no attenuation of the HEDD energy by penetrating the wall. Since the HEDD action penetrated about equal amounts of mass per unit area passing through the wall and passing through the fuel, the residual energy deposited in the fuel is likely to be one-half to one-third of the initial energy density. This is shown by the low end of the range indicated on the plot." In fact, the lower energy is 1/3 of the higher energy. Luna then states that the correlation, using a particle diameter of 3µm and an energy density of 1/3 the estimated initial energy density, approximates that 5% of the unaccounted mass will be respirable.

There are a number of things seriously wrong with this conclusion. First, the Jardine study that the entire relationship is based on does not take into account thermal effects when estimating the correlation between energy density and respirable aerosol production. The correlation used was obtained from a test involving a calibrated hammer, not a high-temperature explosive device. As was mentioned earlier, Luna comments that "all materials were sufficiently refractory to assure that melting and vaporization were not a factor in the tests." (22) This suggests that the correlation is leaving out the importance of temperature in creating additional respirable particles, which if included would certainly increase the fraction of respirable aerosol production.

Second, the $U0_2$ and spent fuel data points obtained from other studies (MacDougall et al, 1987. "Site Characterization Plan Conceptual Design Report, Volume 4, Appendices F-O," Report No. SAND94-2641, Sandia National Laboratories, Albuquerque, New Mexico), (Alvarez et al, 1982. "Waste Forms Response Project Correlation Testing," Report No. EGG-PR-5590, Idaho National Engineering Laboratory, Idaho Falls, Idaho), which Luna states act to validate the use of the Jardine results for spent fuel, are inconclusive. The data from the MacDougall study is in the very low energy density range, and they cannot be used to demonstrate any correlation without more data points taken in the higher energy density range. The Alvarez study appears (the graph in Luna is hard to read) to provide respirable percents from 2% - 40% at an energy density approximately 7 times smaller than the density estimated for the HEDD. Regardless of any of these uncertainties, the Luna study assumes one value for the respirable fraction produced and places no uncertainty boundaries on it.

Third, Luna assumes that the HEDD will have an energy density of 1/3 that estimated based on the swept volume and kinetic energy of the device. It is argued in the Luna study that since the device penetrated about equal amounts of mass per unit area penetrating the wall of the cask as it did penetrating the fuel rods, the energy available for action on the fuel rods is likely "to be 1/2 to 1/3 of the initial energy density." However, this assumes that the HEDD action on the cask wall does not impart an energy to the fuel rods. Because of this fact, Luna's use of 1/3 of the initial assumed energy density is an underestimate (using 1/3 instead of 1/2 is an underestimate in itself). Without actual knowledge of the amount of respirable aerosol produced (as in a properly sampled test), the energy density should be assumed to be 100% of the initial.

In order to check the effect of the assumptions made by Luna in correlating the Jardine data to the sabotage benchmark, we calculated the likely aerosol release ignoring all of the objections raised here except for the use of 3µm particles (see attached spreadsheet). Instead, we used Figure 2 from the Luna report to obtain a % respirable production in the energy range given by Luna for the HEDD penetration assuming l0µm-sized particles. Using this, the Jardine correlation estimates that 50-100% of the fuel impacted by the HEDD will be respirable, as opposed to the 5% assumed by Luna. This changes the respirable surrogate fuel aerosol produced estimate from .19kg (Luna) to 1.91-3.82 kg.

Without any direct measurement of the respirable aerosol produced by HEDD penetration, the 5% assumption used is neither conservative nor grounded in reality. Unless experimental studies are conducted that specifically measure this term, a more conservative approximation of 50-100% respirable production must be used.

Spent Fuel to Surrogate Fuel Aerosol Ratio

The Luna report also proposes a reduction in the spent fuel to surrogate fuel aerosol ratio used to estimate spent fuel releases using data obtained with $DU0_2$. Luna lists several experimental estimates of the (spent fuel release/ surrogate fuel release) which vary over two orders of magnitude: .53, 5.6, .71, .42, 3, 2.8, 2.5, 3, 12. The Sandoval report used the value of 5.6, obtained for the analysis using a wet sieve technique. However, Luna questioned the validity of this technique, and concluded that a value of 3 was a more valid ratio, largely based on the only spent fuel aerosol point obtained from any experiments. Again, it is difficult to see how this can be substantiated. For the most conservative approach, the ratio should be the highest one experimentally estimated, which is 12.

In order to determine the effect of using different ratios on the estimation of the source term for a spent fuel release, we recalculated the estimated amount and percentage of fuel released from the truck cask used in the Sandoval experiments in the manner done by Luna in table A-1. We calculated this term while varying this ratio from 3 to 12, in addition to varying the estimated respirable aerosol production from 5%-100%. The results are summarized below.

Respirable aerosol production percentage	**Spent fuel-surrogate fuel correction factor**	**Respirable spent fuel produced (kg)**	**Percentage of total spent fuel in cask**
5	3	0.574	0.29%
50	3	1.071	0.53%
100	3	2.294	1.14%
5	5.6	5.736	2.85%
50	5.6	10.708	5.33%
100	5.6	22.945	11.41%
5	12	11.472	5.71%
50	12	21.415	10.65%
100	12	45.890	22.82%

Clearly, the 0.29% release calculated by Luna is not conservative. This is important because the same assumptions about spent fuel-surrogate fuel ratios and respirable aerosol productions are used when estimating the effects of HEDD impact on newer-generation casks. As is shown above, these assumptions are incorrect and lead to highly incorrect results. Because of this, it is recommended that experimental tests be performed subjecting new generation shipping casks to HEDD impact, rather than to rely on an incorrect computer simulation.

SCAP computer code used without sufficient benchmarking

The Luna study attempts to utilize a computer model as a replacement for actual experimentation in order to determine the possible damage caused by two HEDD's on state-of-the-art shipping casks. However, the code that they use admittedly does not model multi-layered targets well. The Luna study "benchmarks" the SCAP code against the Sandoval full-scale test and determines that the code predicts penetration depth well, but underestimates the size of the hole created by the penetration. In an attempt to remedy this, the Luna report multiplies the predicted hole size by a factor of 2.0 to obtain "correct" results, then proceeds to do the same when modeling other cask designs. This approach is seriously incorrect. It assumes that the code will consistently model all cask layer or shell arrangements, including different numbers of layers, which is incorrect. Important to this analysis is understanding the reasons why the SCAP code underpredicts the hole diameter. According to Luna, "underestimation is believed to be a result of some secondary effects, such as the dispersive layered nature of the targets, the relatively unfocused nature of the HEDD1, and the near one-dimensional nature of the flow dynamic of the code." (23) The SCAP user's manual addresses the problems in applying the model to predict penetration characteristics on multi-layered targets, stating that "there may exist interface phenomena not modeled by the code which could result in serious difficulties in comparing SCAP modeling output and experimental data. For a *limited number of interfaces* the code should still be useful." (27, emphasis added).

Below is a table comparing the cask used in the Sandoval study with the casks used in the Luna model.

Cask used in Sandoval:		**Truck Cask used in Luna**		**Rail Cask used in Luna**	
Steel-lead-steel Weight (ton)	25	steel-uranium-steel weight (ton)	25	steel-uranium-lead-steel weight (ton)	125
Inner cavity diameter (cm)	69.86	Inner cavity diameter (cm)		Inner cavity diameter (cm)	162.56
Length (cm)	490.22	Length (cm)	406	length (cm)	
Steel outer shell thickness (cm)	3.175	Steel outer shell thickness (cm)	3.81	steel outer shelf thickness (cm)	4.60375
Lead Wide thickness (cm)	16.84	Uranium middle thickness (cm)	7	lead middle thickness (cm)	1.27
Steel inner shell thickness (cm)	0.79	Steel inner shelf thickness (cm)	0.9525	uranium middle thickness (cm)	5.55625
Neutron Shield: water jacket, empty (cm)	1143	Neutron Shield: steel outer layer (cm)	0.3175	steel inner shell thickness (cm)	3.81
		Neutron shield: polypropylene layer (cm)	11.43	neutron shield: steel outer layer (cm)	0.635
				neutron shield: water jacket layer (cm)	15.24
1 PWR assembly		4 PWR assemblies		26 PWR assemblies	

Looking at the above table, it becomes apparent how different the three casks actually are from each other. They consist of different materials in different proportions, can carry different numbers of fuel assemblies, and have different sizes and weights. Regardless of these factors, the analysis carried out in the Luna report assumes that the correction of "2.0" to the predicted hole diameter is appropriate for all of the casks above.

As is shown on Table 1 of the Luna report (p. 34), the casks are broken down into different layers to be used as input into the SCAP code. What is important to note is that with every different layer, there exists an interface which is not modeled by the SCAP code. For the cask used in "benchmarking" the code, these interfaces were air-steel, steel-lead, and steel-PWR assembly, along with the various interactions in the assembly itself A factor of 2 difference between the predicted hole size and the larger experimental hole was attributed to difficulties in modeling these interface phenomena, among other things. This factor of 2 was then assumed to account for the interface phenomena in the other casks listed above, even though these casks have different interfaces and different numbers of layers. There is no justification of this step.

The use of the SCAP code to model cask response to shaped charge attack without having an appropriate experimental model to calibrate with is unacceptable. The SCAP code consistently underpredicts the diameter of the hole created by the explosion of the M3A1 device against the outdated cask used in the Sandoval report. The only justification that has been given for using a factor of two to correct this underprediction is that this makes the code correlate with experimental results. Therefore, it seems necessary to conduct new experiments using the newer casks to determine how to correlate the SCAP code with these experimental results. Since the newer casks have different numbers and types of layers, and since new HEDD devices are modeled by the code, it is likely that the deviations from experiment will be significantly different from those in the Sandoval case. Therefore, the Sandoval test results must not be used to calibrate the SCAP code for new casks and HEDD's.

Further, it appears that the PWR assemblies were modeled as having a single, uniform density which was taken as an average of the densities of the fuel rods, the uranium, and air. This leads to the false assumption that the penetration of the HEDD will be consistently impeded by dense material, rather than using the reality that the HEDD will find a very mixed environment with respect to density inside the cask cores.

In summary, the SCAP code simply cannot be used to provide a reliable or conservative estimate of the amount of damage expected to be caused by a HEDD on a multi-layered, modem cask. Unless there is experimental evidence that confirms the estimations presented in the Luna report, they should not be used as credible indicators of the effects of a successful sabotage event. The admitted shortcomings of the SCAP code - namely that it does not accurately predict penetration phenomena into multi-layered targets- prevents this code from offering useful information, especially since there have been no actual experiments to back these predictions up. It is not sufficient to benchmark the code against experiments performed on an outdated cask having fewer and different layers. Actual experiments must be performed with potential HEDD's in order to assess the validity of the SCAP predictions. Until this is done, the results remain irrelevant.

Omission of important sabotage scenarios

Intermodal transfer station sabotage event

The EIS, on pg. J-95, states that section J.1.5 evaluates the effects of sabotage on intermodal transfer stations. However, there is no section J.1.5, and there is no mention of this potential sabotage event again. It is essential to perform an analysis of the likely effects of a successful sabotage event on an intermodal transfer station because of its unique conditions. For one, shipping casks at an intermodal station will be stationary. This eliminates some of the problems associated with striking a pivoting target optimally that were presented in the EIS. Also, this makes the possibility of a multiple Cask release possible. Third, the appeal among potential saboteurs of attacking a station rather than a truck or train must be addressed. Intermodal transfer will also occur at reactor sites without rail access. All of these factors suggest that the potential for sabotage at an intermodal station must be addressed in a comprehensive manner.

Barge transport sabotage event

The EIS does not consider the consequences of a possible sabotage event on a barge shipment of spent nuclear fuel. As this is one of the transportation options being considered, it is important to consider the effects of a successful sabotage event, including the breach of shipping casks and release of radioactive material into the air and water, especially near populated areas, water supplies, or natural environments. It is essential to address this concern, especially since there was no discussion of the consequences of severe barge accidents, which were determined by the EIS to be not reasonably foreseeable.

Failure to identify/profile potential "Threat Groups"

It would be helpful to provide some general profiles of potential "Threat Groups" in terms of characterizing exactly what these groups are capable of doing, and the relative likelihood of each group performing a sabotage act. This would help in determining what types of weapons, forces, expertise, etc can be expected to be utilized by different groups, providing the DOE with a better estimate of what safeguards must be put in place. The Final Environmental Impact Statement: U.S. Spent Fuel Policy Storage of Foreign Spent Power Reactor Fuel (1980: DOE/EIS-0015) provides a list of "Threat Groups" to nuclear fuel storage and transportation; a similar, but updated, list would be helpful.

Improper dismissal of considering the probabi1ity of terrorist events

The EIS and the Luna report both consistently state that, since sabotage events are not randomly occurring, no estimation of their probability can be made, other than assuming they are "extremely rare." However, some comment should be made concerning the increase in large-scale terrorist attacks and how this relates to the need for sufficient safeguards against such attacks. Even though attacks are not random events, some effort should be made to identify trends, such as the increase in attacks on American soil over the last few years. This provides a proper foundation through which to analyze the level of protection required from terrorist attacks.

Failure to present a true "worst case scenario" for consequence analysis

Use of "averaged" wind conditions instead of wind blowing in one direction

The inputs used by the DOE in determining health effects of a successful sabotage scenario assume generalized wind conditions. For a true worst Case scenario, the impact of a radiological release directly downwind from a large population center, such as an office building, prison, stadium, etc. must be addressed. The use of wind conditions averaged over all directions dilutes the effect of a single-direction wind event.

Use of "average" (neutral) weather conditions, instead of worst Case conditions
The EIS states that, because the time and place of a sabotage event cannot be predicted, average weather conditions for the entire United States must be used. However, it seems likely that potential saboteurs will, to the degree feasible, plan sabotage events around those weather conditions that are the most damaging. Thus, for a true "worst case" sabotage scenario, weather conditions leading to the greatest consequences should be used.

"One bullet assumption"

As has been previously discussed, the consideration of only a single HEDD strike in the simulation of a sabotage event is unrealistic. Terrorists who are serious about causing a significant release of radioactive material, and who have the means of obtaining armor-penetrating weaponry, will likely bring a complete arsenal, including several armor-penetrating devices, incendiary devices, etc. Therefore, cask response to multiple missile penetrations, especially if they are fired in succession such that missiles strike an already damaged cask, must be addressed. It is extremely likely that the damage done to an already-penetrated cask will be substantial. This has not been assessed by the DOE and must be in order for the sabotage portion of the EIS to be considered complete.
Failure to assess social, psychological, environmental, or economic costs

In order to be able to assess the consequences of a successful sabotage event satisfactorily, the full scale of effects must be studied. The DOE has commissioned studies addressing the psychological impacts of radiation accidents on the public, but similar studies have not been performed for this EIS. In addition, no consideration of the cost of cleanup of such an event is given. Below is a skeleton outline of the various factors not considered by the EIS that need considerable attention.

Social/psychological costs not addressed
  Increased fear of nuclear energy, and nuclear industry
  Fear of vulnerability to attack (see Oklahoma City bombing)
  Susceptibility of foreign-born citizens to discrimination
  Distrust of government that transports materials capable of such destruction

Environmental costs not addressed
  Groundwater and/or surface water contamination more human costs
  Loss of land use near site for significant amount of time

Economic costs not addressed
  Cleanup costs
  Decontamination costs
  Lost workdays due to radioactive contamination of roads, buildings, etc

Loss of tourism in Las Vegas, e.g., due to contamination or fear
Evacuation costs
Relocation costs

Response
This comment has two main components. The first deals with a critique of the Sandia study (DIRS 104918- Luna, Neuhauser, and Vigil 1999); the second with aspects of the Draft EIS. The critique of the Sandia study has five major sections, to which DOE has responded in order. The part of the comment that deals with problems in the Draft EIS has four major sections.

Criticisms of Luna, Neuhauser, and Vigil (1999):

1. Inadequate Selection of Reference Weapons and Reference Cask. For security reasons DOE cannot state specifically which high-energy density devices (HEDDs) were considered. The analysis provided is expected to envelop the damage that might be produced by modern weapons in a successful sabotage event. The cask tested in Sandoval et al. (DIRS 156313-1983) to produce the data used as the basis for the analysis was not modern, but the use of the SCAP computer code allowed the results from that steel/lead/steel cask to be applied to modern cask wall designs using depleted uranium or lead shielding.

   It is possible that a sabotage attack could involve a fire. Whether the fire could enhance the consequences would depend on their location in relation to the cask and duration. A fire collocated with the cask could cause a greater release of material, but that material would be transported aloft in the plume of smoke and become unavailable for causing radiological impacts near the cask. The additional dispersion from fire-generated turbulence would mean that radiological doses a kilometer or so downwind of the cask would be only slightly higher. The net effect would not be proportional to the increased release.

2. Improper Extrapolation of Previous Experiments to Current Cask Designs. The commenter makes a valid comment with regard to the equation in the report for swept volume. It is incorrect as printed; the number of rows of pins along the disruption path should not be divided by the pin pitch, and the disruption path should therefore be unitless. The actual calculations in the report were rechecked and found to be correct.

   The tests discussed in Sandoval et al. (DIRS 156313-1983) provided both full penetration (two-wall) and one wall penetration results for subsequent use.

   The mass of respirable aerosol exterior to the cask from Sandoval et al. (DIRS 156313-1983) were restated in terms of a fraction of swept volume to use the release fraction results for other HEDDs which might produce a different diameter and length of damaged fuel. The release fraction for a single entry hole case was used as the basis of the calculation of release fraction because the SCAP computer code did not project that either of the HEDDs considered would penetrate both walls of the two representative cask designs considered. Were a through hole produced, a higher release fraction would have been used, but that was not the case. Thus, the increase in release fraction of a factor of 10 as suggested by the commenter is not warranted.

   The thermal properties of shielding material have little effect on the predicted geometry of penetration from use of a HEDD. Penetration is unrelated to thermal effects; it is related to density, depth, and, to some extent, strength of the materials with which the device would interact.

   While multiple holes could lead to an increased release fraction, as suggested by the commenter, the result is unlikely to be additive. This results because the driving pressure from rod pressurization that was postulated to enhance the release fraction over that measured by Sandoval et al. (DIRS 156313-1983) would be lower for each successive hole as the number of undamaged fuel pins get smaller. Without a mechanism for producing a strong flow out of the cask, respirable material within the cask is likely to plate out on the huge surface area within the cask. Thus, DOE believes that it has adequately bounded the sabotage consequence scenario.

   The commenter suggested that multiple holes would allow a flow of air into the cask that would enable exposed UO_2 to oxidize to U_3O_8 [when temperatures exceeded 250ºC (482ºF)], which is asserted to be a fine powdery material. While the oxidation process could occur, achieving temperatures of 250ºC to make the process occur quickly could not occur easily. Penetration by the weapon would not increase temperature noticeably inside the cask, and fires would take some time to get enough heat into the cask to raise temperatures above 250ºC. Moreover, conversion to U_3O_8 in the cask does not mean that particles would escape from the cask or that they would be small enough to become a significant health hazard. Because this scenario requires even more aspects of the sabotage event to proceed perfectly, it becomes increasingly unlikely.

The commenter suggests that more analysis is needed before the swept mass can be used as a correlation factor and that all HEDDs may not produce the same aerosol fraction related to swept mass. Since the publication of the Draft EIS and Luna, Neuhauser, and Vigil (1999), additional data has become available in a paper by Luna (DIRS 157201-2000). This paper describes with three experiments in which an unspecified HEDD penetrated a ductile cast-iron CASTOR cask containing nine mocked-up pressurized-water reactor fuel assemblies. Each assembly was made up of pressurized fuel rods filled with unirradiated fuel pellets. Two experiments were substantially the same. Each yielded a respirable release exterior to the cask of about 1 gram of aerosol. A third experiment was done with the cask interior at a pressure of 0.8 atmosphere, which yielded a release of about 0.3 gram of respirable aerosol. These releases include the cask purging effect of the release of rod plenum gases. The experiment described in Sandoval et al. (DIRS 156313-1983) yielded a respirable release of 3 grams but included no rod pressurization to create a purging flow that would force additional respirable material out of the cask. The two results are close, but the conditions for each were different.

Luna (DIRS 157201-2000) used the swept mass concept to relate these experiments. The respirable release fraction scaled to swept mass for the first two experiments was about a factor of 2 smaller (DIRS 156313-Sandoval et al. 1983). Based on the CASTOR experiments, which suggested that little of the aerosol in assemblies behind the first one penetrated was likely to find its way to the entry hole and be released, the fractional respirable aerosol release fraction was found to be quite close to the value for the Sandoval et al. (1983) experiment. This value includes the effect of releasing rod pressurization gas. This suggests that scaling the release to swept mass is a workable concept for translating experimental results to other situations.

Scaling the diameter of the cavity predicted by the SCAP computer code by comparing its predicted diameter to that observed in two experiments is an approximation that is believed to give reasonable results. What was most important in the SCAP results was the penetration depth prediction that was key in selecting the appropriate scaling factor to swept mass (full penetration versus one wall). As indicated in Luna, Neuhauser, and Vigil (DIRS 104918-1999), SCAP predicted penetration depth closely in two very different configurations. This provides confidence in the overall validity of the estimate of the swept mass from Luna, Neuhauser, and Vigil (1999).

3. Respirable Aerosol. Estimating the total quantity of respirable aerosol in the cask was needed to account for the purging effect of rod plenum gas release that was not simulated in the tests described in Sandoval et al. (DIRS 156313-1983). The commenter takes issue with several aspects of the analysis and concludes that instead of 5-percent respirable the result should have been 50 to 100 percent. Several issues were raised in support of that contention.

3.1 Respirable Particle Diameter. One of the first issues is what constitutes a respirable aerosol. The International Commission on Radiological Protection lung model suggests that the aerodynamic diameter of particles must be smaller than 10 micrometers to reach the lung in significant quantity. To convert aerodynamic diameter to geometric diameter, divide by the square root of the particle density. Thus, uranium oxide particles with a density 10.5 grams per cubic meter must have a diameter of 3.1 micrometers or smaller to be inhalable. Uranium oxide particles with a geometric diameter smaller than 10 micrometers, suggested by the commenter as being respirable, have an aerodynamic diameter of 32 micrometers that is well out of the respirable range. Using that assumption together and accepting other aspects of the Luna, Neuhauser, and Vigil (DIRS 104918-1999) analysis yielded the 50- to 100-percent respirable estimate made by the commenter. This is clearly not a reasonable value for respirable aerosol.

3.2 Thermal Effects. The commenter states that there could be thermal effects in the experiments described in Sandoval et al. (DIRS 156313-1983) that were not accounted for in Jardine's experiments. Sandoval et al. (1983) saw no evidence of thermally generated uranium oxide aerosols in the experiments; therefore, the

Jardine experimental relationship between aerosol production and impact energy density was used to estimate respirable aerosol production.

3.3 Extrapolation of Jardine's Relationship. Jardine's work included energy densities to 140 Joules per kilogram but the estimated energy range for the Sandoval et al. (DIRS 156313-1983) experiment was between 1,000 and 10,000 Joules per kilogram. The commenter criticizes using results of an experiment at the Idaho National Engineering and Environmental Laboratory together with the Jardine relationship to obtain an estimate of the respirable fraction at the high energy density of the original experiments from Sandoval et al. (1983). As discussed in Luna, Neuhauser, and Vigil (DIRS 104918-1999), the Idaho National Engineering and Environmental Laboratory data are within the likely confidence range for the Jardine data, which gives confidence to the extrapolation.

3.4 Energy Density Estimate. The commenter suggests that the end point of the extrapolation should have been at the full energy of the HEDD before the cask wall was penetrated. This suggestion is contrary to reality. It takes energy to penetrate the wall and the penetrated material flows back and away from the direction of HEDD action. Little of this energy expenditure imparted to the wall material could be directed at the surrogate fuel rods as suggested.

Based on the above, the estimate of 5-percent respirable aerosol production is reasonable based on the analysis presented by Luna, Neuhauser, and Vigil (DIRS 104918-1999), however, the experiments discussed in Luna (DIRS 157201-2000) suggest that even the 5-percent value is too high or that there is more significant deposition of the material in the cask before it is released.

4. Spent Nuclear Fuel-to-Surrogate Fuel Ratio. The commenter suggests that the largest observed value of the ratio (12) should be used rather than the value of 3 used in Luna, Neuhauser, and Vigil (DIRS 104918-1999) or the value of 5.6 used in Sandoval et al. (DIRS 156313-1983). Sandoval et al. used 5.6 as an upper limit, which might have been appropriate for the purpose of the analysis. That document indicated that the appropriate value was about 1. For Luna, Neuhauser, and Vigil (1999), it was judged that a realistic, but conservative, value should be used. Looking at the range of experimental values, a value of three was in the middle of the range and reflected 2 of the possible values. This made it a realistically conservative choice for the analysis.

5. SCAP Computer Code Used Without Sufficient Benchmarking. The commenter overlooked the three benchmarking calculations that were completed on a variety of cask and cask-like configurations. These included the same averaging of surrogate fuel and open space to represent fuel assemblies. The prediction of depth of penetration, which is a key issue in the analysis, was correct. The need to adjust the SCAP-predicted diameter by a factor of 2 was preferable to using the predicted diameter and is not likely to introduce significant error in the analysis.

Criticisms of EIS:

1. Omission of Important Sabotage Scenarios. The commenter identifies two additional scenarios, involving an intermodal transfer station and barge transport. Spent nuclear fuel casks at an intermodal transfer facility would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR Part 73), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons.

   Barge transport sabotage scenarios were considered in Appendix J of the EIS. While there could be the opportunity for a radiation dose from releases to surface water as a result of a barge accident or sabotage, the consequences would be likely to be much less than releases to the atmosphere (DIRS 157052-Ostmeyer 1986).

2. Failure to Identify/Profile Threat Groups and Improper Dismissal of the Probability of Terrorist Acts. The threats against which spent nuclear fuel shipments must be protected are known as "design-basis threats," and are defined in 10 CFR Part 73. Profiling threat groups is beyond the scope of this EIS. With regard to the

probability of terrorist acts, because of the attacks on September 11, 2001, DOE and other agencies are reexamining the protections built into their physical security and safeguards systems. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

3. Failure to Present a True Worst-Case Scenario for Consequence Analysis. The Council on Environmental Quality rescinded the requirement to perform a worst case analysis in an EIS in 1986 (51 *FR* 15618, April 25).

3.1 Use of Averaged Wind Conditions Instead of Wind Blowing in One Direction. The atmospheric data used in the sabotage analysis was a joint frequency of wind speed and stability class. As suggested by this comment, the wind was assumed to blow toward the population, and consequences were estimated for an urban area.

3.2 Use of Average (Neutral) Wind Conditions, Instead of Worst-Case Conditions. The Council on Environmental Quality rescinded the requirement to perform a worst case analysis in an EIS in 1986 (51 *FR* 15618, April 25).

3.3 One-Bullet Assumption. As discussed above, while multiple holes would probably lead to an increased release fraction, as suggested by the commenter, the result would be unlikely to be additive. This results because the driving pressure from rod pressurization that was postulated to enhance the release fraction over that measured in Sandoval et al. (DIRS 156313-1983) would be lower for each successive hole as the number of undamaged fuel pins got smaller. Without a mechanism for producing a strong flow out of the cask, respirable material inside the cask would be likely to plate out on the huge surface area inside the cask. DOE believes that it has adequately bounded the sabotage consequence scenario.

4. Failure to Assess Social, Psychological, Environmental or Economic Costs. In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments (DIRS 154814-Sandquist et al. 1985), and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $270 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 included data compiled from case studies involving actual cleanup of radioactive materials contamination. Section J.1.4.2.5 discusses environmental restoration after a release of radioactive material. Social and psychological issues are discussed in Appendix N.

8.10.1 (5620)
<u>Comment</u> - EIS001887 / 0246
Page 4-65; Section 4.1.8.3 - Sabotage
The Draft EIS examines a scenario involving low-level exposures in the waste-handling building which can contain radionuclides but not a more serious incident outside of a building, such as a breached cask/container in Caliente. (See Appendix A, section A 2.2/A 2.3) The assumption made in the Draft EIS that "rural targets" for terrorists are non-desirable has recently been proven wrong with the Amtrack derailment in Arizona. The proposed intermodal transfer station would make an attractive and potentially vulnerable target secluded in a canyon with clear overhead shots available.

<u>Response</u>
Spent nuclear fuel casks at an intermodal transfer facility would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR Part 73), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health.

Although it is not possible to predict the types of potential sabotage events with certainty, DOE has examined various accident scenarios, which can provide a sense of the consequences that could occur in such events. In addition, DOE has specifically analyzed the potential consequences of sabotage against a truck or rail cask. The results of this analysis indicate that the maximally exposed individual would increase the risk of incurring a fatal cancer from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments and key facilities. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (6127)

Comment - EIS001654 / 0016

Perhaps it has been studied previously by DOE, but we are unsure whether sabotage threats have been analyzed and compared for shipment of nuclear waste by the various modes. It is possible that one of the attributes of rail shipment that may be advantageous for accident risk exposure may also be a disadvantage in terms of vulnerability to terrorism or other willful attempts to interfere with the shipments. We are not experts in such analyses, but we recommend that the transportation mode selection decision criteria be identified and views of various experts and perspectives be considered in making the optimum mode selection based on a comprehensive risk assessment.

Response

The radiological accident risks estimated in Chapter 6 of the EIS would be sufficiently small so that there is no rationale for using radiological accident risk as reason for selecting a transportation mode.

Both truck and rail spent nuclear fuel shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons.

Although it is not possible to predict the types of potential sabotage events with certainty, DOE has examined various accident scenarios, which can provide a sense of the consequences that could occur in such events. In addition, DOE has specifically analyzed the potential consequences of sabotage against a truck or rail cask. The results of this analysis indicate that the maximally exposed individual would increase the risk of incurring a fatal cancer from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (6372)

Comment - EIS001587 / 0002

So we proceeded to embark upon a study of terrorism. We used eight different methodologies in attempts to breach these casks. I am not going to tell you what those were. I am not going to provide you with a cookbook. But I will tell you one that didn't work. This was long before the Alfred P. Murrah Building in Oklahoma City, and we used 5,000 instead of 4,000 pounds of ammonium nitrate fuel oil, 10 feet away from a simulated cask. We bent it like a banana and hurled it a hundred feet, but if it had been a real cask, it would not have released any material. That was an unsuccessful method.

We found, indeed, there are ways to open these casks using explosives. We consulted terrorism experts and we were told that terrorists need basically four things. They need the expertise, and there are those people with the expertise. They need the tools, and there are those people who have the tools. They need access to the cask, and we strive hard to prevent that access.

For one thing, each one of these shipments has a transmitter on it and we know within a hundred feet where it is at all times, and if it's diverted we know it immediately. And, fourthly, they need time. The less time you can give them, the lower the probability of a successful attack, and, again, part of our system is to reduce that available time. So, given that, even so, we did find that there are ways to breach the cask.

What we did find is of interest to the terrorists as much as is to you. We selected one method and we conducted an experiment on a shipping cask that had seen service and was retired from service, and we put this thing in a giant bottle and then we attacked it explosively, and we poked a hole in the cask, and we collected all of the material that came out of the cask, and we weighed it and we weighed all the material that was still in the cask, so we knew exactly how much material came out.

We, furthermore, screened the material so we knew what the respirable sizes were, or what the particle sizes were and we could, therefore, infer how much of that cask came out respirable material. All of this done in a bottle.

Now, prior to doing this, we had estimated that an attack of this sort would release one percent of the contents of the cask. And our finding was that it released one ten-thousandth of that amount, .0001 percent.

Now, if you look at that kind of an attack and you conduct it in Manhattan at rush hour on an intersection, the explosion would kill about 400 to 500 people. The release of radioactive materials from the cask, would result in two-tenths of one latent cancer. So the problem is not the release of material. The problem is the explosives and the terrorists know that and so this becomes an unattractive target.

Response
This comment is basically correct as it relates to the experiments carried out at Sandia National Laboratories in the early 1980s. Later analyses reinterpreted that data and extended the estimate of release to current cask designs and spent nuclear fuel loads. While there is a modest increase in expected consequences resulting from cask loading and design, the basic conclusion given in the comment is correct.

8.10.1 (7084)
Comment - EIS000995 / 0006
Once the high-level radioactive waste leaves the reactor sites, how will you avoid accidents or sabotage all along the shipping route? Will emergency management personnel all along the route be fully trained and equipped for a "criticality" accident? What can they really do other than cordon off the area?

Response
Section 6.2.4.2 of the EIS provides information on the data and methods used to analyze transportation accidents. Additional information provided in Section J.1.4.2.1 discusses actuarial data and potential effects of human error on accident impacts. Avoidance of accidents and getting a shipment of spent nuclear fuel or high-level radioactive waste (or any other material) from origin to destination safely would primarily be the responsibility of the management and crews operating the vehicles. The DOE Regional Servicing Contractor would ensure that crews were appropriately trained as required in U.S. Department of Transportation regulations (49 CFR Part 171) and that all operational requirements on the shipments would be met. Section M.3.2 provides some additional information on the operational procedures and protocols required by DOE for shipments. Section M.5 provides additional information on emergency response requirements and responsibilities among state, Federal, and local organizations. As discussed in Chapter 2 of the EIS, the Department would be responsible for implementing the requirements of Section 180(c) of the NWPA by providing funds for determining need for and training state, tribal, and local authorities for the safe transport and response to potential emergencies involving these shipments.

Additional information on stipulations of Section 180(c) is provided in Section M.6 of the EIS. Dealing with a criticality event in an accident is not a goal of the emergency response function. The Nuclear Regulatory Commission certification requirements for casks effectively prevent such an occurrence in transport. DOE expects that emergency response personnel would recover and treat those injured from the physical events of the accident, and control crowds, fires, and dispersal of hydrocarbon fuels at the scene. While emergency response crews would be trained to function in a radiological release situation, it is very unlikely that radioactive material would ever be released from an accident involving a cask. Section M.4 provides additional information on cask safety and testing. Section M.7 provides an overview of procedures used to provide physical protection of shipments.

8.10.1 (7295)
Comment - EIS001832 / 0032
We [The Nuclear Energy Institute] endorse DOE's treatment of sabotage and security risks in this EIS.

A system of safeguards and regulations exist to ensure the safety of the public, handling personnel, and the environment before transport, during transport, and upon arrival of the transport package at its end destination.

NRC [Nuclear Regulatory Commission] will be the lead agency in assessing spent nuclear fuel shipment safety, safeguards, and security. Some of the measures that will ensure safeguarding of spent fuel shipments include:

Periodic updating of route conditions to facilitate use of alternative itineraries en route as conditions warrant.

Route approval and security arrangements for each shipment that must be approved by NRC

Use of armed escorts in urban areas.

Requirements that State and local authorities be notified of shipments.

Vehicle design features that would prevent the unauthorized movement of trucks carrying spent nuclear fuel (locking devices on trucks used to transport SNF [spent nuclear fuel]).

Response
As pointed out by the commenter, transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (7447)
Comment - EIS001969 / 0006
That there are devices already in existence that can penetrate the truck shipping casks (page 6-33 of the EIS) if used by saboteurs, must not be taken lightly. That the trains and trucks will be guarded solves part of the problem, but not entirely. It is presumed that the guards will be armed, but would that protect against an intentional derailment? If the act of sabotage is successful, how would DOE address response and cleanup or control?

Response
Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons.

Cask safety features that provide containment, shielding, and thermal protection also provide protection against sabotage. The casks would be massive. The spent nuclear fuel in a cask would typically be only about 10 percent of the gross weight; the remaining 90 percent would be shielding and structure.

Although it is not possible to predict the types of potential sabotage events with certainty, DOE has examined various accident scenarios, which can provide a sense of the consequences that could occur in such events. In addition, DOE has specifically analyzed the potential consequences of sabotage against a truck or rail cask. The results of this analysis indicate that the maximally exposed individual would increase the risk of incurring a fatal cancer from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments (DIRS 154814-Sandquist et al. 1985), and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $270 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 included data compiled from case studies involving actual cleanup of radioactive materials contamination. Section J.1.4.2.5 discusses environmental restoration after a release of radioactive material.

8.10.1 (7449)
Comment - EIS001969 / 0007
We could find no mention, in the EIS, of the possibility of one of the trucks being hijacked. A hijacked truck could be driven anywhere and used as a threat. A hijacked trucks would be most vulnerable when they are stopped so that the guards and drivers can eat or sleep. How does DOE plan to address this situation?

Response
Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons.

8.10.1 (7548)
Comment - EIS000544 / 0003
There was very little about sabotage. We found in fact that the sabotage, the only thing that really related to it was in terms of what could happen at the waste handling building, and it really didn't relate to anything outside in the rural areas in canyons or any of the choke points that occur along these routes.

Lastly, we're finding numerical differences basically in looking at turning radii for operating heavy-haul vehicles on our system as it is now. There are certain summits and curves on routes that are listed that we don't think even a double articulated multi-tractored vehicle can actually traverse and legally stay within its loads.

With that I would like to end my comments by saying that we're not here to really say pro or con on the whole project, but we are adamantly against any heavy-haul option.

Response
The EIS discusses sabotage during transportation in Section 6.2.4.2.3. Although it is not possible to predict the types of potential sabotage events with certainty, DOE has examined various accident scenarios, which can provide a sense of the consequences that could occur in such events. In addition, DOE has specifically analyzed the potential consequences of sabotage against a truck or rail cask. The results of this analysis indicate that the maximally exposed individual would increase the risk of incurring a fatal cancer from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Heavy-haul vehicles do make more demands than other vehicles on the geometry and construction of roadways on which they might be used. DOE has identified mostly rail as its preferred mode of transportation both nationally and in Nevada.

DOE has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was approved, DOE would issue at some future date a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would then identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada.

It is the Department's opinion that the EIS adequately analyzes the potential impacts of Nevada heavy-haul implementing alternatives for transporting spent nuclear fuel and high-level radioactive waste.

8.10.1 (7811)
Comment - EIS001756 / 0002
I would like to start by repeating one statement that I think is extremely important, even though it's been said.

It is estimated that a mixture of approximately 6,000 train and truck shipments would pass through the St. Louis area over the 30 years shipping campaign, or on average one every other day, thus creating the potential for innumerable accidents and terrorist attacks. Terrorists would love to steal our plutonium to manufacture their own bombs or they might just want to demand millions of dollars or other terrorists' release from jail in exchange for not blowing up a high-level radioactive waste transport. With such frequency of shipment, it couldn't be too hard for terrorists to figure out where and when these materials are on route.

If a bomb landed on one of these vehicles or a suicide bomber decided to ram one, we're talking about life-threatening pollution, not just to the surrounding area, but to the entire city. In the DOE's Draft Summary Environmental Impact Statement in a chart of estimated national transportation impacts for 24 years of operation, latent cancer fatalities from maximum reasonably foreseeable accidents are five for mostly truck scenarios and 31 for mostly rail scenarios. These estimates could not possibly have included potential terrorist attacks. Apparently there is some concern about such attacks, as the Nuclear Regulatory Commission will require two armed escorts for every shipment of irradiated fuel rods. Such guards might have been able to save the stagecoaches of days past, but I have little hope that they could overpower modern terrorists.

While I am deeply disturbed about the danger to citizens from these transportation risks, the situation at the Yucca Mountain site itself could be described as a terrorist's dream. If the plan is approved, shipments could begin as early as 2004, but they'll have no safe place to go. Supposedly nuclear wastes can begin to be loaded into the new facility when it is 10 percent completed, but until that time they will be huddled together like a flock of sitting ducks on a parking lot, a perfect target even for an air attack.

While our Department of Energy may not fully acknowledge the peril in transporting high-level nuclear wastes, we don't have to look far to find others around the world who do. Last Saturday's New York Times reported the following: "Bowing to renewed concerns about terrorist attacks, Panama authorities said today that they were beefing up security to protect a British ship carrying radioactive cargo through the Panama Canal this weekend. 'The vessel is a visible target for any group that wants to make a statement,' Jorge Quijano, director of maritime operations for the Panama Canal Authority, said in an interview today. Environmental groups fear that the ship carrying high-level waste to Japan from France is vulnerable to terrorists who could board and dislodge or rupture the casks with the waste, threatening a potentially catastrophic release of radioactivity." Paul Leventhal, a representative from the Nuclear Control Institute in Washington commented, "The consequence of a release of radioactive waste would be long-lived. It would be very hard to clean up, and it could render the canal inoperable and the surrounding areas uninhabitable."

The very thought of submitting countless numbers of our citizens to the possible disasters herein described is incomprehensible.

Response
Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons.

In addition, 10 CFR 63.21 requires a repository at Yucca Mountain to have physical protection consistent with 10 CFR 73.51. This regulation specifies a performance objective, which provides "high assurance that activities involving spent nuclear fuel and high-level radioactive waste do not constitute an unreasonable risk to public health and safety." The regulation requires that spent nuclear fuel and high-level radioactive waste be stored in a protected area such that:

- Access to the material would require passage through or penetration of two physical barriers. The outer barrier would have isolation zones on each side to facilitate observation and threat assessment, would be continually monitored, and would be protected by an active alarm system.

- Adequate illumination would be provided for observation and threat assessment.

- The area would be monitored by random patrol.

- Access would be controlled by a lock system and personnel identification would be used to limit access to authorized persons.

A trained, equipped, and qualified security force would be required to conduct surveillance, assessment, access control, and communications to ensure adequate response to any security threat. Liaison with a response force would be required to permit timely response to unauthorized entry or activities.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments and key facilities. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (8472)
Comment - EIS000817 / 0144
P. 6-33. If this Sandia study is anything like the "sanitized" one I studied for our hearing on the VSC-24 cask, I distrust it. You can't analyze a cask using only a part of a rod or an aimed missile, or balloons (that mostly burst) to test radiation in the air -- the whole thing was a mess and unrelated to the real thing as I saw it. I have not seen this Luna Neuhauser 1999 study, but if it relies on a General Atomics cask holding only 4 assemblies -- I say get real! You are planning on using casks for 21 assemblies, aren't you? And dual purpose casks aren't even certified or used yet.

Response
The Sandia study (DIRS 104918-Luna, Neuhauser, and Vigil 1999) estimated the radioactive material release fraction for a truck cask (4 pressurized-water reactor assemblies) and rail cask (26 pressurized-water reactor assemblies) that might result from optimal attacks using two different high-energy density devices. DOE used those release fractions in its analysis and is confident that the results from that study are realistically conservative based on information currently available. Similar analyses can be applied to other cask designs as they become available, but it is not expected that results would be markedly different.

8.10.1 (8503)
Comment - EIS001737 / 0002
We aren't even allowed the liberty of buying milk that is labeled non-hormone treated or other food stuffs labeled non-genetically fiddled with. Haul the stuff by rail -- no. Haul it by highway -- no. Today's trucks can't even turn a corner without getting over into the other person's lane. Not only do we have normal accidents and human error involved, but we have now the threat of deliberate terrorism. What happens when a terrorist plot or some other more common occurrence causes a nuclear-loaded truck or train to go off a bridge on I-44, either on the highway I-44 or railroad bridge over the Gasconade River near Waynesville. The water is subsequently flowing into the Missouri River, then into the Mississippi just above St. Louis.

Response
Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The

objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons.

Although it is not possible to predict the types of potential sabotage events with certainty, DOE has examined various accident scenarios, which can provide a sense of the consequences that could occur in such events. In addition, DOE has specifically analyzed the potential consequences of sabotage against a truck or rail cask. The results of this analysis indicate that the maximally exposed individual would increase the risk of incurring a fatal cancer from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

It is the Department's opinion that the EIS adequately analyzes the potential impacts of sabotage.

8.10.1 (8612)
Comment - EIS001837 / 0010
What about the crossing of the vast East Mojave wilderness managed by the Bureau of Land Management and the National Park Service? The DEIS fails to address the issue of terrorist attacks in the East Mojave, the impact of spills in the East Mojave National Preserve.

What alternative routes would be used that would impact operations in the East Mojave National Preserve? How are agencies prepared to manage nuclear waste spills and accidents and cleanups? How will they manage visitors in the area?

Response
Shipments of spent nuclear fuel and high-level radioactive waste would occur primarily on Interstate System highways and mainline railroads. As a result, in the event of an accident, there would probably be relatively good access to the accident site without additional disturbance of the wilderness. In the unlikely event of an accident, cleanup, recovery, or access limitation actions would have to balance the impact on the wilderness with future safety of people in the area.

Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons.

8.10.1 (8733)
Comment - EIS001317 / 0001
Recently our local Citizens Advisory Panel to the chemical industry was denied risk management plan information on a worst case scenario basis due to FBI [Federal Bureau of Investigation] concerns for terrorist activities. This covered Fixed chemical plants of different sizes and relative risks. No thought was considered to the shipment of materials and no cumulative risk was considered due to the number of plants in the area.

With all the variables to consider in the shipment of nuclear waste no such concern for terrorism has been expressed in today's presentation by DOE.

Response
The EIS discusses sabotage in Section 6.2.4.2.3. Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting

the environment and public health. Section M.7 provides additional information on the physical protection of spent nuclear fuel during transportation.

8.10.1 (9184)
Comment - EIS002123 / 0003
Here's the picture and they've got the cask here and it says: "Armed guards and radiation experts escort a truck transporting a nuclear waste cask from an indoor storage pool at Calvert Cliffs nuclear power plant to a new outdoor storage bunker nearby," and they've got guns and they've got masks on their faces and they've got this cask surrounded, and it's just going to a grove of trees. I wonder what they'd -- what terrorist would do with it if it takes -- for one cask for all these people to guard it to this extent?

Response
The security requirements of nuclear power stations are such that armed guards are required whenever the exterior access doors to the spent nuclear fuel pool (or other sensitive areas) are open. The crew charged with the loading of the cask would be in full protective clothing with masks as they completed the cask loading operation.

8.10.1 (9269)
Comment - EIS001618 / 0004
I did find a fascinating section called the impacts of acts of sabotage on page 6-33, which considered the impacts of successful sabotage attempts on a cask, the casks that most of us have never gotten to see and don't really know how they'll work. We certainly don't know in what ways they've been tested. But don't worry because for the ones that are being shipped on trucks, and the analysis estimated that a sabotage event occurring in an urbanized area could result in the population dose of 31,000 person REM, which would cause an estimated 15 fatal cancers among the population of exposed individuals.

This number is so farcical that the idea that a successful -- I mean, these are casks made out of uranium. So we can look at research that is going on into servicemen as well as native populations in Iraq that have been dealing with depleted uranium shells and probably find higher cancers than that. But the idea that a successful sabotage event in a city like Chicago might cause 15 cancers is the sort of disinformation that one really associates with the Soviet Union denying any of the deaths from Chernobyl, rather than an actual seriously peer reviewed government document on the environmental impact of transportation problems.

And it goes down to 2.4 fatal cancers if it happens out in a rural area, so the farmers should feel totally at ease that the food they sell, I assume that's been irradiated, won't in any way cause cancers.

Not only actually interim during the time its transiting, but any one of these casks could stop, break open, in many other ways be breached. And I like the way this section actually talks about a sabotage event cannot be characterized as a random event. So we are pretty much assuming they are going to happen.

Response
Although it is not possible to predict the types of potential sabotage events with certainty, DOE has examined various accident scenarios, which can provide a sense of the consequences that could occur in such events. In addition, DOE has specifically analyzed the potential consequences of sabotage against a truck or rail cask. The results of this analysis indicate that the maximally exposed individual would increase the risk of incurring a fatal cancer from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area. The fact that some casks contain uranium shielding does not mean that a sabotage attack on such a cask would produce a significant additional radiological or environmental impact compared with the result of the sabotage attack itself.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (9422)
Comment - EIS001584 / 0002
I would like to refer to these casks. In 1976, Hunt Spatza, one of our prominent post Manhattan project physicists at Cornell, was promoting these casks being used on railroad cars. Now, at that time, 15-year-olds were pranking, sending freight trains off to Coventry, as the British would say, off to remote areas….

So that no matter how good your casks are, you're stuck with a time in our life that creates problems more in the area of the Nevada people, their focus on things outside of the technical.

Response
Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage, and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons. For these reasons, deliberate misrouting of spent nuclear fuel shipments is unlikely.

However, because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (9566)
Comment - EIS001888 / 0239
The DEIS failed to credibly address problems of security and terrorism. Security problems should have been prominently discussed. The only discussion of the issue was confined to the cursory refutation of arguments made by the State of Nevada. No discussion of eco-terrorism, civil disobedience, or the diversion of military equipment was included.

Response
The repository and spent nuclear fuel shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of nuclear facilities and spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR Part 73), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health.

In response to comments, additional information is provided in Appendix M of the EIS on safeguards and security requirements that would be imposed by DOE and the Nuclear Regulatory Commission. Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (9597)
Comment - EIS001888 / 0271
Security/Escort

The State of Nevada has successfully argued that the Nuclear Regulatory Commission (NRC) should reconsider the security requirements for handling SNF [spent nuclear fuel]. The DEIS presents no information on the contribution security arrangements will make on the transportation of SNF. This is unfortunate because many responsible trucking companies have developed sophisticated systems for handling sensitive materials that would assist public understanding of the safety systems that can confound potential attackers. The DEIS should have included a description of the contribution to risk made by security and escort programs for each of the modal and implementing alternative options.

Response
The Nuclear Regulatory Commission has not ruled on the State of Nevada petition to reconsider security requirements for spent nuclear fuel but, if the Commission should change its requirements, DOE will incorporate those changes in its procedures. Section M.7 of the EIS contains information on safeguards and security requirements that would be imposed by DOE and the Nuclear Regulatory Commission.

8.10.1 (9631)
Comment - EIS001888 / 0300
The DEIS does not provide a credible analysis of the potential consequences of effects of terrorist activity. In June of 1999, the State of Nevada petitioned the Nuclear Regulatory Commission (NRC) to perform a comprehensive assessment of the security requirements for shipping radioactive waste. This much-needed assessment could establish that there is a definite terrorist threat to shipments of Spent Nuclear Fuel (SNF) and that shipments of high-level waste through Clark County, Nevada en route to Yucca Mountain could be especially vulnerable. The threat of terrorist activity is not trivial and should be taken seriously in the DEIS. The DEIS should be considered insufficient until a credible estimate of the likelihood and consequences of terrorist activity is completed. The DEIS is insufficient because it fails to consider the threat to shipments posed by a wide array of terrorists. The threat should be considered for each of the implementing alternatives considered by the DEIS.

Response
Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons.

Although it is not possible to predict the types of potential sabotage events with certainty, DOE has examined various accident scenarios, which can provide a sense of the consequences that could occur in such events. In addition, DOE has specifically analyzed the potential consequences of sabotage against a truck or rail cask. The results of this analysis indicate that the maximally exposed individual would increase the risk of incurring a fatal cancer from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (9633)
Comment - EIS001888 / 0301
To date, two threats against spent fuel shipments have been reported in the United States since 1984. In November 1984, Northern States Power (NSP) shipped spent fuel from the Monticello reactor in northern Minnesota to a storage facility at Morris, Illinois. On February 4, 1985, NSP received a telephone threat warning that a group of anti-nuclear protesters would use a small airplane to stop a train carrying spent fuel from Monticello to Morris. On October 27, 1986, an unknown party removed a 39-foot long section of rail along the Burlington Northern route used for these shipments in Golden Valley, Minnesota. Authorities found a sign reading “Stop RadWaste Shipments” near the tracks. This incident did not result in damage to the train transporting spent fuel. However, a Burlington Northern train hauling lumber, scheduled immediately prior to a train transporting spent fuel from Monticello, derailed at the site of the sabotage.

Clark County believes that the threat of a terrorist attack on a spent fuel shipment capable of causing radiological sabotage should be considered credible and should be evaluated in the DEIS. History clearly suggests that although the terrorist threat may be low, it is not so low that it can be ignored.

The FBI found that the major determinants of the character of a terrorist attack are: 1) the technological means, 2) the political motivation behind the attack, and 3) the weaknesses of the target. The FBI believes that changes will occur in the motivations and goals of terrorist groups. Traditional motivations for terrorism (ethnic, tribal, and religious animosities) will continue and intensify. The disintegration of the Soviet Union and Yugoslavia have fostered entirely new groups that are both well-equipped and well-schooled in terrorist activity. As the World Trade Center bombing demonstrates, terrorists activities span the globe.

Response
Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons.

Although it is not possible to predict the types of potential sabotage events with certainty, DOE has examined various accident scenarios, which can provide a sense of the consequences that could occur in such events. In addition, DOE has specifically analyzed the potential consequences of sabotage against a truck or rail cask. The results of this analysis indicate that the maximally exposed individual would increase the risk of incurring a fatal cancer from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (9634)
Comment - EIS001888 / 0302
Clark County presents terrorists with an attractive target for a number of reasons. Each of these reasons, taken individually provides a sound rationale for concern about a terrorist threat. When viewed together, they present a compelling argument in favor of anticipating a terrorist event of some sort. These reasons, visitors, operational consideration, infrastructure, military facilities, and symbolic value are discussed below.

Visitors

“Major events taking place inside the United States may be seen as attractive targets for terrorism.”

Clark County’s population is an attractive target for terrorists. The sheer number of visitors to Clark County (31 million visitors in 1998) provides terrorists with an attractive target. The concentration of people created by Clark County’s mega resorts make it possible for terrorists to craft an attack that would contaminate a large number of people. An example of this concentration is easily exemplified by the intersection of Tropicana and Las Vegas Boulevards. On the comers of this intersection, are 16,500 hotels rooms-more than are in the entire City of San Francisco. Clark County’s hotels are usually 91% occupied. This inflames the problems faced by emergency services should an evacuation be necessary. A terrorist attack on a spent fuel shipment in the valley could create an accident that would overwhelm the ability of local emergency management agencies to provide protection and evacuation.

Exacerbating the problems faced by the County is the large number of special events of all types and sizes. Perhaps the largest of these is COMDEX, the world’s largest computer exposition. Special events can draw up to 250,000 people to the city from all over the world. It is likely that terrorists would schedule an attack to coincide with a well-known event in order to amplify the effects of their attack through media exposure. This occurred at the Munich Olympic Games, the Atlanta Olympic Games and several others. As the FBI report notes, terrorists select targets with care and sophistication. Terrorist activities have a ready-made target in Clark County. The DEIS should present a worst Case terrorism scenario that coincides with an important local event.

Symbolic Value

The number of tourists present in Clark County has value from a terrorists’ perspective not only because of the increased number of potential victims. Terrorist select targets based on their symbolic and political value. One prominent author paraphrases Clausewitz by characterizing terrorism as “politics by other means.” Targets with symbolic significance like government buildings and special events are particularly attractive. This was demonstrated by the Oklahoma City bombing, the Munich Olympic Games, and the Atlanta Olympic Games. Terrorists wish to get immediate publicity for their cause. Any attack in Las Vegas, the world’s center for tourism, would receive extensive media coverage. This problem will increase in the future as Las Vegas adds new events, such as race tracks, major sports teams and so on.

Other aspects of the region deserve mention in any discussion of the symbolic value of examining terrorist activity. The first aspect is the nature of the Nevada Test Site (NTS), which partly contains Yucca Mountain. The DOE conducted approximately 1,000 nuclear tests at the site from the 1950’s to the late 1980’s. These tests became extremely controversial and incited protest marches and acts of civil disobedience. Even without nuclear testing, the NTS remains a lightning rod for opponents of nuclear power as well as nuclear energy. It provides antinuclear groups with a powerful raison d’Etre and ensures the likelihood of an ecoterrorist attack on shipments through the regional remains a real possibility.

The second aspect of Clark County’s symbolic value is due to the controversial nature of its economy. The symbolism of killing Americans in their most famous tourist community makes Clark County a much more attractive target. The Las Vegas Convention and Visitors Authority (LVCA) has surveyed peasants in India and found that they were aware of two cities in the US New York and Las Vegas. Las Vegas may be regarded as anathema by fundamentalist regimes in the Muslim world because it represents everything that is corrupt and sinful about the West. Clark County’s symbolism is an important characteristic that should be examined by the DEIS.

Military Facilities

Nellis Air Force Base, its auxiliary facilities, and the Nevada National Guard armored cavalry squadron (1” Squadron/221st Cavalry) provide options for a terrorist group to distract local law enforcement, or to divert weapons useful in an attack on a shipment.

The close proximity of these facilities to several of the implementing alternatives for transporting the waste increases the likelihood that a terrorist group would favorably view this area for a coordinated series of terrorist events. These facilities also assist in the response to and the mitigation of a terrorist attack. The benefits of these facilities should be assessed. In that assessment should be some analysis of how well they have been integrated into local emergency response planning.

Methods and operational Considerations

The DEIS’ treatment of terrorism relies on incomplete analysis of the ways in which terrorists are likely to attack. Both the methods and the operational characteristics of a terrorist attack should be examined.

Methods

The weapon used by terrorists to attack a shipment of nuclear waste is an important issue that the NRC has agreed to reconsider. The NRC [Nuclear Regulatory Commission] has rightly concluded that it must reexamine the threat defined in its 1984 rulemaking. The DEIS accepted the Sandia National Laboratory’s 1984 and 1999 reports that evaluated the damage to a canister using a military MW demolition charge. The State of Nevada has argued that more sophisticated anti-tank weapons should be considered potential threats. Clark County agrees with this and recommends the NRC examine a terrorist scenario in which the terrorists are equipped with a TOW II or Milan antitank missile or a car bomb as their primary weapon. As the FBI’s 1996 report stated:

“The threat at the lower end of the spectrum is likely to grow as well. The M-16, M-10, Uzi and AK-47 assault rifles will be supplemented by standoff weapons like Stinger antiaircraft missiles, LAWs and RPG-7s, already available on the world weapons market. Just because a weapon is relatively unsophisticated does not mean it cannot cause massive casualties. A stinger missile aimed at a jumbo jet as it takes off or as it approaches a large metropolitan airport could cause tremendous casualties. A LAW or RPG round lobbed into the right area of a nuclear power plant could produce catastrophic consequences.”

These standoff weapons provide the opportunity for highly flexible hit and run attacks. Either of these types of weapons would be more realistic than the cratering charge in the current scenario. A review of terrorist activities reveals that the antitank missile and car bomb are favorite weapons of terrorists and are likely to impose greater strains on the canisters than the M3AI cratering charge currently being considered.

Response
Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons.

Cask safety features that provide containment, shielding and thermal protection also provide protection against sabotage. The casks would be massive. The spent nuclear fuel in a cask would typically be only about 10 percent of the gross weight; the remaining 90 percent would be shielding and structure.

Although it is not possible to predict the types of potential sabotage events with certainty, DOE has examined various accident scenarios, which can provide a sense of the consequences that could occur in such events. In addition, DOE has specifically analyzed the potential consequences of a saboteur using a high-energy density device on a truck or rail cask. The results of this analysis indicate that the maximally exposed individual would increase the risk of incurring a fatal cancer from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (9635)
Comment - EIS001888 / 0303
Civil Disobedience

As a subset of terrorism, the problem of Civil disobedience is another area in which the DEIS should have made some statement. The transportation of spent nuclear fuel to the Gorleben facility in Germany has touched off numerous annual riots. These riots have resulted in the destruction of infrastructure and deliberate efforts to prevent the transportation of waste. The Nevada experience with civil disobedience is long and centered on opposition to the Nevada Test Site. To date, the protestors have refrained from acts of violence; however, the decision to store HLW [high-level radioactive waste] in Yucca Mountain could be viewed by some radical groups as illegitimate. It is possible that an ecoterrorist group could, while “monkeywrenching” the transportation of spent fuel, inadvertently cause a more severe accident to occur. Certainly, the DEIS must consider the possibility of civil disobedience as an impact.

Response
Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons.

DOE relies on local authorities to maintain order and DOE anticipates that the safeguards and security plans for the shipments would include whatever measures necessary to protect the shipments from any threat and ensure that they reach their destination. Appendix M of the EIS provides additional information on transportation safeguards and security requirements.

8.10.1 (9636)
Comment - EIS001888 / 0304
In order for the DEIS to be regarded as a credible document, it is important that certain modifications be made that will ensure the DEIS has properly addressed the problem of terrorist attacks on HLW [high-level radioactive waste] casks. These are:

The DEIS should contain a safety assessment that discusses the relative security of shipping waste via dedicated trains and general freight. The safety assessment should also compare the safety of transporting the waste via dedicated train and truck.

The DEIS should examine the implications of advance approval of truck and rail routes. Security considerations should be incorporated into rail and truck routes selection and RADTRAN modeling should be performed for alternative security scenarios to assess the relative benefits of security considerations.
The DEIS should examine the safety implications escort requirements to include more than a single driver as a possible escort.

The DEIS should discuss the types and character of the terrorist threat likely to effect the proposed action. Civil disobedience should also be included in that discussion.

The DEIS should report on the vulnerability and utility of local military facilities to likely terrorists.

The DEIS should relate the security of waste shipments to the demonstrated and published techniques used by terrorists.

The DEIS should report the results of a full-scale test of the effects of a TOW II missile impacting obliquely on a GA-4 cask from a range of 1,000 meters.

Response
Transportation shipments by dedicated trains, general rail freight, and truck would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons.

The safeguards requirements for general freight and dedicated train shipments are the same. Dedicated train and truck requirements are generally the same, with the exception of escort requirements, which acknowledge the difference between the transport modes. In response to comments, DOE has added information on transportation safeguards and security measures in Section M.7 of the EIS.

8.10.1 (9758)
Comment - EIS001888 / 0342
[Clark County summary of comments it has received from the public.]

Several commenters requested that the EIS evaluate the implications of transport and disposal of SNF [spent nuclear fuel] and HLW [high-level radioactive waste] on national security, terrorism, and proliferation of nuclear weapons in the U.S. and abroad. Mechanisms that preclude terrorism and proliferation also should be addressed by the EIS.

Response
DOE prepared the EIS to complete the mandate of Congress. Part of the reason to develop a repository would be to dispose of these materials permanently to protect the public health and safety and the environment, including to remove the material from potential diversion and terrorist acts.

8.10.1 (9942)
Comment - EIS001732 / 0011
What safeguards will be in place during the shipping and storage process in case of failed equipment; for instance, O-ring failure as in the TMI [Three Mile Island] case, human error as when a buffer car with a TMI fuel train was labeled as containing calcium carbide, an explosive compound, vehicular accidents such as the accident involving a citizen's car which stalled on the tracks here in St. Louis and was hit by the TMI train, or sabotage? Unfortunately, terrorism is an increasing reality in today's society and must not be ignored, and let me say here, terrorists are very innovative people.

Response
Quality assurance procedures would be in place to minimize the kind of errors cited in this comment, but there is still a chance that errors could occur. However, errors of this sort would require another accident or incident to occur to trigger any effect. The likelihood of a simultaneously occurring event is very low, but even if that occurred, the casks are extremely robust and would survive very severe events.

Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (10021)
Comment - EIS001888 / 0515
[Clark County summary of comments it has received from the pubic.]

DOE's Developing the Transportation Plan is now in EIS and has no focus on security (i.e., guards) for shipments.

Response
Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons. One of the specific requirements in 10 CFR 73.37 is that armed escorts would be required in heavily populated areas that are generally defined as urban areas with a population of 100,000 or greater. Additional information on physical protection of shipments can be found in Appendix M of the EIS.

8.10.1 (10032)
Comment - EIS000657 / 0002
Another thing that bothers me is this transportation thing. We've dwelt on that a great length.

One that I think that boggles my mind, if one of those trains goes through a big city like Denver, Salt Lake City, or Las Vegas and some terrorist dropped a missile on that thing, ain't no way in the world you're going to clean that thing. It's impossible.

Response
The EIS discusses sabotage during transportation in Section 6.2.4.2.3. Although it is not possible to predict the types of potential sabotage events with certainty, DOE has examined various accident scenarios, which can provide a sense of the consequences that could occur in such events. In addition, DOE has specifically analyzed the potential consequences of sabotage against a truck or rail cask. The results of this analysis indicate that the

maximally exposed individual would increase the risk of incurring a fatal cancer from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (10033)
Comment - EIS000809 / 0004
Transportation Security-From the data presented in the EIS, it appears that acts of sabotage greatly increase the risk of concentrated releases of nuclear material. Our concern in this area emanates from the number of stated shipping points. All told, there are a total of 77 separate shipping points. We know that transportation security is fairly consistent within the DOE. However, we would like to have the assurance that transportation security will be treated uniformly from all 77 shipping points and that the DOE will have ultimate responsibility for the security of all such shipments.

Response
Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons. Because DOE would conduct the shipments according to Nuclear Regulatory Commission requirements and Departmental directives, there would be little variation in the process for shipments from the 77 sites.

Although it is not possible to predict the types of potential sabotage events with certainty, DOE has examined various accident scenarios, which can provide a sense of the consequences that could occur in such events. In addition, DOE has specifically analyzed the potential consequences of sabotage against a truck or rail cask. The results of this analysis indicate that the maximally exposed individual would increase the risk of incurring a fatal cancer from approximately 23 percent (the current risk of incurring a fatal cancer from all other causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (10053)
Comment - EIS001877 / 0009
DOE should incorporate terrorism/sabotage risk management and countermeasures in all DOE transportation plans relating to operation of a repository, interim storage facility, and/or intermodal transfer facility, including liability for costs and damages resulting from terrorism/sabotage against nuclear waste shipments.

To date, DOE has said that it would rely on regulations and the security oversight of the Nuclear Regulatory Commission to ensure the safety of its OCRWM [DOE Office of Civilian Radioactive Waste Management] shipments. No commitments to extra-regulatory measures have been made.

Response
Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons.

In addition, 10 CFR 63.21 requires a repository at Yucca Mountain to have physical protection consistent with 10 CFR 73.51. This regulation specifies a performance objective, which provides “high assurance that activities involving spent nuclear fuel and high-level radioactive waste do not constitute an unreasonable risk to public health and safety.” The regulation requires that spent nuclear fuel and high-level radioactive waste be stored in a protected area such that:

- Access to the material would require passage through or penetration of two physical barriers. The outer barrier would have isolation zones on each side to facilitate observation and threat assessment, would be continually monitored, and would be protected by an active alarm system.

- Adequate illumination would be provided for observation and threat assessment.

The area would be monitored by random patrol.

- Access would be controlled by a lock system and personnel identification would be used to limit access to authorized persons.

A trained, equipped, and qualified security force would be required to conduct surveillance, assessment, access control, and communications to ensure adequate response to any security threat. Liaison with a response force would be required to permit timely response to unauthorized entry or activities.

Because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments and key facilities. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (10918)
Comment - EIS000241 / 0005
In a recent study in which they took the early experimental results and applied them to modern casks, and again, as I said, we have calculation tools to do this now as a result of the scale model and full-scale testing we’ve done, you apply these to the existing casks today.

It turns out that the result of a sabotage event is still well within the kinds of environmental impacts, including impact to the public, that you would find acceptable. The latent cancer fatalities are somewhat less than 1 in 100, or 1/100th of one latent cancer fatality.

The other thing that isn’t factored into those kinds of considerations is the fact that these munitions are not easy to use. And two things determine the effectiveness of these munitions. They’re shaped charges. They’re the kind of things the Army uses as bazookas. One of these factors is called obliquity, which means that the shaped charge has to hit the surface of the cask at 90°. If it hits as little deflection as 10°, then the jet is deflected off, and it doesn’t penetrate.

Now, in both cases, the rail cask and the concrete cask, the sides of the cask are such that that area of the cask that you can hit and be successful in poking a hole in it is quite small.

Furthermore, these weapons, if you’re going to use a launcher to fire them, it’s incredible. The closer you are, the more likely you are to miss, because the flight of the projectile is very erratic when it first comes out of the launch tube. It’s only at ranges of about 100 yards that the flight becomes predictable, where the person firing it can actually aim it at something and have a fair chance of hitting it.

But at 100 yards you’re trying to hit a band on a cask that’s maybe four inches wide, maybe six inches wide at the most. And so the likelihood of satisfying the obliquity requirements are very, very low.

Secondly, there is a requirement for this kind of munition to be detonated at a precise distance from the surface it’s trying to penetrate. In these shoulder-launch devices there is a nose cone on there that provides you with that standoff distance, and the fuse is in the nose cone. So when it touches the surface, everything goes off.

The only problem is that these have personnel barriers around them, and so that is what the nose cone is going to hit, and you have defeated the munition simply because of standoff distance.

Now, there is a possibility, if you want to entertain it, that that person's intent on causing this damage could gain physical control of the unit and, in fact, set the system up so it is optimal in its capability for destroying the cask.

Understand, though, that there is a button in the truck, in the cab of the truck, so that if the driver senses any sort of interdiction, he presses the button and red lights go off in all of these control centers all over, and response to the system is quite good, quite quick.

So it takes time for the saboteur to set up the conditions he wants and to detonate his device. And in the meantime, you've got all the resources that we've got coming down on him, and that does not make it a very attractive target for a saboteur.

Response
The EIS discusses sabotage during transportation in Section 6.2.4.2.3. Although it is not possible to predict the types of potential sabotage event with certainty, DOE has examined various accident scenarios, which can provide a sense of the consequences that could occur in such events. In addition, DOE has specifically analyzed the potential consequences of a saboteur against a truck or rail cask. The results of this analysis indicated that the maximally exposed individual would increase the risk of incurring a fatal cancer from approximately 23 percent (the current risk of incurring a fatal cancer from all causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

However, because of the attacks on September 11, 2001, DOE and other agencies ar reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (11120)
Comment - EIS001207 / 0009
Although DOE Yucca Mountain Site office cannot intervene in local political manipulation of democratic process, it must acknowledge that trusting local levels to implement NEPA [National Environmental Policy Act] and democratic process is, at times, trust misplaced. Unethical actions and illegal actions have recently been subject of criminal and civil investigations within the region of Ohio and Kentucky considered by DOE as transport corridors for HLRW [high-level radioactive waste] (and surplus nuclear weapons arsenal materials). DOE must consider recent regional examples of conduct (and lack of concern) which could potentially place the general public at considerable risk during transport of nuclear materials through regional transportation corridors.

Lewis County of Kentucky Grand Jury recently indicted an individual believed to be connected to a multi-state, semi-trailer theft ring. The man was from Lucasville, Ohio. Further investigation is continuing with charges expected against a man from Piketon, Ohio (location of the Portsmouth Gaseous Diffusion Plant). See Attachment V, "First Charges Brought in Theft Ring Investigation," THE LEDGER INDEPENDENT, January 25, 2000, pg. A-1. The point here is rather obvious, transport of materials to the Yucca Mountain Site may not be as "secure" as DOE would seem to believe in agency calculations regarding risk assessment from accident, "incident" or theft.

Response
The safety and security of spent nuclear fuel shipments is the responsibility of DOE. DOE would ensure that the contractors making the shipments follow all DOE and Nuclear Regulatory Commission safeguards requirements.

Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons.

8.10.1 (11220)
Comment - EIS001729 / 0002
With respect to terrorist assault, I find that the casks are adequately designed to protect against what I would call any expected terrorist assault, but quite frankly, I believe that these packages are not even on the list of anyone who's interested in sabotage or terrorism. They are a target of low opportunity with a very low probability of having any effect and there are far more targets of opportunity, and no one in St. Louis or any other place in the country ought to be worried about it, that particular aspect of the movement of fuel. We've done it. We've been there, done that, as the expression goes. We know what we're doing and we will continue to do it safely in the future.

Response
The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection and safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the physical protection and safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons. The cask safety features that provide containment, shielding, and thermal protection also provide protection against sabotage. The casks would be massive. The spent nuclear fuel in a cask would typically be only about 10 percent of the gross weight; the remaining 90 percent would be shielding and structure. Additional information on the physical protection of spent nuclear fuel and high-level radioactive waste during transportation can be found in Section M.7 of the EIS.

It is not possible to predict whether sabotage events would occur, and if they did the nature of such events. Nevertheless, DOE examined various accidents, including an aircraft crash into a transportation cask. The consequences of both the maximum reasonably foreseeable accident and the aircraft crash are presented in the EIS for the mostly truck and mostly rail transportation scenarios and can provide an approximation of the types of consequences that could occur from a sabotage event. In addition, DOE analyzed the potential consequences of sabotage against a truck or rail cask (see Section 6.2.4.2.3 of the EIS). The results of this analysis indicate that the risk of the maximally exposed individual incurring a fatal cancer would increase from approximately 23 percent (the current risk of incurring a fatal cancer from all causes) to about 29 percent. The same event could cause 48 latent cancer fatalities in an assumed population of a large urban area.

Because of the terrorist attack of September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.1 (11503)
Comment - EIS002137 / 0004
We talk about terrorism. Somebody mentioned terrorism. Why would you want to attack a -- a cask full of spent fuel rods? Right out here at Nellis Air Force Base, we have 1,450 nuclear devices. If you want to shoot a missile at something, that ought to light our fire. We don't see anybody saying, "How long are they going to last, 10,000 years?" They got there. They got there on B-52s, they got there with trucks.

Response
Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons. Assessing the vulnerability of military bases to terrorist attacks is not within the scope of this EIS.

8.10.1 (12134)
Comment - EIS001887 / 0436
Improper Attention to Sabotage and Terrorism Scenarios

2.1 Inadequate Selection of "Reference Weapons"

2.1.1 The 1999 Sandia Study (Luna et al) needs to be more specific on what type of device it selected for computer simulation. Although the report claims that the vagueness was necessary to prevent the document from being classified, it is necessary to provide more details so a thorough analysis of its findings can be performed. This is the only way to test the validity of the computer simulations used in the report.

2.1.2 The DOE needs to make clear exactly what range of devices is available for consideration as "reference devices." It is our belief that devices such as the Milan Anti-Tank Missile and the US TOW 2 Anti-Tank missile, reported to have armor-penetrating capabilities of great than 1000mm (39.4 inches) and greater than 700mm (28.5 inches), respectively, must be considered (Norris).

2.1.3 All Sandia reports considering sabotage implicitly assume that a terrorist attack will involve a single strike using a single charge or missile. However, some devices can be fired multiple times in quick succession: the US TOW 2 can be fired up to three times in 90 seconds (Norris, Halstead & Ballard). The DOE needs to address the potential for a multiple-strike terrorist attack, which is likely to cause significantly more damage then the scenario modeled in the Sandoval and Luna reports.

2.2. Improper extrapolation of previous experiments to current cask designs

2.2.1. Use of "Swept Volume" as a surrogate for fraction or respirable material released

2.2.1.1. The equation listed in the Luna report which attempts to define a "swept mass" solely in terms of the geometric properties of the hole left by the charge does not balance its units. This will be analyzed in detail in the Review Comments. If this equation turns out to be invalid, the entire analysis performed in the Luna report and cited in the EIS becomes irrelevant, requiring a completely new analysis. Until this is addressed the results correlating swept volume and respirable aerosol production cannot be trusted.

2.2.1.2. The relationship assumes that there is only one hole into the fuel cask (i.e., an entry hole but no exit hole). Multiple holes will significantly increase the amount of respirable material released (Luna estimated it to be by a factor of 10). Due to the possibility that certain weapons can completely penetrate a cask, or that a cask will be penetrated by multiple shots, any relationships relying on a single hole entry into the cask is not credible as a worst Case scenario.

2.2.1.3. The "one hole assumption" results in another underestimation of the fraction of respirable aerosol produced by the oxidation of UO_2. Assuming a cask is fully penetrated, this will create a flow of oxygen into the cask, which will result in the oxidation of UO_2 to $U_3 O_8$, a fine powder of mostly respirable particles. This oxidation rate is increased significantly at temperatures above 250ºC (Aronson). Temperatures this high will be likely in the event of a missile strike coupled with a fire. This significant source of respirable aerosols was not accounted for in the Luna correlation exercises.

2.2.1.4. Using a geometric correlation assumes that all casks, and all devices used in an attack, will exhibit the same thermal properties as the cask in the Sandoval experiments. Since the thermal properties of uranium are very different from lead, this will not be the case. Because of this, it is not enough to simply assume a relationship between aerosol released and swept volume, and use this to estimate releases in unrelated casks. This ignores thermal mechanisms of aerosol generation, such as oxidation of UO_2 under elevated temperatures. Further, different attack devices will impart a different amount of heat into the cask, resulting in different aerosol production rates as a function of thermal input. This will be likely to change to relationship between swept volume and aerosol released, making any correlation attempt between different casks or different devices trivial.

2.2.2. Estimation of respirable aerosol produced due to breach of pressurized rods

Luna cited irrelevant data to estimate the amount of surrogate fuel aerosol that could be created within the cask and released in the event of breach. The cited experiment showed a linear relationship between the energy density in the material from the impact of a calibrated hammer on brittle objects and mass of particulate material having diameter smaller than 10µm. However, the materials chosen were refractory to ensure that melting and vaporization were not observed. In the event of a missile strike, temperature effects are likely to be extremely significant. Therefore, any study that tries to estimate aerosol production as a function of energy density, but does not include temperature effects, is irrelevant and should not be used. Because of this, the estimate of 5% aerosol production due to HEDD [high-energy density device] impact is not accurate or conservative. It may do better to assume that all of the uranium mass not accounted for in the Sandoval studies (assumed to be inside the cask and deposited on its walls) was of respirable size and able to be expelled in the event of cask compromise. This will significantly alter the consequence analysis, since about 1% of the total UO_2 mass, and 37% of the mass released from the pins, was "unaccounted for" in the Sandoval full-scale experiment. A direct measurement of the amount of material deposited inside the cask walls is necessary to estimate how much aerosol is produced due to HEDD action. Therefore, a new study is recommended with more complete sampling procedures in order to obtain an experimental value for the respirable aerosol production due to the HEDD. The 5% value assumed is likely to be low.

2.2.3. Unsubstantiated reduction in the spent fuel-surrogate fuel ratio

Luna attempts to reduce the value used by Sandoval which accounts for the fact that spent fuel will produce more respirable aerosols then the surrogate fuel used in most experiments. Luna quotes the following experimental estimations of this ratio: .53, 5.6, .71, .42, 3, 2.8, 2.5, 3, 12. From this, it is estimated that 3 is the most appropriate ratio, even though the range of experimentally-determined ratios differs over 3 orders of magnitude. Further, after Luna (correctly) dismisses all values less than 1.0 as implausible, it would make sense to use the largest cited value for a conservative approximation. Alternately, the geometric mean of a large distribution of numbers is often used for estimation purposes (a value of 4 in this case), so long as a range based on the standard deviation about the mean is given as well.

However, more likely is that the large distribution of estimated ratios suggests that there is no clear, reproducible relationship between the amount of spent fuel and surrogate fuel aerosols produced from a blast of given intensity. Thus, it is argued that no ratio is acceptable. Rather, the inconsistent data suggest that the only way to determine spent fuel response to a detonation is to detonate a cask containing spent fuel and analyze the results. Short of doing this, the correlation used by Luna is arbitrary, non conservative, and unacceptable.

2.3 SCAP computer code used without sufficient benchmarking

The Luna study attempts to utilize a computer model as a replacement for actual experimentation in order to determine the possible damage caused by two HEDD's on state-of-the-art shipping casks. However, the code that they use admittedly does not model multi-layered targets well. The Luna study "benchmarks" the SCAP code against the Sandoval full-scale test and determines that the code predicts penetration depth well, but underestimates the size of the hole created by the penetration. In an attempt to remedy this, the Luna report multiplies the predicted hole size by a factor of 2.0 to obtain "correct" results, then proceeds to do the same when modeling other cask designs. This approach is seriously incorrect. It assumes that the code will consistently model all cask layer or shell arrangements, including different numbers of layers, which is incorrect. With no experimental data to prove this, this assertion is unacceptable. It cannot be assumed that a computer code which, when used to model multi-layered targets could result in "serious difficulties in comparing SCAP modeling output and experimental data" (Robinson), would be expected to model, for example, a lead-steel interface with the same degree of incorrectness as a lead-uranium interface. Therefore, until an experimental proof of the merits of using the SCAP code to model the behavior of a shaped charge strike on a uranium-shielded cask is performed, the code cannot be considered validated. Further, since the code underestimated the true size of the hole in the Sandoval experiments, it cannot be assumed that this code will provide a conservative approximation of penetration damage. This leads to the call for a full set of experiments designed to determine the true effect of a HEDD explosion on cask integrity.

2.4. Omission of two important sabotage scenarios

2.4.1. Nevada intermodal transfer station sabotage event

The EIS, on pg. J-95, states that section J.1.5 evaluates the effects of sabotage on intermodal transfer stations. However, there is no section J.1.5, and there is no mention of this potential sabotage event again. It is essential to perform an analysis of the likely effects of a successful sabotage event on an intermodal transfer station because of its unique conditions. For one, shipping casks at an intermodal station will be stationary. This eliminates some of the problems associated with striking a moving target optimally that were presented in the EIS. Also, this makes the possibility of a multiple Cask release possible. Third, the appeal among potential saboteurs of attacking a station rather than a truck or train must be addressed. Intermodal transfer will also occur at reactor sites without rail access. All of these factors suggest that the potential for sabotage at an intermodal station must be addressed in a comprehensive manner.

2.4.2. Barge transport sabotage event

The EIS does not consider the consequences of a possible sabotage event on a barge shipment of spent nuclear fuel. As this is one of the transportation options being considered, it is important to consider the effects of a successful sabotage event, including the breach of shipping casks and release of radioactive material into the air and water, especially near populated areas, water supplies, or natural environments. It is essential to address this concern, especially since there was no discussion of the consequences of severe barge accidents, which were determined by the EIS to be not reasonably foreseeable.

2.5. Failure to identify/profile potential “Threat Groups”

It would be helpful to provide some general profiles of potential “Threat Groups” in terms of characterizing exactly what these groups are capable of doing, and the relative likelihood of each group performing a sabotage act. This would help in determining what types of weapons, forces, expertise, etc can be expected to be utilized by different groups, providing the DOE with a better estimate of what safeguards must be put in place. The Final Environmental Impact Statement: *U.S. Spent Fuel Policy, Storage of Foreign Spent Power Reactor Fuel* (1980: DOE/EIS-0015) provides a list of “Threat Groups” to nuclear fuel storage and transportation; a similar, but updated list would be helpful.

2.6. Improper dismissal of considering the probability of terrorist events

The EIS and the Luna report both consistently state that, since sabotage events are not randomly occurring, no estimation of their probability can be made, other than assuming they are “extremely rare.” However, some comment should be made concerning the increase in large-scale terrorist attacks and how this relates to the need for sufficient safeguards against such attacks. Even though attacks are not random events, some effort should be made to identify trends, such as the increase in attacks on American soil over the last few years. This provides a proper foundation through which to analyze the level of protection required from terrorist attacks.

2.7. Failure to present a true “worst case scenario” for consequence analysis

2.7.1. Use of “averaged” wind conditions instead of wind blowing in one direction

The inputs used by the DOE in determining health effects of a successful sabotage scenario assume generalized wind conditions. For a true worst Case scenario, the impact of a radiological release directly downwind from a large population center, such as an office building, prison, stadium, etc. must be addressed. The use of wind conditions averaged over all directions dilutes the effect of a single-direction wind event.

2.7.2. Use of “average” (neutral) weather conditions, instead of worst Case conditions

The EIS states that, because the time and place of a sabotage event cannot be predicted, average weather conditions for the entire United States must be used. However, it seems likely that potential saboteurs will, to the degree feasible, plan sabotage events around those weather conditions that are the most damaging. Thus, for a true "worst case" sabotage scenario, weather conditions leading to the greatest consequences should be used.

2.7.3. "One bullet assumption"

As has been previously discussed, the consideration of only a single HEDD strike in the simulation of a sabotage event is unrealistic. Terrorists who are serious about causing a significant release of radioactive material, and who have the means of obtaining armor-penetrating weaponry, will likely bring a complete arsenal, including several armor-penetrating devices, incendiary devices, etc. Therefore, cask response to multiple missile penetrations, especially if they are fired in succession such that missiles strike an already damaged cask, must be addressed. It is extremely likely that the damage done to an already-penetrated cask will be substantial. This has not been assessed by the DOE and must be in order for the sabotage portion of the EIS to be considered complete.

2.7.4. Failure to consider effects of breached cask coupled with long-duration fire

The EIS assumes that there will be no significant secondary effects on the cask after missile impact, since the casks themselves are not flammable. However, the trucks and trains carrying them are flammable. Further, there is the possibility of deliberately causing a fire, either by truck bomb or other method, to intensify the damage from a penetrated cask. This scenario must be taken into account.

2.8. Failure to assess social, psychological, environmental, or economic costs

In order to be able to truly assess the consequences of a successful sabotage event, the full scale of effects must be studied. The DOE has commissioned studies addressing the psychological impacts of radiation accidents on the public, but similar studies have not been performed for this EIS. In addition, no consideration of the cost of cleanup of such an event is given. Below is a skeleton outline of the various factors not considered by the EIS that need considerable attention.

2.8.1. Social/psychological costs not addressed
2.8.1.1. Increased fear of nuclear energy, and nuclear industry
2.8.1.2. Fear of vulnerability to attack (see Oklahoma City bombing)
2.8.1.3. Susceptibility of foreign-born citizens to discrimination
2.8.1.4. Distrust of government that transports materials capable of such destruction

2.8.2. Environmental costs not addressed
2.8.2.1. Groundwater and/or surface water contamination →more human costs
2.8.2.2. Loss of land use near site for significant amount of time

2.8.3. Economic costs not addressed
2.8.3.1. Cleanup costs
2.8.3.2. Decontamination costs
2.8.3.3. Lost workdays due to radioactive contamination of roads, buildings, etc.
2.8.3.4. Loss of tourism in Las Vegas, for example, due to contamination or fear
2.8.3.5. Evacuation costs
2.8.3.6. Relocation costs

Response
This response answers each point using the paragraph numbers from the comment.

2.1 Inadequate Selection of Reference Weapons

2.1.1. Within the scope of its classification policy, DOE can offer no more specific information about the devices considered in Luna, Neuhauser, and Vigil (DIRS 104918-1999).

2.1.2. Within the scope of its classification policy, DOE cannot state specifically which devices the analysis considered. However, the analysis enveloped the damage that modern weapons might produce in an optimally successful sabotage event.

2.1.3. DOE believes that its analysis adequately bounds the sabotage consequence scenario.

2.2 Improper Extrapolation of Previous Experiments to Current Cask Designs.

2.2.1.1. The commenter makes a valid comment with regard to the equation in the report for swept volume. It is incorrect as printed; the number of rows of pins along the disruption path (NR) should not be divided by the pin pitch (PP), and NR should therefore be unitless. The actual calculations in the report were rechecked and found to be correct.

2.2.1.2. While multiple holes could lead to an increased release fraction, as suggested by this comment, the result is unlikely to be additive of the results for a single hole presented in Luna, Neuhauser, and Vigil (DIRS 104918-1999). This is because the driving pressure from rod pressurization postulated to enhance the release fraction over that measured by Sandoval et al. (DIRS 156313-1983) would be lower for each successive attack as the number of undamaged fuel pins became smaller. Without a mechanism for producing a strong gas flow out of the cask, respirable material probably would plate out on the huge surface area in the cask.

The assertion that modern weapons can produce full penetration of both cask walls is not confirmed by calculations from Luna, Neuhauser, and Vigil (DIRS 104918-1999).

2.2.1.3. This comment suggests that multiple holes would allow a flow of air into the cask that would enable exposed UO_2 to oxidize to U_3O_8, which is asserted to be a fine powdery material, when temperatures exceeded 250ºC (482ºF),. While the oxidation process could occur, achieving temperatures of 250ºC to make the process occur quickly could not occur easily. Penetration by the weapon would not increase temperature noticeably inside the cask, and fires would take some time to produce enough heat into the cask to raise temperatures above 250ºC. Moreover, conversion to U_3O_8 in the cask does not mean that particles would escape from the cask or that they would be small enough to become a significant health hazard. Because this scenario requires even more aspects of the sabotage event to proceed perfectly, it becomes increasingly unlikely.

2.2.1.4. The thermal properties of shielding material have little effect on the predicted geometry of penetration from use of a high-energy-density device (HEDD). Penetration is unrelated to thermal effects; it is related to density, depth, and to some extent, strength of the materials with which the device would interact. Thus, the use of swept volume scaling to estimate aerosol production is a reasonable approach. As indicated in Luna, Neuhauser, and Vigil (DIRS 104918-1999), the SCAP computer code predicted penetration depth closely in two very different configurations involving different materials. There is good confidence that penetration estimates in lead, uranium, and fuel are sufficiently accurate for the analysis performed and for the estimate of swept mass.

Since the publication of the Draft EIS and Luna, Neuhauser, and Vigil (DIRS 104918-1999), additional data has become available in a paper by Luna (DIRS 157201-2000). This paper describes three experiments in which an unspecified HEDD penetrated a ductile cast-iron CASTOR cask containing nine mocked-up pressurized-water reactor fuel assemblies. Each assembly was made up of pressurized fuel rods filled with unirradiated fuel pellets. Two experiments were substantially the same. Each yielded a respirable release exterior to the cask of about 1 gram of aerosol. A third experiment was done with the cask interior at a pressure of 0.8 atmosphere, which yielded a release of about 0.3 gram of respirable aerosol. These releases include the cask purging effect of the release of rod plenum gases. The experiment described in Sandoval et al. (DIRS 156313-1983) yielded a respirable release of 3 grams but included no rod pressurization to create a purging flow that would force additional respirable material out of the cask. The two results are close, but the conditions for each were different.

Luna (DIRS 157201-2000) used the swept mass concept to relate these experiments. The respirable release fraction scaled to swept mass for the first two experiments was about a factor of 2 smaller (DIRS 156313-Sandoval et al. 1983). Based on the CASTOR experiments that suggested that little of the aerosol in assemblies behind the first one penetrated was likely to find its way to the entry hole and be released, the fractional respirable aerosol release fraction was found to be quite close to the value for the Sandoval et al. (1983) experiment. This value includes the effect of releasing rod pressurization gas. This suggests that scaling the release to swept mass is a workable concept for translating experimental results to other situations.

2.2.2. There are two assertions in this section. One deals with the experimental data used to extrapolate to a 5-percent respirable source term and seeks to discredit that estimate. The second assertion is that all material not specifically accounted for in Sandoval et al. (DIRS 156313-1983) should have been assumed to be respirable.

Experiments. The materials used in the experiments cited in Luna, Neuhauser, and Vigil (DIRS 104918-1999) were not "chosen to be refractory to ensure that melting and vaporization were not observed," as suggested. They were typical of spent nuclear fuel and other waste forms. This comment seems to separate temperature effects from energy density effects when, in fact, temperature and pressure are indicators of energy density and were included in the experiments used in the report. The work cited (hammer experiments) is not irrelevant to estimating the respirable particles produced, as suggested. In addition, this comment does not recognize that Sandoval et al. (DIRS 156313-1983) saw no evidence of melting or vaporization-generated uranium oxide aerosols in their experiments. Similarly, there were none in the hammer-related studies.

Respirable Particulate. Because the experiments in Sandoval et al. (DIRS 156313-1983) did not account for all materials in all volumes on all surfaces and there was potential for gas release from rods to move more respirable material from the cask to the environment, Luna, Neuhauser, and Vigil (DIRS 104918-1999) corrected the original source term estimate from Sandoval et al. (1983). This comment suggests that the 5-percent respirable estimate used for this purpose was too low and that a new experiment is needed. As stated above, a more recent experiment suggests that the original Sandoval et al. (1983) result was correct and that the 5-percent respirable aerosol estimate derived in Luna, Neuhauser, and Vigil (1999) might be an overestimate. DOE believes that the current analysis, based on past and recent experiments, provides a reasonable estimate of the potential consequences of a very unlikely event.

2.2.3. The spent nuclear fuel-to-surrogate fuel ratio is important in the estimation of the source term. The approach taken in Luna, Neuhauser, and Vigil (DIRS 104918-1999) was to use a value of 3 for the ratio, justified on the grounds that it was a central value. In fact, the mode of the values given is 2.8 and the median is about 2.6, which are other measures of central tendency for which a value of 3 is somewhat conservative. This comment suggests the use of a geometric mean value and estimates that value to be 4 (the actual geometric mean of the nine values given is actually about 2.1). The comment then suggests that the range is so wide that there is no reproducible relationship and DOE should perform a full-scale experiment with spent nuclear fuel. However, there is a body of data [of which the Jardine data used in Luna, Neuhauser, and Vigil (1999) are a part] that suggests that there is a definite relationship between particulate production and energy density in impacts in brittle solids. That being the case, there should be a reasonably well-defined relationship for aerosol production between various brittle materials like spent nuclear fuel and UO_2. The fact that it was too expensive to do many correlation experiments in the 1980s experiments does not mean that the relationship does not exist. The experiments performed suggest a central value of about 3, as used in Luna, Neuhauser, and Vigil (1999).

2.3 SCAP Computer Code Used Without Sufficient Benchmarking.

The application for which the SCAP code was used was well suited to its capability. The comment overlooked the three benchmarking calculations on a variety of cask and cask-like configurations. These calculations included the averaging of surrogate fuel and open space to represent fuel assemblies. The prediction of depth of penetration, which is a key issue in the analysis, was correct. The need to adjust the diameter predicted by the SCAP code by a factor of 2 seems preferable to using the predicted diameter and introducing a known underestimate. This normalization is not likely to introduce major unconservative errors in the analysis.

2.4 Omission of Two Important Sabotage Scenarios

The commenter identifies two additional scenarios, which involve an intermodal transfer station and barge transport. Spent nuclear fuel casks at an intermodal transfer facility would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules aimed specifically at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR Part 73), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under the control of unauthorized persons.

DOE considered barge transport sabotage scenarios in Appendix J of the EIS. While there could be the opportunity for a radiation dose from releases to surface water as a result of a barge accident or sabotage, the consequences are likely to be much less than releases to the atmosphere (DIRS 157052-Ostmeyer 1986).

1.5 Failure to Identify/Profile Threat Groups

The threats that spent nuclear fuel shipments must be protected against are known as "Design Basis Threats." Design basis threats are defined in 10 CFR Part 73. Profiling of threat groups is beyond the scope of this EIS.

Improper Dismissal of Considering the Probability of Terrorist Events

With regard to the probability of terrorist acts, because of the attacks on September 11, 2001, DOE and other agencies are reexamining the protections built into their physical security and safeguards systems. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

1.6 Failure to Present a True Worst-Case Scenario for Consequence Analysis

An EIS is not required to present a "true worst-case scenario" because the Council on Environmental Quality rescinded the requirement to perform a worst-case analysis in an EIS in 1986 (51 *FR* 15618, April 25).

2.7.1 Use of Averaged Wind Conditions Instead of Wind Blowing in One Direction. The atmospheric data used in the sabotage analysis was a joint frequency of wind speed and stability class. As suggested by this comment, the wind was assumed to blow toward the population, and consequences were estimated for an urban area.

2.7.2 Use of Average (Neutral) Wind Conditions, Instead of Worst-Case Conditions. As mentioned above, the Council on Environmental Quality rescinded the requirement to perform a worst-case analysis in an EIS in 1986 (51 *FR* 15618, April 25).

2.7.3 One-Bullet Assumption. As discussed above, while multiple holes could lead to an increased release fraction, as suggested by the commenter, the result is unlikely to be additive. This results because the driving pressure from rod pressurization that was postulated to enhance the release fraction over that measured in Sandoval et al. (DIRS 156313-1983) would be lower for each hole as the number of undamaged fuel pins got smaller. Without a mechanism for producing a strong flow out of the cask, respirable material within the cask would be likely to plate out on the huge surface area within the cask. Thus, DOE believes that it has adequately bounded the sabotage consequence scenario.

2.7.4 Failure to Consider Effects of a Breached Cask Coupled with a Long-Duration Fire. It is possible that a sabotage attack could involve fires. Whether the fires could enhance the consequences would depend on their locations in relation to the cask and duration. A fire collocated with the cask could cause a greater release of material, but that material would be transported aloft in the plume of smoke and become unavailable for causing radiological impacts near the cask. The additional dispersion from fire-generated turbulence would mean that radiological doses a kilometer (0.6 mile) or so downwind of the cask would be only slightly higher.

2.8 Failure to Assess Social, Psychological, Environmental or Economic Costs

In response to public comments, DOE has included a discussion on the range of potential costs of cleanup following a severe transportation accident in Appendix J of the EIS. This discussion reviews calculations of land area contaminated and costs for cleanup presented in past studies, including a report used in the 1986 Environmental Assessments (DIRS 154814-Sandquist et al. 1985), and information submitted by the State of Nevada in its comments on the Draft EIS. The information submitted by the State included estimates of cleanup costs as high as $270 billion. Cost data used in the studies reviewed in Section J.1.4.2.5 included data compiled from case studies involving actual cleanup of radioactive materials contamination. Section J.1.4.2.5 discusses environmental restoration after a release of radioactive material. Social and psychological issues are discussed in Appendix N.

8.10.1 (12200)
Comment - EIS010485 / 0004
Given the September 11, 2001, hijacking of commercial jets, it is not difficult to imagine similar events taking place on our highways, irrespective of the claims made for the strength of the spent fuel/nuclear waste containers.

These possibilities are not [addressed] by the EIS.

Response
Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons. Nuclear Regulatory Commission safeguards rules require the capability to immobilize the cab or cargo-carrying portion of the vehicle, so that a hijacked truck could not be moved. Aircraft crashes into spent nuclear fuel casks are discussed in Section 6.3.3.1 of the EIS. This analysis showed that an aircraft crash into a spent nuclear fuel cask would not penetrate the cask.

8.10.1 (12359)
Comment - EIS010489 / 0003
As of September 11, 2001 I can't see how a plan to transport such toxic waste across our nation could even be considered. Not only would there be the nuclear power plants as terrorists' targets but in addition our highways and communities throughout our nation would become targets.

Response
Transportation shipments would be protected from sabotage. The Nuclear Regulatory Commission has developed a set of rules specifically aimed at protecting the public from harm that could result from sabotage of spent nuclear fuel casks. Known as physical protection or safeguards regulations (10 CFR 73.37), these security rules are distinguished from other regulations that deal with issues of safety affecting the environment and public health. The objectives of the safeguards regulations are to minimize the possibility of sabotage and facilitate recovery of spent nuclear fuel shipments that could come under control of unauthorized persons.

However, because of the attacks on September 11, 2001, the Department and other agencies are reexamining the protections built into their physical security and safeguards systems for transportation shipments. As dictated by results of this reexamination, DOE would modify its methods and systems as appropriate.

8.10.2 EMERGENCY RESPONSE

8.10.2 (114)
Comment - 89 comments summarized
Commenters stated that the Draft EIS did not examine what emergency response personnel, training, and equipment would be needed along transportation routes or what the specific impacts of a transportation accident would be. Commenters wanted to know who would respond in the event of an accident: would local responders be the first to arrive at the scene of an accident or would transport vehicles be escorted with a response team? Other commenters asked who would train people and what level of training would be received and when would the hospitals and personnel in their communities be trained and equipped to handle radiation victims. Others asked how long it would take to train all of the necessary personnel for a potential nuclear "catastrophe." Other commenters noted that heavy trucks would be used to haul the spent nuclear fuel and high-level radioactive waste and were concerned that most cities, towns, and villages would not have the equipment available to move these vehicles in the event of an accident.

A state public utility commission noted that it would be involved in providing the funds and technical assistance to the affected communities in its state, both in the routing process and in supplying funds to train emergency responders. Another commenter noted that the emergency response training should be separate from the current Occupational Health and Safety Administration training requirements of first responders to hazardous materials incidents. Other commenters stated that training needed to be conducted early to allow local responders to learn what would be involved in responding to an accident and that no spent nuclear fuel or high-level radioactive waste should be transported until the infrastructure for proper containment, transportation, and safety response/community education was in place. Commenters were concerned that without the proper equipment and training, fatalities would increase among first responders and others. Others stated that, because DOE would avoid identifying specific routes, that would contribute to a lack of training for the emergency response crews along those proposed routes.

Response
As discussed in Section 6.2.4.2 of the EIS, accidents involving the transportation of spent nuclear fuel or high-level radioactive waste shipments could occur. However, of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. As a consequence, the likelihood that a first responder or other emergency personnel would become contaminated, even in very severe accidents, would be remote. The only expected radiological exposure of first responders would be from any gamma radiation and neutrons penetrating the shielding of the casks. These radiation levels would be low, easily measured, and controlled to meet the limits of Nuclear Regulatory Commission regulations. Additional information on cask safety and testing is provided in Section M.4. Additional information on emergency response following an accident is provided in Section M.5.

As described in Section M.5 of the EIS, as with any transportation accident, state and tribal governments have primary responsibility to respond to and protect the public health and safety in their jurisdictions in accidents involving radioactive materials. This includes providing, managing, and maintaining responsibility for emergency response capabilities. Although DOE would originally provide the funding, each state and tribe would determine how it would administer that funding. Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for addressing emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using a planning grant and based on availability of funds in annual Program budgets specified by Congress.

The schedule in the proposed policy and procedures for implementation of Section 180(c) of the NWPA (63 *FR* 23753, April 30, 1998) is designed to provide adequate time for training of first responders in advance of the first shipments. If there was a decision to proceed with the development of a repository at Yucca Mountain, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. Based on interactions with stakeholders, DOE believes that this would be sufficient time for emergency responders to receive the training to prepare them to respond to an accident involving DOE shipments. See Section M.6 of the EIS for a discussion of the DOE Section 180(c) policy and procedures.

If there was an accident involving a shipment to the proposed repository, the first responders and response time would be the same as those for any transportation accident. The primary public health and safety issue would be emergency care for those involved in the accident and the safety of those who responded. As discussed in Appendixes J and M of the EIS, accidents involving a spent nuclear fuel or high-level radioactive waste shipment would be likely over the proposed shipping period. Most real-world accidents that have been postulated, including truck crashes into bridges, train derailments followed by fires, derailments followed by immersion of a cask into a river, and similar extreme accident conditions, would not be likely to result in release of radioactive materials from the shipping casks.

In the unlikely event someone was contaminated as the result of an accident involving shipments to a repository, there are several means to deal with such incidences. The Department has several programs available to provide assistance to state, tribal, and local governments in response to radioactive material accidents. The Radiological Assistance Program, for example, provides trained personnel with equipment to evaluate, assess, advise, and assist in the mitigation and monitoring of potential immediate hazards associated with a transportation accident. As part of the program, DOE maintains eight Regional Coordinating Offices across the country that are staffed 24 hours a day, 365 days a year. The staff consists of nuclear engineers, health physicists, industrial hygienists, public affairs specialists, and other personnel who provide field monitoring, sampling, decontamination, communications, and other services, as requested. In addition, DOE's Radiation Emergency Assistance Center/Training Site (REAC/TS) focuses on providing rapid medical attention to people involved in radiation accidents. REAC/TS maintains a 24-hour response center to provide direct support, including deployable equipment and personnel trained and experienced in the treatment of radiation exposure, to assist Federal, state, tribal, and local organizations.

Recovering 23-metric-ton (25-ton) truck casks or rail casks weighing up to 140 metric tons (150 tons) loaded with spent nuclear fuel would involve methods commonly used to recover heavy trucks following truck accidents or railcars and locomotives following rail accidents. Capability to lift such weights exists for rail and truck modes and would be deployed as required. Railroads use emergency response contractors with the capability to lift derailed locomotives that could weigh as much as 140 metric tons.

At this time many years before shipments to the proposed repository at Yucca Mountain could begin, DOE is not ready to make decisions on which specific transportation routes would be used for shipping spent nuclear fuel and high-level radioactive waste. The routes used in the EIS transportation analyses might not be the routes used for actual shipments. The route selection process would be conducted in accordance with applicable U.S. Department of Transportation regulations on route selection, state or tribal routing designations allowable under existing regulations, and the processes described in Section M.3.2.1.2 of the EIS. Section J.4 identifies the representative truck and rail routes DOE used in the impact analyses.

8.10.2 (194)
Comment - 8 comments summarized
Commenters expressed concern about the welfare of workers such as police and fire department personnel and first responders in the event of an emergency and stated that the Draft EIS inadequately assessed the potential increased exposure of and health risks to emergency first responders. Other commenters stated that the Draft EIS did not consider the impacts of accidents on hospital workers and health care professionals who might be in direct contact with high-level radioactive waste via the injured and at the scene. Another commenter was particularly concerned about rural areas where local emergency workers and health care professionals without specialized training might be the first and only workers on an accident scene for many hours. Commenters questioned what provisions would be provided for the families of workers and first responders since there would be a loss of income while injured victims recuperated. Other commenters asked how first responders to potential accidents would be notified of potential life threatening exposures. Others stated that millions of Americans could be put at risk in addition to emergency responders. Some commenters asked whether DOE would provide the necessary planning mechanism, Material Safety Data Sheets, and levels of personal protection equipment to the local emergency planning committees to distribute to first responders.

Response
In response to public comments, DOE has modified Section 6.2.4.2.1 of the EIS to include estimated radiological impacts to emergency personnel who would respond to transportation accidents. The analysis assumed a first responder would be trained and would follow guidance in the *2000 Emergency Response Guidebook* (DIRS 155776-DOT 2000) when responding to transportation accidents involving shipments of radioactive materials. The maximum estimated dose to a first responder would be 830 millirem. This dose, which is about 40 percent of the limit for annual dose to radiation workers at DOE facilities, would lead to an increase of about 0.03 percent in the individual's lifetime risk of a latent fatal cancer. Health care professionals would likely receive smaller doses from caring for radioactively contaminated accident victims or workers.

In addition, DOE has added information to the EIS on the proposed operational aspects of spent nuclear fuel and high-level radioactive waste transportation, emergency response planning, and financial assistance programs. (See Sections M.3 through M.6.) Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for addressing emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using a planning grant and based on availability of funds in annual Program budgets specified by Congress. Additional Federal response capabilities, such as expert services from the Radiological Assistance Program Team, could be activated, as requested by states and tribes. The schedule in the proposed policy and procedures (63 *FR* 23753, April 30, 1998) for implementation of Section 180(c) of the NWPA is designed to provide adequate time for training of first responders in advance of the first shipments. If there was a decision to proceed with the development of a repository at Yucca Mountain, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. See Section M.6 for a discussion of the DOE Section 180(c) policy and procedures.

DOE has several programs available to provide assistance to state, tribal, and local governments in response to radioactive material accidents. The Radiological Assistance Program, for example, provides trained personnel with equipment to evaluate, assess, advise, and assist in the mitigation and monitoring of potential immediate hazards associated with a transportation accident. As part of the program, DOE maintains eight Regional Coordinating Offices across the country that are staffed 24 hours a day, 365 days a year. The staff consists of nuclear engineers, health physicists, industrial hygienists, public affairs specialists, and other personnel who provide field monitoring, sampling, decontamination, communications, and other services, as requested. In addition, DOE's Radiation Emergency Assistance Center/Training Site (REAC/TS) focuses on providing rapid medical attention to people involved in radiation accidents. REAC/TS maintains a 24-hour response center to provide direct support, including deployable equipment and personnel trained and experienced in the treatment of radiation exposure to assist Federal, state, tribal, and local organizations.

DOE would provide information concerning shipments to the state-designated point of contact for advance notification of the shipments. If approved by the Nuclear Regulatory Commission, states and tribes could monitor the shipments by a satellite tracking and communications system. Drivers of trucks and crews of trains transporting radioactive material would carry shipping papers, as required by U.S. Department of Transportation regulations. These papers would identify the cargo as required by regulations in 49 CFR Part 172, Subpart C. In addition, placards that identify the cargo as radioactive would be prominently displayed on transport vehicles, as required by Department of Transportation regulations.

With respect to compensation for losses associated with an accident involving spent nuclear fuel and high-level radioactive waste, the Price-Anderson Act (discussed in Section M.8 of the EIS) establishes a system of financial protection for persons liable for and for persons injured by a nuclear accident or incident. The Price-Anderson Act establishes a system of private insurance and Federal indemnification that generally ensures that up to $9.43 billion is available to compensate for damages suffered by the public, regardless of who causes the damages. Beyond that level, Congress will consider further action it determines is necessary to provide full and prompt compensation to the public. The Price-Anderson Act indemnifies all persons liable for the nuclear damage including state, local, and tribal governments, emergency response workers, health care personnel, victims, and any other citizens or members of the public.

8.10.2 (200)
Comment - 20 comments summarized
Commenters stated that no baseline emergency response capability was established along the potentially affected routes or in affected communities. Because no baseline was established in the affected communities, the impact on community emergency preparedness could not be determined; therefore, the Draft EIS failed to meet National Environmental Policy Act requirements. They stated that a credible evaluation would identify the adequacy or inadequacy of emergency response capacity along routes and allow the state and local authorities to deploy the necessary resources. Commenters stated that emergency response capabilities must be described as part of the affected environment and that emergency services are an essential part of local public services. Other commenters questioned whether the emergency medical facilities, fire departments, and police departments in an affected community would be adequately equipped and trained to handle an emergency situation. Commenters stated that the EIS should identify what emergency response, equipment, facilities (for example, isolation rooms for radioactively contaminated individuals), and trained personnel are available in these communities. One commenter stated that radioactive materials can be shipped safely with no significant risk to any population, including emergency responders, if basic measures are taken, such as identifying the emergency response agency having jurisdiction over a specific route, providing that agency with a copy of the training materials, and providing each agency the opportunity to have personnel attend an instructor-led class.

Response
In evaluating the potential impacts of transportation accidents in the EIS, DOE conservatively assumed that no emergency response would occur and evaluated the full impacts of the accident on the surrounding population. The analysis of impacts of transportation accidents in the EIS (Section J.1.4.2.1) does not take credit for emergency response efforts to reduce exposures to individuals. Therefore, the impacts consider the range of what could happen regardless of the emergency response capabilities of jurisdictions along transportation routes. If responders followed standard emergency response procedures, such as avoiding the downwind smoke of a major fire, exposures would be low. However, because DOE could not predict what type of emergency response would be available, it could not factor any mitigation of impacts as a result of such measures into the EIS analysis.

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions the Department would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for addressing emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using a planning grant and based on availability of funds in annual Program budgets specified by Congress. Additional Federal response capabilities, such as expert services from the Radiological Assistance Program Team, could be activated, as requested by states and tribes. See Section M.6 of the EIS for a discussion of the DOE Section 180(c) policy and procedures.

If there was a decision to proceed with the development of a repository at Yucca Mountain, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At present, DOE intends to purchase services and equipment from Regional Servicing Contractors who would perform waste acceptance and transportation operations. The Department has issued a draft Request for Proposals requiring each Regional Servicing Contractor to prepare a transportation plan that describes the contractor's operational strategy and delineates the steps it would implement to ensure compliance with all regulatory and other DOE requirements. This includes identification of proposed routes and associated routing considerations, coordination and communication with all participating organizations and agencies, including other Regional Servicing Contractors, DOE, state, tribal, and local governments, and interactions with appropriate Federal and state organizations. The route and mode determinations would be interactive. If, during the course of the mode or route determinations, one of the previously determined factors changed, the site-specific mode and route analysis would be reevaluated to ensure consistency. The Regional Servicing Contractor would consult with other Regional Servicing Contractors as appropriate to ensure continuity and consistency of routes and to ensure trained emergency response personnel capability.

After identifying a specific route, the Regional Servicing Contractor would submit the route plan to DOE for approval prior to its submittal to the Nuclear Regulatory Commission in accordance with 10 CFR 73.37 [a][7]. Additional mode and route selection factors are in a U.S. Department of Transportation report, *Identification of Factors for Selecting Modes and Routes for Shipping High-Level Radioactive Waste and Spent Nuclear Fuel* (DIRS 103718-DOT 1998).

For highway shipments, the Regional Servicing Contractor's transport carriers would use "preferred" routes as specified in 49 CFR 397.101[b][1]. Section M.3 of the EIS contains more information about the proposed role of the Regional Servicing Contractor.

DOE believes that the EIS adequately analyzes transportation-related impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site was recommended and approved. See the introduction to Chapter 8 of this Comment-Response Document for more information.

8.10.2 (203)
Comment - 21 comments summarized
Issues Commenters expressed concern about communities or counties in either rural or remote areas located along transportation routes because the necessary equipment, trained personnel, or funding would not be available to respond to an accident involving spent nuclear fuel and high-level radioactive waste. Other commenters noted that

the distance to the nearest hospital could be as much as 145 kilometers (90 miles) in some communities and that because of this the response time could exceed 90 minutes. Another commenter stated that transporting spent nuclear fuel and high-level radioactive waste through rural areas with limited emergency response capabilities would increase the risk associated with transportation incidents and asserted that the risk would be higher because of the lack of response capability and the time delay for personnel to respond. Commenters noted that the closest hospital might not be equipped to handle an emergency involving a nuclear accident. Commenters stated that the Draft EIS assumed that the risk of transporting spent nuclear fuel and high-level radioactive waste through rural areas in Nevada would be no greater than through urban communities. However, the commenter stated that assumption was incorrect because first responders and emergency medical service providers in rural areas would be largely unprepared to handle radiation emergencies. Commenters stated that rural communities would be helpless, at least immediately, in the event of a serious accident.

Response

In response to public comments, DOE has added information (see Appendix M of the EIS) on the proposed operational aspects of spent nuclear fuel and high-level radioactive waste transportation, the safety of transportation casks, emergency response planning, and financial assistance programs (see Section M.5). In addition, based on the revised analyses DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 presents consequences for accidents that could release radioactive materials.

In evaluating the potential impacts of transportation accidents in the EIS, DOE conservatively assumed that no emergency response would occur and evaluated the full impacts of the accident on the environment and the surrounding population. The analysis of impacts of transportation accidents in the EIS (Section J.1.4.2.1) does not take credit for emergency response efforts to reduce exposures to individuals. Therefore, the impact assessment considered the range of what could happen regardless of the emergency response capabilities of jurisdictions along transportation routes. If responders followed standard emergency response procedures, such as avoiding the downwind smoke of a major fire, estimated exposures would be reduced. Standard emergency response actions could reduce or prevent radiological exposures. The transportation analyses do take into account the differing transportation accident rates in rural and urban areas in calculating accident probabilities.

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for addressing emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using a planning grant and based on availability of funds in annual Program budgets specified by Congress. Additional Federal response capabilities, such as expert services from the Radiological Assistance Program Team, could be activated, as requested by states and tribes. The schedule in the proposed policy and procedures for implementation of Section 180(c) of the NWPA (63 *FR* 23753, April 30, 1998) is designed to provide adequate time for training of first responders in advance of the first shipments. If there was a decision to proceed with the development of a repository at Yucca Mountain shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. See Section M.6 of the EIS for a discussion of the DOE Section 180(c) policy and procedures.

If there was an accident involving a shipment of spent nuclear fuel or high-level radioactive waste, the first responders and response time would be the same as for any transportation accident. If a release occurred, and local officials were not prepared to deal with it, immediate assistance could be obtained from the DOE Radiation Emergency Assistance Center/Training Site. Appendix M of the EIS contains additional information that addresses these issues.

8.10.2 (212)

Comment - 49 comments summarized

Commenters stated that their communities would be totally unprepared for the consequences of an accident, sabotage, or terrorism and stated that all Native American tribal, state, and local jurisdictions must be fully prepared for spent nuclear fuel and high-level radioactive waste shipments and should be involved in the development of emergency preparedness plans. Others stated that acceptable emergency response plans should be developed and implemented before the initiation of shipments. Other commenters noted that transportation companies and railways would require emergency plans before any shipment could occur. Commenters wanted to know where radioactively contaminated victims would be taken and noted that many hospitals do not have isolation rooms for this type of situation. Others asked how many hospitals in this country would have the capability of handling such an emergency. Other commenters stated that the Draft EIS did not adequately evaluate the potential demands on affected local government related to public health and safety with respect to activities that could occur, such as identifying evacuation routes within city limits.

Commenters stated that the Draft EIS was inadequate because there was neither analysis of potential activities and cost during all phases of emergency management, nor were data given regarding the development of emergency action plans for any metropolitan area affected by potential transportation of spent nuclear fuel and high-level radioactive waste to the proposed repository. One commenter stated that the Draft EIS did not specifically address emergency preparedness along rail spurs, heavy-haul and legal-weight truck routes, or at prospective intermodal transfer stations. Another commenter stated that the Draft EIS must describe specific responsibilities for providing, managing, and maintaining emergency response capabilities, including identifying responsibility for emergency management and response training, responsibility for mitigating accidents, and responsibility for administering funds for emergency response assistance. One commenter stated that the state agencies that would be responsible for overseeing shipments of radioactive spent nuclear fuel and high-level radioactive waste through their communities would ensure that the appropriate shipping standards would be met. Another commenter stated that DOE should seek to enter into a memorandum of understanding with each corridor state to spell out responsibilities, liability, compensation, response times, cleanup, and other duties connected with emergency situations.

Response

As discussed in Section 6.2.4.2 of the EIS, accidents involving the transportation of spent nuclear fuel or high-level radioactive waste shipments could occur. However, of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. As a consequence, the likelihood that a first responder or other emergency personnel would become contaminated, even in very severe accidents, would be remote. The only expected radiological exposure of first responders would be from gamma radiation and neutrons penetrating the shielding of the casks. These radiation levels would be are low, easily measured, and controlled to meet the limits of Nuclear Regulatory Commission regulations. Additional information on cask safety and testing is provided in Section M.4 of the EIS. Additional information on emergency response following an accident is provided in Section M.5.

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for addressing emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using a planning grant and based on availability of funds in annual Program budgets specified by Congress. Additional Federal response capabilities, such as expert services from the Radiological Assistance Program Team, could be activated, as requested by states and tribes. The schedule in the proposed policy and procedures for implementation of Section 180(c) of the NWPA (63 *FR* 23753, April 30, 1998) is designed to provide adequate time for training of first responders in advance of the first shipments. If there was a decision to proceed with the development of a repository at Yucca Mountain, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. Additional information on Section 180(c) is provided in Section M.6 of the EIS.

Although DOE and its contractors would develop their own emergency response plans, the preparation and implementation of emergency response and evacuation and contingency plans are a state or tribal responsibility for lands within their jurisdictions. Section 180(c) funding would be provided to eligible jurisdictions for the preparation of these plans, as well as emergency response and safe routine transportation planning and coordination activities.

In the unlikely event someone was contaminated as the result of an accident involving shipments to a repository, there are several means to deal with such incidents. Major hospitals are equipped to deal with radioactive contamination because they routinely handle medical radioisotopes. In cases where there is no training or procedures to handle a contaminated individual, assistance can be obtained from the DOE Radiation Emergency Assistance Center/Training Site (REAC/TS). REAC/TS is on call 24 hours a day to provide direct or consultative help when people have been involved in a radiation accident.

As with any transportation accident, state and tribal governments have primary responsibility to respond and to protect the public health and safety in their jurisdictions in accidents involving radioactive materials. This includes providing and managing emergency response capabilities. Although DOE would provide the funding for Section 180(c) activities, each state and tribe would determine how it would administer that funding.

At present, DOE intends to purchase services and equipment from Regional Servicing Contractors, who would perform waste acceptance and transportation operations. Each Regional Servicing Contractor would be required to provide detailed written procedures for how it would respond to an incident and arrange for repair/replacement of equipment or recovery, as appropriate. In accordance with ANSI Standard N14-27 (DIRS 156289-ANSI 1987), the carrier is expected to provide appropriate resources for addressing the consequences of an accident, isolating and cleaning up contamination, and maintaining working contact with the responsible governmental authority until the latter has declared the incident to be satisfactorily resolved and closed. Section M.3 of the EIS contains more detail on the proposed role of the Regional Servicing Contractors.

Existing Federal and state regulations and DOE documents delineate responsibility for duties connected with emergency situations. Section M.5 of the EIS contains additional information on emergency response.

DOE believes that the EIS adequately analyzes transportation-related impacts that could result from the Proposed Action. DOE also believes that the EIS provides the information necessary to make decisions on the basic approaches to transporting spent nuclear fuel and high-level radioactive waste (either rail or truck shipments), as well as the choice among alternative rail corridors in Nevada, if the site was recommended and approved. See the introduction to Chapter 8 of this Comment-Response Document for more information.

8.10.2 (218)
<u>Comment</u> - 7 comments summarized
Commenters expressed specific concerns regarding what equipment would be available to first responders for use in the event of an incident. One commenter asked if state highway patrolmen carried monitoring devices for performing radiation checks in the event of an accident, because a radiation survey would need to be performed immediately. Others stated that emergency responders should be provided with appropriate equipment such as suitable detection devices, heavy shielding for construction equipment, adequately shielded ambulances and instrumentation to permit monitoring in the event of an accident. Others stated that DOE should provide corridor jurisdictions with in-vehicle radio repeaters, binoculars, cellular telephones and other equipment. Another commenter stated that each jurisdiction along affected transportation routes should be provided with two new detection instruments and ongoing calibration services in conjunction with training. Other commenters recommended that the Federal Government encourage the development of and help fund sophisticated state emergency management communication centers in transportation corridors to enhance emergency preparedness and response along potential routes. Commenters stated that DOE should distribute to local public safety and emergency response agencies surplus equipment for use in the event of an emergency.

<u>Response</u>
In response to public comments, in Section 6.2.4.2.1 of the EIS, DOE provides estimates of radiological impacts to emergency personnel who would respond to transportation accidents in which the severity and consequences would be the maximum reasonably foreseeable. In developing the estimates, DOE assumed a first responder would be trained and would follow guidance contained in the U.S. Department of Transportation's *2000 Emergency Response Guidebook* (DIRS 155776-DOT 2000). For example, on arriving at the scene of an accident, a trained responder

determines the presence and identification of hazardous materials that might be involved, cordons off the area to protect members of the public, rescues injured persons, initiates protective actions such as moving upwind and at a distance from the accident scene, and calls for assistance. DOE estimated the maximum dose to a first responder to a rail accident would be 830 millirem from external radiation. The analyzed accident would be one in which forces or heat would be great enough to cause a loss of a portion of a cask's lead shield. The resulting dose to the first responder, which would be about 40 percent of the limit for annual dose to radiation workers at DOE facilities, would lead to an increase of about 0.03 percent in the individual's lifetime risk of a latent fatal cancer. First responders to very severe accidents involving truck shipments would receive much lower doses.

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. In 1998, DOE published a Notice of Revised Proposed Policy and Procedures in the *Federal Register* (63 *FR* 23753; April 30, 1998) that sets forth the proposed mechanisms for implementing the requirements of Section 180(c). As part of this program, about 4 years prior to the first shipments eligible jurisdictions would receive a one-time planning grant to assess their training needs. In accordance with the Draft Section 180(c) Policy and Procedures, jurisdictions may use a certain percentage of their financial assistance to purchase appropriate (for example, training-related) equipment that can be used for training, inspections, and for emergency response. This could include the detection equipment mentioned in the comment. See Section M.6 of the EIS for a detailed discussion of the Section 180(c) provisions and emergency response programs. If requested, DOE and other Federal agencies could assist in responding to an incident.

DOE has several programs available to provide assistance to state, tribal, and local governments in response to radioactive material accidents. The Radiological Assistance Program, for example, provides trained personnel with equipment to evaluate, assess, advise, and assist in the mitigation and monitoring of potential immediate hazards associated with a transportation accident. As part of the program, DOE maintains eight Regional Coordinating Offices across the country that are staffed 24 hours a day, 365 days a year. The staff consists of nuclear engineers, health physicists, industrial hygienists, public affairs specialists, and other personnel who provide field monitoring, sampling, decontamination, communications, and other services, as requested. In addition, DOE's Radiation Emergency Assistance Center/Training Site (REAC/TS) focused on providing rapid medical attention to people involved in radiation accidents. REAC/TS maintains a 24-hour response center to provide direct support, including deployable equipment and personnel trained and experienced in the treatment of radiation exposure to assist Federal, state, tribal, and local organizations.

With regard to communications, DOE intends to use a satellite tracking system to monitor shipments to Yucca Mountain. If approved by the Nuclear Regulatory Commission under regulations contained in 10 CFR Part 73, DOE would provide training on, and equipment for, states and tribes to track and communicate about shipments under the NWPA. Additional information on satellite tracking of shipments is in Section M.3.2.1.5 of the EIS.

8.10.2 (579)
Comment - EIS000066 / 0003
In the event of an accident which results in the release of spent nuclear fuel and radioactive waste, an extensive water sampling program would be required to ensure that there are no adverse health effects. This sampling, coupled with spill control and contamination prevention measures, could result in the closing of water and wastewater treatment plants which would, thereby, create water shortages and sanitation problems. Consideration should be given to plans for providing emergency supplies of potable water and emergency wastewater treatment.

Using a list of all populated areas through which a Kentucky route passes, an emergency notification guide needs to be prepared. The guide needs to list for each populated segment a 24-hour telephone number for the local water and wastewater authorities. The drivers of the highway vehicles or the crews of the trains with the railroad cars containing the spent nuclear fuel and radioactive waste need to have instructions to notify those local authorities so that appropriate action could be taken to protect:

- the intakes and facilities of water treatment plants,
- wastewater treatment plants by having the spilled material held in interceptors or routed to bypass the plant, and
- the operators of water and wastewater plants.

Transporters need to comply with the federal Hazardous Materials Transportation Safety Act (49 U.S.C. Section 1801 *et seq.*) requirements including contingencies for response contractors, phone notifications, and special requirements for monitoring Cleaning.

Response
It is extremely unlikely an accident involving shipments of spent nuclear fuel or high-level radioactive waste would result in the release of spent nuclear fuel or radioactive waste. The Nuclear Regulatory Commission regulates the design, construction, use, and maintenance of shipping containers or casks for shipments of spent nuclear and high-level radioactive waste. The casks must be designed to withstand a series of impact, puncture, and fire environments, thereby providing reasonable assurance that packages would withstand serious transportation accidents. See Section M.4 of the EIS for additional information on cask safety and testing.

States and tribes through whose jurisdictions shipments would be made would receive prior notification of the shipments in accordance with Nuclear Regulatory Commission requirements. The notification process is discussed in Section M.3.2.2.1 of the EIS. The contractor providing transportation services to DOE would be required to have an Emergency Response Plan that provided for appropriate notifications to Federal agencies and state, tribal, and local units of government in the event of an emergency. Continuous real-time tracking of all shipments to the repository would provide the location of any incident. However, if an accident with release of radioactive waste was to occur, the state or tribe could request assistance from Federal agencies. DOE, the Environmental Protection Agency, and the Department of Agriculture would monitor water and wastewater to determine contamination and appropriate treatment in accordance with the Federal Radiological Emergency Response Plan. These agencies, as well as the Federal Emergency Management Agency and the Department of Health and Human Services, would help to ensure the distribution of potable water supplies if needed. Section M.6 describes the assistance available in greater detail.

Transporters would be in compliance with the U.S. Department of Transportation's Hazardous Materials Transportation Safety regulations. These regulations implement the provisions of the Hazardous Materials Transportation Safety Act.

8.10.2 (680)
Comment - EIS000205 / 0005
Roughly 50,000 truck shipments will ultimately travel through 43 states past millions of people over the lifetime of the project. Accidents will happen, and we cannot be sure that communities will be prepared to respond when they do. The DEIS does not sufficiently discuss the proposed shipping routes or the training and equipment necessary for emergency response personnel in communities along the route. This information is an essential part of determining the safety of the shipments.

Response
As discussed in Section J.1.2.2 of the EIS, DOE has not yet determined the specific modes or routes it would use to ship spent nuclear fuel and high-level radioactive waste to the proposed repository. During the long period before shipments could begin, many factors affecting route designation could change. However, DOE used current U.S. Department of Transportation regulations governing highway shipments (49 CFR 397.101) and historic rail industry practices to select existing highway and rail routes for the analyses presented in the EIS. Additional information on procedures and protocols on how routes would be eventually selected is provided in Section M.3.2.1.2. Section J.4 presents state maps showing the routes used in the analysis.

The training and equipment required for emergency response for shipments of spent nuclear fuel and high-level radioactive waste would be determined by the state, tribal, and local governments through whose jurisdictions shipments would pass. DOE has proposed a one-time only planning grant to every eligible state and tribe to aid in this determination. A discussion of funding and technical assistance for the training and associated equipment necessary for emergency response personnel in communities along shipping routes is provided in DOE's Draft Proposed Policy and Procedures for implementing the requirements of Section 180(c) of the NWPA [see Section M.6 of the EIS for additional information on emergency response responsibilities and capabilities and Section M.6 for additional information on implementation of Section 180(c)].

8.10.2 (999)
Comment - EIS000235 / 0006
The Draft EIS is silent on the need for local emergency medical capabilities. The extent to which Section 180(c) and other DOE-funded enhancements to local emergency response capabilities might reduce risk below even existing levels should be addressed within the Final EIS.

Response
As discussed in Section J.1.4.2 of the EIS, in an effort to consider the associated range of potential impacts from accidents, the analyses in the EIS did not take credit for or assume emergency response interdiction, dose mitigation, or evacuation to reduce accident consequences. Nonetheless, impacts of accidents are estimated to be small for transporting spent nuclear fuel and high-level radioactive waste either using legal-weight trucks or rail transportation. Thus, although it could be possible to reduce consequences of the most severe accidents, reductions in risk that could be achieved through enhancements in local emergency response capabilities would be small.

Under Section 180(c) of the NWPA, eligible states and tribes will be provided funds to determine their emergency response capabilities and training needs. Section M.5 of the EIS provides additional information on the implementation of Section 180(c).

8.10.2 (1325)
Comment - EIS000991 / 0003
The IAFC [International Association of Fire Chiefs] is primarily concerned with the safety of the actual transport of the nuclear waste materials. In the event of a transportation accident, a local fire department will most often be the first responder. Thus our interest in the rules and regulations governing the transportation of nuclear waste materials. Prior to any shipment we believe the following rules, regulations, and protocols must be in place:

- Require cask designs able to withstand severe accident scenarios with substantial built-in safety factors. A safe container will assure that no material will leak from a cask involved in a large catastrophic accident. This will protect the responders, citizens, and the environment from danger and contamination.

- Require proper marking, labeling, placarding, shipping papers and emergency response information as regulated by U.S. Department of Transportation for rail and highway shipments be in place.

- Require the filing of written route plans to include origin/destination of the shipment, routes, planned stops, estimated arrival, and emergency telephone numbers in each state through which the shipment will traverse.

- Require carriers to use preferred routes for highway shipments - interstate highways, bypasses and beltways. States may propose alternate routes to the interstate highway system. However, fire and emergency response agencies in the potentially affected states and localities must be consulted in designation of alternate routes.

- Require that shippers notify the governor seven days in advance of the material being transported through the state.

- Recommend that legislation and regulation require governors and their emergency managers to notify the response forces in each jurisdiction through which shipment will pass. It is critical for local planning purposes that this notification be made.

- Require a tail escort for each shipment. This escort needs to be knowledgeable of radiation, have appropriate equipment and instruments, be uniformed, be knowledgeable of the Incident Command System and be ready to provide intelligence information to the Incident Commander about the condition associated with the radioactive materials involved. After shipments become a routine matter, consideration may be given eliminating the escort.

Response
DOE agrees with the International Association of Fire Chiefs that a primary concern is the safety of the transport of spent nuclear fuel and high-level radioactive waste. Most of the recommendations in the comment are incorporated

in the regulations that DOE and its contractors would observe strictly, and are reflected in the transportation protocols included in the discussion of processes and protocols included in the draft Request for Proposals, *Acquisition of Waste Acceptance and Transportation Services for the Office of Civilian Radioactive Waste Management* (DIRS 153487-DOE 1998), summarized in Section M.3.1 of the EIS. A response to each recommendation follows.

Casks would be designed to meet Nuclear Regulatory Commission regulations in 10 CFR Part 71. Studies have shown that casks would survive severe real-world accidents.

All U.S. Department of Transportation regulations for marking, labeling, placarding, shipping papers, and emergency response information would be rigorously followed.

Route plans would be prepared as required by the Nuclear Regulatory Commission regulations in 10 CFR 73.37. In addition to the information recommended by the commenter, the route plans would include the location of safe havens.

Carriers would use preferred routes for highway shipments, as required by Federal regulations at 49 CFR Part 397, Subpart D.

The governor or the governor's designee would be notified as required by Nuclear Regulatory Commission regulations at 10 CFR 73.37(f). Notification of local response forces would be provided in accordance with individual state procedures. However, 10 CFR 73.37(g) requires any individual, whether or not a licensee of the Commission, to protect schedule information against unauthorized disclosure as specified in 10 CFR 73.21. In addition, the regulations require the shipper to provide that arrangements have been made with local law enforcement agencies along the routes of road and rail shipments, and at U.S. ports where vessels carrying spent nuclear fuel shipments are docked, for their response to an emergency or a call for assistance.

Training requirements for shipment escorts are specified in Appendix D of 10 CFR Part 73.

8.10.2 (1745)
Comment - EIS000366 / 0001
I want to talk about emergency response to mobile Chernobyl, if you would. When and where there is a transportation accident – it's a foregone conclusion by the general public -- some questions arise. (1) What agency will provide the first response -- federal, state, or local agency? (2) What training will have been provided to the responders and by whom? (3) Who will bear the overall financial responsibility for such training and equipment necessary for local containment? And, lastly, who will bear the costs beyond the emergency response, such as regional effects like the river contamination that happened at Dunsmuir on the Sacramento River and contaminated Shasta Lake a few years back?

Response
As discussed in Section M.5.1 of the EIS, states and Native American tribes are primarily responsible for the health and safety of their citizens. Although the transporting personnel would be at the scene, state, local, or tribal emergency response personnel would be the first public safety officials to respond to hazardous materials accidents and would assume incident management on arrival (Section M.5.2 contains more information). The state, local, or tribal government could request assistance from Federal agencies under the Federal Radiological Emergency Response Plan. Section M.6 contains more information on available assistance.

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for determining the need for and training of public safety officials of appropriate units of local government and tribes through whose jurisdictions it would ship spent nuclear fuel and high-level radioactive waste. This training would cover procedures for dealing with incident-free transportation and emergency response situations. It would be up to state, local, and tribal authorities to determine who would receive training and what equipment would be required. DOE would provide funds for training and the associated purchase of equipment for safe routine transportation and emergency response. Costs beyond emergency response would be borne by the transportation contractor's insurance and by coverage under the Price-Anderson Act. The Price-Anderson Act provides for indemnification of liability up to $9.43 billion to cover claims that might arise from an accident in which radioactive materials were released or one in which an authorized precautionary evacuation was made (see Section M.8 of the EIS for a more complete discussion of the Price-Anderson Act).

8.10.2 (2273)
Comment - EIS000669 / 0002
The residents of Lincoln County and the City of Caliente are already facing risks of hazardous and radiological materials.

Daily, several hundred box cars and tankers pass through Caliente on rail with chlorine, propane, and other pressurized toxic chemicals which, if the tanker is ruptured, escape into the environment, especially chlorine would be virtually instantaneously fatal for virtually the whole valley here.

Approximately 1,000 box cars of explosives annually travel through this community. Thousands of tankers of toxic non-pressurized chemicals go through here in 10,000 gallon units in the tankers. Currently we have scheduled shipments of low-level radiological waste passing through this community, and the frequency which will accelerate as the bad weather closes off the northern routes and they have to further drive down the highways in the southern routes. This is one of the areas that they drive through to get to the NTS [Nevada Test Site].

Current levels of capabilities of handling chemicals or radiological contaminations -- let's pretend that one of us was chemically contaminated with a fuel or some other chemicals.

They take us out to the gutter outside the hospital, strip us down as far as necessary, and that may include everything. Wash us off with a garden hose until the chemical contamination was released and then they'd be able to put us on a gurney and take us into the facility since we'd be simply a patient.

As far as I'm concerned, that's unacceptable.

Response
The potential for accidents involving transportation of spent nuclear fuel and high-level radioactive waste to Yucca Mountain is discussed in Chapter 6 and Appendix J of the EIS. The potential for a release of radioactive material and contamination of individuals is very small and is not expected to occur during the 24-year period of transportation. Of the thousands of shipments completed over the last 30 years, none has resulted in an identifiable injury through release of radioactive material. The Nuclear Regulatory Commission regulates the design, construction, use and maintenance of shipping containers or casks for shipments of spent nuclear fuel and high-level radioactive waste. The casks must be designed to withstand a series of impact, puncture, and fire environments, thereby providing reasonable assurance that packages would withstand serious transportation accidents. Additional information on cask safety and testing is provided in Section M.4.1.

In addition, emergency responders would be prepared in the event of an accident. Section 180(c) of the NWPA requires DOE to provide financial and technical assistance to states and tribes to train emergency responders. DOE is committed to providing funding to the State of Nevada – which would in turn provide funding to potentially affected cities and counties - for emergency planning and emergency response training in event of accidents involving Yucca Mountain-bound material. If additional resources were required to handle an accident, the state or tribe could call upon Federal agencies for assistance. For example, in providing treatment to a person who might have become contaminated, assistance could be requested from the DOE Radiation Emergency Assistance Center/ Training Site (REAC/TS). REAC/TS is on call 24 hours a day to provide direct or consultative help with cases where people have been involved in a radiation accident. Additional information of emergency responsibilities and capabilities is provided in Section M.5.1 of the EIS. Section M.6 provides additional information on the provisions of Section 180(c).

8.10.2 (2350)
Comment - EIS000707 / 0001
What provisions have been made to equip the medical community, not only in Nevada, but the other 43 states along the transportation route, to handle a radioactive hazard waste accident?

- Will the DOE train the appropriate medical staff to respond to such an emergency?
- Who will incur the cost of such training?
- Who will be responsible for the cost of medical treatment of any victims?
- How will these people who are exposed to nuclear waste be compensated for time lost from work?
- In the event of a terminal illness, as a result of the nuclear accident, who would be responsible for [retribution] to the families?

Response
Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training public safety officials of units of local government and Native American tribes through whose jurisdictions spent nuclear fuel or high-level radioactive waste would be transported on its way to a repository. This technical assistance and training covers procedures required for safe routine transportation of these materials, as well as for dealing with emergency response situations. The training could apply to state, local, or tribal emergency personnel including medical emergency responders.

States and tribes are primarily responsible for the health and safety of their citizens. However, in the event of an accident that released radioactive materials, a jurisdiction could request assistance from Federal agencies under the Federal Radiological Emergency Response Plan and Federal Radiological Monitoring and Assessment Plan. DOE has several assets that could assist, including the Radiation Emergency Assistance Center/Training Site (REAC/TS). REAC/TS is on call 24 hours a day to provide direct or consultative help with cases where people have been involved in a radiation accident.

With regard to who would pay for costs such as medical treatment, compensation for time lost from work, and compensation to families for terminal illnesses resulting from an accident, the U.S. Department of Transportation requires transporters of hazardous materials to carry insurance covering accidents. Costs associated with accidents would be borne by the transportation contractor's insurance and by coverage under the Price-Anderson Act. The Price-Anderson Act provides for indemnification of liability up to $9.43 billion to cover claims that might arise from an accident in which radioactive materials were released or one in which an authorized precautionary evacuation was made (see Section M.8 of the EIS for a more complete discussion of the Price-Anderson Act).

8.10.2 (2740)
Comment - EIS000641 / 0004
The next thing in health and safety, I guess it's been rehashed, but I would like to say it anyway, monitoring. Whose responsibility is it to monitor these things? The air quality, the ground quality, the water quality, this sort of thing. Who is to participate in this? Is it to be the federal government, the regulatory agencies, county, and where does the money come from?

You don't believe the county is tight, ask Pete. And he won't spend any money, I guarantee that.

Response
As discussed in Section M.5.1 of the EIS, states and tribes are primarily responsible for the health and safety of their citizens. However, Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for determining the need for and training of public safety officials of appropriate units of local government and tribes through whose jurisdictions it would ship spent nuclear fuel and high-level radioactive waste. This training would cover procedures for dealing with incident-free transportation and emergency response situations. It would be up to state, local, and tribal authorities to determine who would receive training and what equipment would be required. DOE would provide funds for training and the associated purchase of equipment for safe routine transportation and emergency response.

In addition, several Federal agencies have training and available capabilities should states or tribes request them. If an accident with release of radioactive waste occurred, affected states and tribes could request assistance from DOE, Environmental Protection Agency, Department of Agriculture, Department of Health and Human Services, and the

Federal Emergency Management Agency. These agencies, in cooperation with states, tribes, and each other, would monitor and assess radioactive materials in air, ground, agricultural products, and water in accordance with the Federal Radiological Emergency Response Plan and the Federal Radiological Monitoring and Assessment Plan. The costs for such services would be borne by the Federal agencies.

Costs associated with accidents would be borne by the transportation contractor's insurance and by coverage under the Price-Anderson Act. The Price-Anderson Act provides for indemnification of liability up to $9.43 billion to cover claims that might arise from an accident in which radioactive materials were released or one in which an authorized precautionary evacuation was made (see Section M.8 of the EIS for a more complete discussion of the Price-Anderson Act).

Section M.3.2 of the EIS describes the operating protocols, including monitoring of the conduct of transportation activities, that DOE's Regional Servicing Contractors would carry out. In addition, states could require and perform monitoring of transportation activities as a part of their permitting process.

8.10.2 (3213)
Comment - EIS001120 / 0003
Currently our local area, as well as other rural regions, is grossly understaffed, under budgeted, and unprepared to respond to current accidents involving the release of hazardous waste. DOE promises to provide local entities with assistance to prepare for the eventuality of a nuclear waste release occurring from an incident involving one of the 49,000 truck shipments and/or 13,000 rail shipments.

A minimum of 1/3 of our state is covered by mountains where distances between towns is not measured by miles, but by how many hours it takes to get from one place to another. With waste being transported from 72 commercial sites and five DOE facilities, how could DOE respond (or any other regional response team) in an adequate time given the restraints of geography, the enormous size of region the waste is being transported across and the sheer volume of waste being shipped over the next two decades?

Each community cannot afford its own emergency response team to prepare for the possibility of a nuclear clean up. The time that lapses between notification and response could mean the difference between total and partial ruination of a local habitat, area, region or watershed. What possible solution could DOE design to eliminate concerns of response time? Transportation of this waste is an endangerment to all living things.

Many of our major highways run parallel to our major drainages and waterways. Containment of this type of waste would be impossible once it has reached one of those watersheds. The Colorado River serves as basin providing water to a minimum of five states and Mexico. No amount or duration of response and resulting attempts to clean up a spill will return the environment to what it once was, not in our lifetime, not in our children's lifetime. Your proposal is endangering not only the livelihood of local communities and their inhabitants, but also a threat to the very ecosystem that sustains all life here on earth.

Response
If there was an accident involving shipments of spent nuclear fuel or high-level radioactive waste to a repository, the response time would be the same as it would for any transportation accident. Funds provided under Section 180(c) of the NWPA would help emergency responders prepare for any accidents involving these shipments. If additional resources, over and above what are available locally, were needed the state or tribe could request them from various Federal agencies.

It is extremely unlikely an accident involving shipments to the repository would result in the release of spent nuclear fuel or radioactive waste. The Nuclear Regulatory Commission regulates the design, construction, use, and maintenance of shipping containers or casks for shipments of spent nuclear and high-level radioactive waste. The casks must be designed to withstand a series of impact, puncture, and fire environments, thereby providing reasonable assurance that packages would withstand serious transportation accidents. As discussed in Appendixes J and M of the EIS (see Section M.4.1), most real-world accidents that have been postulated, including truck crashes into bridges, train derailments followed by fires, derailments followed by immersion of a cask into a river, and similar extreme accident conditions, would not be likely to result in release of radioactive materials from the shipping casks. A study conducted for the Nuclear Regulatory Commission (DIRS 152476-Sprung et al. 2000) estimated that less than 0.01 percent of accidents would result in a release of radioactive material from a shipping cask that met the requirements of regulations in 10 CFR Part 71. These regulations ensure that the casks would be extremely robust. Chances of contaminating major drainages and waterways following a rail or truck accident would be extremely unlikely. Section M.4.1 contains additional information on cask safety and testing.

8.10.2 (4242)
Comment - EIS001160 / 0057
Transportation routes identified by the State of Nevada and evaluated in Appendix J go through White Pine County's most populated area and county seat, Ely. Here, ninety percent of the County's population exists within a 15 mile radius of the Ely city center and proposed transportation route. The main highway to the southwest goes five miles uphill along a winding, mountainous two lane route to Murry Summit (which is 7,300 feet high) passing within yards of the main water supply for the city. For six to eight months of many years, U.S. Hwy 6 is often icy and snow covered. It is not unusual for emergency first responders to take an hour to reach an accident site on any major highway because of the distances involved. If any highway is closed there are limited alternatives for routing traffic. The resulting economic impact could be devastating. Fog and snow can and has closed the only airport. The only hospital has limited capabilities. Volunteers are relied upon for fire and EMS [emergency medical support] resources. The DEIS does not adequately address these issues. The FEIS should include an assessment of unique circumstances impacting upon effective emergency first response in White Pine County.

Studies need to be undertaken to provide accurate assessments for those who are making transportation decisions concerning this area. Resources are limited and often inadequate without adding another demand on them. Money needs to be provided to increase the capabilities to specified levels and it must be provided to maintain those levels. Communications systems, support facilities, shelters, training and equipment, as well as qualified personnel are really inadequate to handle any serious accident. If a decision is made to route radioactive wastes through the county the costs associated with providing proper health and safety response agencies must be considered. There are some problems which money cannot solve. The DEIS then, must consider a combination of mitigation and compensation if risk management through effective emergency first response is to occur.

Before any decision is made concerning routing shipments through White Pine County a thorough assessment needs to be conducted and the results conveyed to those who will make the decision. This information, if not contained within the FEIS, should be a component in a subsequent supplement to the FEIS.

Carrier and shipper responsibilities and emergency response procedures require that response entities have a response team on call 24 hours a day. Will DOE and its carriers require/request 24 hour response capabilities of local first responders? The regulations at 10 CFR, Part 73, govern special safeguards. These regulations specify that transport vehicles carry personal communications devices. The DEIS should evaluate the extent to which such devices will function in rural Nevada and the extent to which rural emergency first responders have compatible communications capabilities. Of particular concern is the extent of communication "dead spots" located in areas of high accident hazard (i.e. canyons). Measures to mitigate communication deficiencies should be identified and evaluated within the DEIS (i.e. repeaters). The DEIS should recognize that communications would be helpful to situation assessment. Keeping in mind that there is a lot of highway area and distance to travel, emergency first responders would benefit from knowing what was occurring at the incident before these Emergency Response Teams from White Pine County arrive. The FEIS should consider what enhancements in local communications capabilities would be required to facilitate such communication. The FEIS needs to include more investigation, study and planning if transportation is to be safe for both the environment and the communities within White Pine County.

Response
As discussed in Section J.1.2.2 of the EIS, DOE has not yet determined the specific modes or routes it would use to ship spent nuclear fuel and high-level radioactive waste to the proposed repository. During the period before shipments could begin, many factors affecting route designation could change. As discussed in Section J.1.2.2, DOE evaluated potential alternate highway routes the State of Nevada could designate to assess the sensitivity of impacts that could occur in the State and nationally. Additional information on procedures and protocols on how routes would be eventually selected is provided in Section M.3.2.

Under current DOE planning, operation of a transportation system would be conducted by Regional Servicing Contractors under the procedures and protocols outlined in the request for proposals summarized in Section M.3.2 of the EIS. These protocols implement the multitude of requirements promulgated in U.S. Department of Transportation and Nuclear Regulatory Commission regulations, including security, safety, and communications.

As outlined in the DOE Draft Policy and Procedures for implementing Section 180(c) of the NWPA, eligible state and Native American jurisdictions would receive a one-time planning grant of $150,000 to conduct an assessment of their needs for safe routine transportation and emergency response. Additional technical assistance and funds for training would be provided by the Department for local emergency responders. Additional information on the provisions of Section 180(c) Policy and Procedures is provided in Section M.6 of the EIS.

States and tribes are primarily responsible for the health and safety of their citizens and would set the requirements for availability of first responders in their jurisdictions. For the purposes of communication, DOE intends to use satellite tracking communications and to make this equipment and training on the equipment available to all eligible jurisdictions after receiving Nuclear Regulatory Commission approval that the use of the satellite tracking technology does not violate Commission safeguards s and security regulations. Satellite tracking has been used successfully throughout the country regardless of the length of highway area and the far distances.

8.10.2 (4790)
Comment - EIS001475 / 0007
So this transportation, this is what is going to happen. There's no emergency response, either. On our reservation we only have one fire hydrant for our emergency response.

DOE won't admit to accidents. They're not going to let the public know who get affected. And these people, where they have these skills, you know, they're not going to drive a mile. That's what we say, how safe it is. How about the future generations, generations down the road? Will they be affected? I'm sure they will.

Response
Based on the analysis presented in the EIS, DOE believes the impacts from shipments of spent nuclear fuel and high-level radioactive waste to the proposed repository would be low. The impacts from incident-free transportation as well as from accidents are discussed in Appendix J of the EIS. It should be noted that of the thousands of shipments of these materials over the last 30 years, none has resulted in an identifiable injury through the release of radioactive material. As discussed in Appendixes J and M (see Section 4.2), most real-world accidents that have been postulated, including truck crashes into bridges, train derailments followed by fires, derailments followed by immersion of a cask into a river, and similar extreme accident conditions, would not likely result in release of radioactive materials from the shipping casks. A study conducted for the U.S. Nuclear Regulatory Commission (DIRS 152476-Sprung et al. 2000) estimated that less than 0.01 percent of accidents would result in a release of radioactive material from a shipping cask that meets the requirements of regulations in 10 CFR Part 71. These regulations ensure that the casks would be extremely robust.

Under Section 180(c) of the NWPA, DOE is required to provide technical assistance and funds to states for training public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions it would make shipments of spent nuclear fuel and high-level radioactive waste to a repository. Additional information on Section 180(c) is provided in Section M.6 of the EIS.

DOE anticipates providing financial and technical assistance to eligible jurisdictions at least 5 years before the commencement of shipments to a repository.

8.10.2 (5067)
Comment - EIS001441 / 0055
Transportation routes identified by the State of Nevada and evaluated in Appendix J go through White Pine County's most populated area and county seat, Ely. Here, ninety percent of the County's population exists within a 15 mile radius of the Ely city center and proposed transportation route. The main highway to the southwest goes five miles uphill along a winding, mountainous two lane route to Murry Summit (which is 7,300 feet high) passing within yards of the main water supply for the city. For six to eight months of many years, U.S. Hwy 6 is often icy and snow covered. It is not unusual for emergency first responders to take an hour to reach an accident site on any

major highway because of the distances involved. If any highway is closed there are limited alternatives for routing traffic. The resulting economic impact could be devastating. Fog and snow can and has closed the only airport. The only hospital has limited capabilities. Volunteers are relied upon for fire and EMS [emergency medical support] resources. The DEIS does not adequately address these issues. The FEIS should include an assessment of unique circumstances impacting upon effective emergency first response in White Pine County. The Ely Shoshone Tribe is not adequately prepared for any emergency response situations. The Ely Shoshone Tribe currently relies on the White Pine County emergency response team.

Studies need to be undertaken to provide accurate assessment for those who are making transportation decision concerning this area. Resources are limited and often inadequate without adding another demand on them. Money needs to be provided to increase the capabilities to specified levels and it must be provided to maintain those levels. Communications systems, support facilities, shelters, training and equipment, as well as qualified personnel are really inadequate to handle any serious accident. If a decision is made to route radioactive wastes through the county the costs associated with providing proper health and safety response agencies must be considered. There are problems which money cannot solve. The DEIS then, must consider a combination of mitigation and compensation if risk management through effective emergency first response is to occur.

Before any decision is made concerning routing shipments through the Ely Shoshone Reservation and White Pine County a thorough assessment needs to be conducted and the results conveyed to those who will make the decision. This information, if not contained within the FEIS, should be a component in a subsequent supplement to the FEIS.

Carrier and shipper responsibilities and emergency response procedures require that response entities have a response team on call 24 hours a day. Will DOE and its carriers require/request 24-hour response capabilities of local first responders? The regulations at 10 CFR, Part 73, govern special safeguards. These regulations specify that transport vehicles carry personal communications devices. The DEIS should evaluate the extent to which such devices will function in rural Nevada and the extent to which rural emergency first responders have compatible communications capabilities. Communications would be helpful to situation assessment. Keeping in mind that there is a lot of highway area and distance to travel emergency first responders would benefit from knowing what was occurring at the incident before what Emergency Response Teams from White Pine County arrive. The FEIS should consider what enhancements in local communications capabilities would be required to facilitate such communication. The FEIS needs to include more investigation, study and planning if transportation is to be safe for both the environment and the communities within White Pine County.

Response
As discussed in Section J.1.2.2 of the EIS, DOE has not yet determined the specific modes or routes it would use to ship spent nuclear fuel and high-level radioactive waste to the proposed repository. During the period before shipments could begin, many factors affecting route designation could change. . As discussed in Section J.1.2.2, DOE evaluated potential alternate highway routes the State of Nevada could designate to assess the sensitivity of impacts that could occur in the State and nationally. At the time of selection, the Department would initiate consultations with responsible State, tribal, and local authorities to assess potential impacts and appropriate mitigative measures. Additional information on procedures and protocols on how routes would be eventually selected is provided in Section M.3.2.

Under current DOE planning, operation of a transportation system would be conducted by Regional Servicing Contractors under the procedures and protocols outlined in the request for proposals summarized in Section M.3.2 of the EIS. These protocols implement the multitude of requirements promulgated in U.S. Department of Transportation and Nuclear Regulatory Commission regulations, including security, safety, and communications, and require consultations with responsible agencies.

As outlined in the Draft Proposed Policy and Procedures for implementing Section 180(c) of the NWPA, eligible state and tribal jurisdictions (those through which NWPA shipments would pass) would receive a planning grant of $150,000 to conduct an assessment of their needs for safe routine transportation and emergency response. Additional technical assistance and training would be provided by the Department for local emergency responders. Additional information on the provisions of Section 180(c) Policy and Procedures is provided in Section M.6 of the EIS.

States and tribes are primarily responsible for the health and safety of their citizens and would set the requirements for availability of first responders in their jurisdictions. For the purposes of communication, DOE intends to use satellite tracking communications and to make this equipment and training on the equipment available to all eligible jurisdictions after receiving Nuclear Regulatory Commission approval that the use of the satellite tracking technology does not violate the Commission's safeguards and security regulations. Satellite tracking has been used successfully throughout the country regardless of the length of highway area and the far distances.

8.10.2 (5276)
Comment - EIS000968 / 0001
The transportation of high-level nuclear waste through our County is of grave concern, and requires major planning to prepare for, respond to, and safely mitigate any accidents that may occur. Our review of the Draft Environmental Impact Statement (DEIS) leaves us with many more questions than answers, and makes planning virtually impossible. Therefore:

The Clark County Local Emergency Planning Committee (LEPC) believes the Yucca Mountain Draft Environmental Impact Statement is an insufficient analysis of the impacts of the Yucca Mountain Project on Clark County because it fails to provide specific detail about the Maximum Reasonably Foreseeable Accident and because it fails to describe how Section 180c of the Nuclear Waste Policy Act as Amended (NWPAA) will be implemented.

Response
Sections 6.2.4 and J.1.4.2.1 of the EIS describe the maximum reasonably foreseeable accidents analyzed in the EIS. The information in Appendix J has been updated and expanded to reflect the findings of a recent study, *Reexamination of Spent Fuel Risk Estimates* (DIRS 152476-Sprung et al. 2000).

In response to comments on the Draft EIS, additional information has been provided in Section M.5.1 of the EIS on the proposed operational aspects of spent nuclear fuel and high-level radioactive waste transportation, emergency response planning, and in Section M.6 for financial assistance programs. Section 180(c) of the NWPA requires DOE to provide technical and financial assistance to states and tribes to train public safety officials in emergency response and safe routine transportation. As a result of this program first responders would likely have sufficient training to be knowledgeable of the hazards to which they could be exposed from spent nuclear fuel and high-level radioactive waste shipments. Part of the Section 180(c) funds are for planning and coordination activities. States and tribes may use a percentage of the funding to purchase equipment for training purposes, which may then be used for emergency response, if necessary. States and tribes may request additional support from various Federal agencies in the event of an incident.

A draft Proposed Policy and Procedures for implementing the requirements of Section 180(c) was issued in 1998. A final Policy and Procedures would be issued if a repository site was approved.

8.10.2 (5520)
Comment - EIS001660 / 0034
Discussion of transportation emergencies, emergency assistance, emergency response, and carrier and shipper responsibilities is vague, misleading, and inadequate (p. 6-30). No consideration is given, to local jurisdictions choosing not to respond to radiological incidents, that them may not have the capabilities to respond even if assistance and training are available, or that limited emergency response may itself create impacts. Specifically:

The statement that "DOE would, as requested, assist state, tribal and local governments in several ways to reduce consequences of accidents related to the transportation of (SNF [spent nuclear fuel] and HLW [high-level radioactive waste])" (p. 6-30) does not provide sufficient information regarding the adequacy of emergency response capabilities;

Although DOE may provide assistance to state, local and tribal governments, this assistance may not be adequate for necessary emergency responses;

There is no guarantee or assurance that DOE assistance is forthcoming.

The statement that "(u)nder Section 180(c) of the NWPA, the Department would provide technical assistance and funding to train state, local, and tribal public safety officials" does not completely address the need for, or potential effectiveness of training of emergency responders; does not address whether such training is even desired by all jurisdictions; does not make it clear that the money is granted only to states; or does not even identify an amount. Potential assistance under Section 180(c) does not constitute assistance needed to help local jurisdictions deal with transportation emergencies, and the DEIS does not analyze whether it is the only assistance needed by state, local, and tribal governments.

The statement the DOE would require its transportation contractors to comply with the ANSI [American National Standards Institute] standard for carrier and shipper responsibilities and emergency response procedures does not adequately cover the need to discuss carrier and shipper responsibilities. The reference to carriers' and shippers' responsibilities for preparation of an emergency response plan, provision of information and assistance to emergency responders, and resources for dealing with the consequences of an accident fails to analyze whether these requirements would lessen the impacts of the proposed action and any of its alternatives.

The discussion of transportation emergencies does not fully address the local emergency response that would be expected or required, even if federal or private response resources were available and dispatched. Also, it does not identify constraints on local emergency response or the consequences of prolonged delays due to lack of local resources.

Response

States and tribes are primarily responsible for the health and safety of their citizens. However, in the event of an accident that released radioactive materials, a state or tribe could request assistance from Federal agencies under the Federal Radiological Emergency Response Plan and Federal Radiological Monitoring and Assessment Plan. DOE has several assets that could assist including the Radiation Emergency Assistance Center/Training Site (REAC/TS). REAC/TS is on call 24 hours a day to provide direct or consultative help with medical and health physics problems associated with an accident or incident involving radioactive materials.

Regarding the concern about jurisdictions refusing to respond to emergencies, it is the intent of Section 180(c) of the NWPA that first responders would be sufficiently trained to respond safely to an incident involving the shipment of spent nuclear fuel and high-level radioactive waste. In addition, the Emergency Planning and Community Right-to-Know Act mandates the formation of emergency planning and response capability by states. Under this provision, emergency responders cannot simply refuse to respond to an emergency.

Regarding the adequacy of assistance for emergency responses, DOE has published several *Federal Register* notices outlining its intentions regarding technical and financial assistance for states and tribes for training. Interested parties have had numerous opportunities to comment on these notices. The majority of commenters have indicated that training to the awareness-level for emergency response and inspector training for safe routine transportation is adequate preparation for shipments of spent nuclear fuel and high-level radioactive waste. In addition, as stated in the *Federal Register* notices, DOE would provide funding for equipment and additional technical assistance under Section 180(c), as requested. Additional information on the provisions of Section 180(c) is provided in Section M.6 of the EIS.

Regarding the assurance that the assistance from DOE would be forthcoming, the Department is required under Section 180(c) of the NWPA to provide technical and financial assistance for training in safe routine transportation and emergency response. The assistance mandated by that section would be provided at least 4 years before shipments began. This is the timeframe committed to by the Department on numerous occasions in numerous public forums and publicly issued documents.

The *Federal Register* notices make it clear that the funding would go to states and tribes. Local governments would not be eligible to receive Section 180(c) grants directly. However, states and tribes, if they have subjurisdictions, would have to coordinate their planning with local jurisdictions, indicating in the application that the needs of local public safety officials have been considered and how the training assistance would be provided to local jurisdictions and their appropriate public safety officials.

The Draft RFP for acquisition of Regional Servicing Contractors (DIRS 153487-DOE 1998) outlines the responsibilities, processes, and protocols for planning and operation of the transportation system. Though it focuses in detail on these responsibilities, it identifies other related responsibilities. Additional information on the responsibilities and processes is provided in Section M.3.2 of the EIS. For a more detailed discussion of roles and responsibilities of local, State, and Federal emergency responders, see Section M.5.1.

Regarding constraints on local emergency response, DOE places no constraints on emergency responders and feels that the Draft Policies and Procedures for implementing Section 180(c) of the NWPA are adequate to prepare states, tribes, and local governments for emergency situations.

8.10.2 (5718)
Comment - EIS001887 / 0331
Page 6-37; Section 6.3 - Nevada Transportation

The assessment of socioeconomic impacts associated with Nevada transportation fails to address impacts on State and local governments. Specifically, any response to an incident, accident, or even a simple vehicle breakdown will impact a large group of responders. The Draft EIS does not discuss facilities, equipment, and mitigation, etc. that will be required. It refers only to the transporter's responsibilities regarding these issues, not the impact on public safety (response) agencies. Some of the issues are:

- Availability of equipment to deal with the large (size and weight) transportation casks in the event of vehicle breakdowns, load shifting, accidents, etc.; and

- Response costs for breakdowns and incidents/accidents. Timely responses would require staged equipment, trained and equipped personnel, and the associated infrastructure to support them.

Response
In accordance with the draft RFP for the Acquisition of Waste Acceptance and Transportation Services for the Office of Civilian Radioactive Waste Management (available at *www.rw.doe.gov/wasteaccept/wasteaccept.html*), transportation contractors would be responsible for providing a Transportation Plan addressing, among other things, the handling and correction of off-normal events. The contractor would provide the drivers and crews with specific written procedures clearly defining detailed actions to be taken in the event of an off-normal event. These procedures would address repair or replacement of equipment, or recovery, as appropriate. These requirements would be applicable to transport by truck and rail. If an accident occurred at an intermodal transfer station, the contractor operating that facility would be responsible for providing the necessary cleanup and recovery equipment.

Regarding the concern about response times, if there was an incident involving shipments of spent nuclear fuel and high-level radioactive waste, shipment drivers and escorts would be on the scene and trained to respond until local authorities arrived. Local first responders would respond in the same period that they would respond to any emergency. Section 180(c) funds would help them prepare for this type of emergency. Given the integrity of the casks transporting the waste, and the fact that more than 2,700 shipments of spent nuclear fuel have been safely transported in the last 30 years with no fatalities, injuries, or environmental damage caused by the radioactive nature of the cargo, the chances of contamination of local communities and the environment from an incident involving this type of waste are extremely unlikely and not expected to occur. DOE feels that this waste can, indeed, be transported safely.

The training of public officials who could be called upon to respond to an accident or incident involving shipments to a repository would be funded under Section 180(c) of the NWPA. Additional information on this issue is contained in Section M.6 of the EIS.

8.10.2 (5824)
Comment - EIS001728 / 0002
Require the shippers not only to notify the state government's office, but also that the emergency responders along the route have to have a general idea when this is coming through. At two o'clock in the morning when the responders respond, they need to know what they're dealing with and what they may encounter. They also -- that during the early stages of shipment when the campaign starts, we feel that a tail escort, knowledgeable person, escort

this material to give the incident commander adequate information, have instrumentation to be able to help the incident commander decide if there is a problem and how to handle it. We feel that later on that we'll be able -- you could be able to probably eliminate that escort.

Most importantly, emergency response forces along the route must be trained to deal with an emergency, should one occur. We believe that currently there is adequate training programs available on the subject, but we fear that these programs may go too far in-depth into the subject matter and will never reach the core group of responders who need them. Training should be self-sustaining, it should be simple, it should be fairly shipment-specific so the people understand, and it's got to get to the people on the street. It's got to get to those on the local level. All too often we develop great programs and they end up at the state level and they never get to the people on the street, so we're very much in favor of some legislation that will make sure that the responders along the route get that education.

Response
DOE is required by the Nuclear Regulatory Commission (10 CFR 71.97) to notify the state or tribal designated point of contact. It is the state or tribal representative's responsibility to coordinate with local officials and emergency responders. The emergency responders would receive information about the shipments of spent nuclear fuel and high-level radioactive waste before they reached their jurisdictions through various means. In addition to the advance notification, DOE would conduct dialogues with state and tribal authorities regarding projected shipments. DOE would also track the shipments through a satellite tracking system such as the TRANSCOM system, which would be available to states and tribes if the Nuclear Regulatory Commission determined that it did not violate safeguards and securities regulations. As required by the U.S. Department of Transportation (49 CFR Part 172), the vehicle would be properly placarded and the containers marked so that emergency responders would have knowledge of the cargo. The carrier would possess shipping papers describing the cargo contents.

Regarding the issue of training, DOE would provide financial assistance for training emergency responders at least 5 years before the commencement of shipments of spent nuclear fuel and high-level radioactive waste. As indicated in Section 180(c) of the NWPA, states and tribes, in coordination with local public safety officials, would determine who received training to the awareness level. The regulation clearly provides that the emergency responders on the local level should be trained. See Section M.6 of the EIS for additional information regarding Section 180(c).

Shipments of spent nuclear fuel and high-level radioactive waste would be physically protected by trained personnel as required by the Nuclear Regulatory Commission requirements (10 CFR 73.37). Additional information regarding physical protection of shipments in provided in Section M.7 of the EIS.

8.10.2 (6405)
Comment - EIS001114 / 0001
I would have to assume transport by road is the safest way to go so the only thing I would suggest is that all of the municipalities this convoy goes through takes part in safe passage with one or two fire trucks equipped with hazardous waste spill material and also a police escort front and rear with co-op from Ill, state Police and the Feds, under this controlled situation can you create the safe transportation that will be needed.

Response
The transportation of spent nuclear fuel and high-level radioactive waste by either truck or rail is considered safe. Of the thousands of shipments completed over the last 30 years, none has resulted in an identifiable injury through release of radioactive material. DOE plans to use rail where possible to reduce the number of shipments.

The Nuclear Regulatory Commission requires shipments to be escorted for security reasons, but there is no requirement for them to be escorted by emergency response personnel. It is believed that, in the event of an emergency, state, tribal, and local emergency response capabilities would be able to respond effectively. Technical assistance and funds for training these emergency response assets are available from DOE through the provisions of Section 180(c) of the NWPA. Additional information on these issues can be found in Section M.6 of the EIS.

8.10.2 (6428)
Comment - EIS001819 / 0002
The City [Kirkwood, Missouri] recommends, at a minimum, that local emergency management officials and fire chiefs be notified in advance of shipments passing through Kirkwood; local fire and emergency management personnel be provided training and procedures to follow in the event of an accident; and that, rail cars be adequately marked as to their radioactive contents.

Response
As stated in Section 2.1.3 of the EIS, DOE would comply with all applicable regulations of the U.S. Department of Transportation and the Nuclear Regulatory Commission (NRC). As required by NRC regulations (10 CFR Part 73), the state's and tribe's designated points of contact would receive advance notification regarding shipments of spent nuclear fuel and high-level radioactive waste. It is the responsibility of the states and tribes to notify local emergency management officials and fire chiefs. This notification process is discussed in Section M.3.2.2.1 of the EIS. The contractor providing transportation services to DOE would be required to have an Emergency Response Plan that provided for appropriate notifications to Federal agencies and state, tribal, and local units of government in the event of an emergency. Continuous real-time tracking of all shipments to the repository would provide the location of any incident.

As required by Section 180(c) of the NWPA, local fire and emergency management personnel would receive funding for training through their states and tribes. Additional information on emergency response and provisions of Section 180(c) is provided in Sections M.5.1 and M.6 of the EIS, respectively.

Railcars would be placarded when transporting radioactive materials consistent with U.S. Department of Transportation regulations (49 CFR Part 172).

8.10.2 (6505)
Comment - EIS001774 / 0011
During an accident who's in charge? Where are the evaluations of costs, risks and route-specific data on possible accidents, population density, weather?

Response
As discussed in Section M.5.1 of the EIS, according to the Federal Radiological Emergency Response Plan, state and local governments have the primary responsibility for determining and implementing measures to protect life, property, and the environment, with support provided, upon request, by Federal agencies, including DOE. State and local governments deal with transportation accidents involving hazardous materials on a daily basis across the United States. According to the Notice of Revised Proposed Policy and Procedures, DOE would provide funding and technical assistance to states and tribes along transportation routes to address incremental training requirements resulting from shipments of spent nuclear fuel and high-level radioactive waste to the repository. DOE would allow a variety of activities an applicant state or tribal jurisdiction might consider appropriate for training under the Section 180(c) program. Along a specific transportation route, it would be the applicant's decision as to who received training.

Section J.1.4.2 of the EIS discusses the methods and data used to evaluate the risks and consequences to populations and individuals of transportation accidents. This section includes discussions of the population density data, accident rate data, and the weather conditions used in the analyses. The risks and consequences associated with transportation accidents are summarized Sections 6.2.4.2.1 and 6.2.4.2.2. As discussed in these sections, radiological risks to populations within 80 kilometers (50 miles) of an accident ranged from about 0.5 person-rem for the mostly legal-weight truck scenario to 1 person-rem for the mostly rail scenario. The consequences to the population of maximum reasonably foreseeable, but highly unlikely, transportation accidents ranged from about 1,100 person-rem for the mostly legal-weight truck scenario to about 9,900 person-rem for the mostly rail scenario.

A review of previous estimates of the costs associated with severe transportation accidents have been added to Appendix J of the EIS. These costs ranged from $200,000 to an estimate by the State of Nevada of $270 billion. The extreme costs estimated in some analyses are based on consequences estimated using extremes of estimates for all parameters in the analysis and are considered not reasonably foreseeable and therefore not useful for decisionmaking. Furthermore, DOE believes that estimating the costs associated with severe, but highly unlikely, transportation accidents requires a high degree of speculation and that speculation of this kind is not required by the National Environmental Policy Act.

8.10.2 (6566)
Comment - EIS001632 / 0053
The EIS recognizes the need to prepare for and respond to accidents. Page 6-30 highlights Section 180(c) of the NWPA under which DOE will provide technical assistance and funding to state, local and tribal public safety programs on transportation emergencies. This page also describes how transportation contractors must prepare an emergency response plan and take other steps to deal with the consequences of accidents.

Response
Thank you for your comment. Information presented in Section M.5.1 of the EIS provides additional information related to emergency response planning and Section M.6 provides additional information on financial assistance programs.

8.10.2 (6697)
Comment - EIS001878 / 0063
The DEIS fails to adequately assess the potential public health and safety impacts of the proposed Carlin rail corridor and other corridors (pp. 6-11, -37, -39 to -41, -49, -63) in a number of important areas. (For additional discussion of this point, see the January 19, 2000, letter to the DOE from Eureka County's Local Emergency Planning Committee [LEPC].

Transportation of SNF [spent nuclear fuel] and HLW [high-level radioactive waste] through areas with limited emergency response capabilities, including Eureka County and much of rural Nevada, increases the risks associated with transportation incidents. Risks are higher because of the lack of initial response capability and the time delay for responding personnel. Some jurisdictions may choose not to respond to incidents involving SNF and HLW due to financial and personnel considerations. Jurisdictions with volunteer fire departments and other volunteer emergency responders may decide not to respond to incidents in which they cannot participate safely. The DEIS must address these scenarios.

The discussion of transportation emergencies, emergency assistance, emergency response, and carrier and shipper responsibilities is vague, misleading, and inadequate. (p. 6-30) It does not consider that local jurisdictions may choose not to respond to radiological incidents, that they may not have the capabilities to respond even if assistance and training are available, or that limited emergency response may itself create impacts. Specifically:

The statement that "DOE would, as requested, assist state, tribal and local governments in several ways to reduce consequences of accidents related to the transportation of [SNF and HLW]" (p. 6-30) does not provide sufficient information regarding the adequacy of emergency response capabilities;

Although DOE may provide assistance to state, local, and tribal governments, that assistance may not be adequate for necessary emergency responses;

There is no guarantee or assurance that assistance from the DOE will be forthcoming, or that it will be adequate;

The statement that "[u]nder Section 180(c) of the Nuclear Waste Policy Act, the Department would provide technical assistance and funding to train state, local, and tribal public safety officials" does not completely address the need for or potential effectiveness of training for emergency responders; address whether such training is even desired by all jurisdictions; make it clear that the money is granted only to states; or identify an amount;

Potential assistance under Section 180(c) does not constitute the universe of assistance needed to help local jurisdictions deal with transportation emergencies, and the DEIS does not analyze whether it is the only assistance needed by state, local, and tribal governments;

The statement that DOE would require its transportation contractors to comply with the ANSI standard for carrier and shipper responsibilities and emergency response procedures does not adequately cover the need to discuss carrier and shipper responsibilities;

The reference to carriers' and shippers' responsibilities for preparation of an emergency response plan, provision of information and assistance to emergency responders, and resources for dealing with the consequences of an accident fails to analyze whether these requirements would lessen the impacts of the proposed action or any of its alternatives;

The discussion of transportation emergencies does not fully address the local emergency response that would be expected or required, even if federal or private response resources were available and dispatched; and
The discussion of transportation emergencies does not identify constraints on local emergency response or the consequences of prolonged delays due to the lack of local resources.

Response
Public health and safety impacts as well as other impacts of each of the rail corridor implementing alternatives in Nevada are discussed in Section 6.3.2.2 of the EIS. States and tribes have the primary responsibility for the health and safety of their residents. The Federal Government supports the states and tribes when requested. At this time, with five rail corridors being evaluated in the EIS, specific public health and safety issues, including emergency preparedness and response, would not be addressed until a single corridor and alignment within the corridor was selected. The Department would then initiate National Environmental Policy Act activities for the chosen rail corridor/alignment, initiate consultations with Federal, state, and tribal authorities, and evaluate these specific considerations in detail in an attempt to mitigate as many potential impacts as possible.

It is the intent of Section 180(c) of the NWPA that first responders would be sufficiently trained to respond safely to an incident involving the shipment of spent nuclear fuel and high-level radioactive waste. DOE has committed to providing technical and financial assistance for training as mandated by Section 180(c) beginning approximately 4 years before shipments began. In addition, the Emergency Planning and Community Right-to-know Act mandates the formation of emergency planning and response capability by the states. The *Federal Register* notices make it clear that the funding would go to states and tribes. Local governments would not be eligible to receive Section 180(c) grants directly. However, states and tribes would be required to coordinate their planning with local jurisdictions, indicating in their applications that the needs of local public safety officials have been considered and describing how the training assistance would be provided to local jurisdictions and their appropriate public safety officials.

DOE recognizes that emergency preparedness capabilities and needs vary from jurisdiction to jurisdiction. To assist states and tribes to determine what their needs are and where the 180(c) funds and assistance can best be applied, DOE would provide a one-time planning grant to aid in making this determination. Additional discussion of Section 180(c) can be found in Section M.6 of the EIS.

In the event of an incident or accident involving radioactive materials, states, tribes, and local governments can request assistance from the Federal Government under the Federal Radiological Emergency Response Plan. Assistance is available from 17 different agencies. In addition, DOE maintains eight Regional Coordinating Offices across the country that are ready to provide assistance. Information concerning these resources can be found in Section M.5.1 of the EIS.

The Regional Servicing Contractor would be required to provide drivers and crews with specific written procedures that clearly define detailed actions to be taken in the event of an emergency or incident. The Draft Request for Proposals, *Acquisition of Waste Acceptance and Transportation Services for the Office of Civilian Radioactive Waste Management* (DIRS 153487-DOE 1998) focuses in detail on these responsibilities, as well as on other related responsibilities. Carrier and shipper responsibilities regarding emergency situations are discussed in Section M.5.1 of the EIS.

8.10.2 (8601)
Comment - EIS001837 / 0006
Upon a cursory review of your Draft DEIS it became apparent that if the DOE intends to go forward with this, DOE needs to rewrite and circulate the DEIS because it is inadequate, deficient and fatally flawed in the following ways:

1. No Evacuation Plan or Contingency Plan has been proposed and no alternative routes across the California Desert Conservation Area (the East Mojave) and through Needles, California have been assessed. This is akin to putting in a huge housing development in, with only one road to go in and out on and no fire escape route. Obviously, if alternate routes are assessed for this major proposal of massive shipments of the most lethal materials known to humanity, the DOE would be forced to include California Environmental Quality Act (CEQA) regulations and write a Environmental Impact Report meeting the requirements of CEQA regulations. In other words, your DEIS should be an DEIS/R. It is no wonder that you held only one meeting in Lone Pine, California. The DOE was obviously playing hide and seek from the People of the State of California.

Response
The preparation and implementation of evacuation and contingency plans is a state or tribal responsibility. Section 180(c) of the NWPA provides funds to eligible jurisdictions for the preparation of these plans as well as emergency response and safe routine transportation planning and coordination activities.

The routes used in the transportation analyses in the EIS are routes that are representative of ones DOE could use to make shipments to a Yucca Mountain Repository. DOE has not selected routes that it would propose to use. At least 4 years prior to the first shipments, DOE plans to notify affected states of preliminary routes it could use. See Section M.6 of the EIS for more information on Section 180(c) and Sections M.3.2.2 and M.5 for more information on emergency response.

8.10.2 (8831)
Comment - EIS001834 / 0014
The DEIS fails to identify what emergency response personnel training and equipment would be needed in all of the communities along the transportation routes. Many communities' emergency responders lack the special equipment and training necessary to respond to a radiological accident. Further, many hospitals do not have isolation rooms for radioactively contaminated victims. This analysis should at the very least be done for the major population centers along the transportation routes (populations of 100,000 or more). The DEIS should indicate what emergency response equipment, facilities, and trained personnel are available in these communities, and what the effects of a transportation accident could be based on what is currently available. For instance, if an accident occurs, and the driver of a nuclear waste truck is radiated, and there is no isolation room in the hospital, what are the impacts?

Response
State, tribal, or local governments must make the determination as to whether a jurisdiction has adequate emergency response capabilities. To aid in this process, a one-time planning grant will be available to eligible jurisdictions under Section 180(c) of the NWPA. In addition, technical assistance and funds will be made available under the provisions of this section for training of public safety officials. Section M.6 of the EIS provides additional information concerning Section 180(c).

In addition to the assistance available under Section 180(c), specific advice and support in the handling of individuals who might have been contaminated in an incident involving radioactive materials can be obtained 24 hours a day from the DOE Radiation Emergency Assistance Center/Training Site (REAC/TS).

The analysis of impacts of transportation accidents in the EIS (see Section J.1.4.2.1 for a discussion of methods and assumptions used) does not take credit for emergency response efforts to reduce exposure to individuals. Therefore the impacts represent what could happen regardless of the emergency response capabilities of jurisdictions along transportation routes. Federal- and state-supported training for responding to accidents involving hazardous materials, including radioactive materials, as well as training that would be supported by DOE for repository shipments, makes it unlikely that a first responder would receive a dose as high as that estimated in the EIS for a maximally exposed individual. The estimated doses from accidents to maximally exposed individuals in Section 6.2.4.2 are high estimates for maximum reasonably foreseeable accidents that could occur, which would have a likelihood of occurring between once in 1 million years and once in 10 million years. These doses were estimated with the assumption that a maximally exposed individual would be present for the full duration of an accident at the location where exposure to radioactive materials in the air and on the ground would lead to the maximum dose that could occur. The doses for a legal-weight truck accident and for a rail accident would be 0.75 rem and 29 rem, respectively, for the maximally exposed individuals. In addition, DOE has included estimates of the dose to an emergency responder to a severe accident. The largest estimated dose for a first responder would be 0.83 rem. This dose is estimated for a first responder to a severe rail accident where a portion of the cask's lead shield had been displaced. This dose, which is less than the administratively imposed annual limit of 2 rem for DOE's radiation workers, would lead to an estimated increase in the risk of a latent fatal cancer of about 3.3 in 10,000 over the individual's lifetime.

8.10.2 (8987)
<u>Comment</u> - EIS001040 / 0022
Where will Missouri's accident response center be located?

<u>Response</u>
Each state is responsible for the health and safety of its people. Therefore, any decisions concerning an accident response center are left to each individual state. As stated in Chapter 2 of the EIS, consistent with the provisions of Section 180(c) of the NWPA, DOE would provide technical assistance and funds to states and tribes for training local public safety officials in the areas of safe routine transportation and emergency response, but it will not dictate to states and tribes where they are to locate any accident response centers. Additional information on emergency response responsibilities and capabilities and the provisions of Section 180(c) is provided in Sections M.5.1 and M.6 of the EIS, respectively.

8.10.2 (9434)
<u>Comment</u> - EIS001888 / 0124
The DEIS failed to consider local and regional conditions with regard to communication among agencies in emergency situations. Any discussion of mitigation, support or compensation must address the development and maintenance of an adequate communication system for a transportation incident involving radioactive waste. The system must include such aspects as area of coverage, interagency arrangements, and backup systems.

<u>Response</u>
The communications needed in response to an incident involving radioactive waste would be no different than that needed to deal with any transportation incident or accident. However, in addition to the equipment that states, tribes, and local governments have in place to deal with other public safety emergencies, DOE plans to use a satellite tracking system such as TRANSCOM to track and provide communications for shipments to a repository (Section M.3.2.1.5). As outlined in Section 180(c) of the NWPA (see Section M.6 of the EIS), DOE would provide funding for equipment and training on the satellite tracking system to states and tribes to allow them access to these communications (if the Nuclear Regulatory Commission approves). DOE would provide funding for states and tribes to coordinate with local public safety officials in the areas of emergency response and communications.

8.10.2 (9457)
<u>Comment</u> - EIS001888 / 0134
DEIS Statement (pg. 240) 2.1.3.2 - In the event of an accident involving a shipment of spent nuclear fuel or high-level radioactive waste, the transportation vehicle crew would notify local authorities and the central communications station monitoring the shipment. DOE would make resources available to local authorities as appropriate to mitigate such an incident.

Clark County Comment - The DEIS stated that "DOE would make resources available to local authorities as appropriate to mitigate" an incident. It did not explain how or when such assistance will be made available. Will local governments and the State of Nevada be burdened with the front-end costs of an incident and have to wait for reimbursement from DOE. If a significant incident occurred, it could be beyond the financial resources of a local entity. The DEIS should clearly state that the DOE will pay for any incident and pay for it up front. NEPA [National Environmental Policy Act] Regulation: Sec. 1502.1 Purpose; Sec. 1502.22 Incomplete or unavailable information.

Response
As discussed in Section M.5.1 of the EIS, states and tribes are primarily responsible for the health and safety of their citizens. However, Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for determining the need for and training of public safety officials of appropriate units of local government and tribes through whose jurisdictions the Department would ship spent nuclear fuel and high-level radioactive waste. This training would cover procedures for dealing with incident-free transportation and emergency response situations. It would be up to state, local, and tribal authorities to determine who would receive training and what equipment would be required. DOE would provide funds for training and the associated purchase of equipment for safe routine transportation and emergency response.

In addition, several Federal agencies have training and available capabilities should the states or tribes request them. If an accident with release of radioactive waste occurred, affected states and tribes could request assistance from DOE, Environmental Protection Agency, Department of Agriculture, Department of Health and Human Services, and the Federal Emergency Management Agency. These agencies, in cooperation with states, tribes, and each other, would monitor and assess radioactive materials in air, ground, agricultural products, and water in accordance with the Federal Radiological Emergency Response Plan and the Federal Radiological Monitoring and Assessment Plan. The costs for such services would be borne by the Federal agencies.

Costs associated with accidents would be borne by the transportation contractor's insurance and by coverage under the Price-Anderson Act. The Price-Anderson Act provides for indemnification of liability up to $9.43 billion to cover claims that might arise from an accident in which radioactive materials were released or one in which an authorized precautionary evacuation was made (see Section M.8 of the EIS for a more complete discussion of the Price-Anderson Act).

8.10.2 (9595)
Comment - EIS001888 / 0269
Incident Response

An essential concern for local governments is the speed and ability to respond to incidents. The DOE's requirement to reduce and mitigate the impact of a radioactive waste spill is an important part of the DOE's program. The DEIS should have discussed how the transportation system will be organized to enhance public safety respond to accidents. The DEIS should at least provide some information about the minimum incident response performance standards required of the RSCs [Regional Servicing Contractors].

Response
The first response to an incident during the transportation of radioactive materials is the responsibility of local officials in the jurisdiction where the incident occurs. Section M.6 of the EIS discusses DOE's responsibilities, as defined in Section 180(c) of the NWPA. That section states that DOE is required to provide technical and financial assistance to states and tribes for training public safety officials in jurisdictions through which it plans to transport spent nuclear fuel or high-level radioactive waste. Regional Servicing Contractors would be required to develop an Emergency Response Plan that addressed activities to be conducted by shippers and carriers in an accident or off-normal incident. The Plan would provide for a knowledgeable representative of the Regional Servicing Contractor to be at the scene as soon as possible after being notified by DOE to provide technical assistance. In addition, the Regional Servicing Contractor would be responsible for providing or having carriers provide drivers and crews with specific written procedures that clearly define detailed actions to be taken in the event of an emergency. Discussions of additional requirements imposed by Section 180(c) on DOE and the requirements imposed on the Regional Servicing Contractors by DOE are provided in Sections M.6 and M.3.2, respectively.

8.10.2 (9614)
Comment - EIS002075 / 0001
I especially brought to the attention of the tribes the matter of the emergency response and preparedness and how we, as tribes, are unprepared at this time and how the federal government and other agencies can look upon the tribes to assume that responsibility. And as was stated, we lack training. We lack staff. We lack equipment. We lack funds to be prepared for any kind of spills near us. And coming from an area where the President has just proclaimed close to our area, two national monuments; one is the Grand Staircase National Monument, and the other one is Grand Canyon, a national monument. As these are developed, there will be more visitors. There will be more

tourists. We will have more visitors from other countries. And tribes are expected to assume full responsibility for their safety when it comes to the use of our highways, our rail systems, and transportation of the waste products that are being sent to Yucca Mountain. Should there be a spill along the way, then our people are not going to be prepared to take care of that, although the general public will look upon us as assuming that responsibility. Then we're going to have environmental justice cases that probably will stem from those problems. So therefore, I think that the EIS needs to address our concerns on emergency response and preparedness and our environmental justice issues.

Response
Section 180(c) of the NWPA requires DOE to provide technical assistance and funds for emergency response training to states and tribes that would have shipments move through their jurisdictions on the way to a repository. A percentage of these funds may be used to obtain equipment. If additional resources are required to deal with an accident, assistance can be requested from Federal agencies. See Section M.6 of the EIS for additional information on Section 180(c) and emergency response.

It is the intent of Section 180(c) of the NWPA that first responders would be sufficiently trained to respond safely to an incident involving the shipment of spent nuclear fuel and high-level radioactive waste. The Department has committed to providing technical and financial assistance for training as mandated by Section 180(c) approximately 4 years before shipments commence. In addition, the Emergency Planning and Community Right-to-Know Act mandates the formation of emergency planning and response capability by the states. The *Federal Register* notices make it clear that the funding will go to states and tribes. Local governments will not be eligible to receive Section 180(c) grants directly. However, states and tribes would be required to coordinate their planning with local jurisdictions, indicating in the application that the needs of local public safety officials have been considered and how the training assistance will be provided to local jurisdictions and their appropriate public safety officials.

DOE recognizes that emergency preparedness capabilities and needs vary from jurisdiction to jurisdiction. To assist states and tribes to determine what their needs are and where the 180(c) funds and assistance can best be applied, DOE will provide a one-time planning grant to aid in making this determination. Additional discussion of Section 180(c) can be found in Section M.6 of the EIS.

In the event of an incident or accident involving radioactive materials, states, tribes, and local governments can request assistance from the Federal Government under the Federal Radiological Emergency Response Plan. Assistance is available from seventeen different agencies. In addition, DOE maintains eight Regional Coordinating Offices across the country that are ready to provide assistance. Information concerning these resources can be found in Section M.5.1 of the EIS.

The Regional Servicing Contractor would be required to provide drivers and crews with specific written procedures that clearly define detailed actions to be taken in the event of an emergency or incident. The Draft Request for Proposals, *Acquisition of Waste Acceptance and Transportation Services for the Office of Civilian Radioactive Waste Management* (DIRS 153487-DOE 1998), focuses in detail on these responsibilities, as well as on other related responsibilities. Carrier and shipper responsibilities regarding emergency situations are discussed in Section M.3.2.2.5 of the EIS.

Sections 4.1.13.4 and 6.1.2.12 of the EIS discuss the issue of environmental justice. The analysis in the EIS determined that the impacts from transportation to humans and other impacts that could affect populations of Native Americans would not be disproportionately high and adverse.

8.10.2 (9831)
Comment - EIS001888 / 0409
[Clark County summary of comments it has received from the public.]

Draft Comments on NOI [Notice of Intent] for Yucca [Mountain] EIS. Savings from delay of EIS could be used also to complete studies of fund distribution to state, local gov't, and tribes for ER [emergency response] preparedness and to clarify risk. Impact assessment approaches to be used by DOE.

Response
Section 180(c) of the NWPA authorizes DOE to provide funding and technical assistance for training of safety and emergency response personnel. Planning grants would be provided at least 4 years prior to commencement of shipments. This should allow sufficient time to prepare for shipments. In addition, states and tribes are allowed to use their initial planning grants to conduct risk assessment and other assessment activities. Section M.6 of the EIS provides additional information on the provisions and timing of Section 180(c) grants and funding. It is not necessary to delay work on the EIS, because sufficient time is built into the Section 180(c) implementation process to conduct these studies.

8.10.2 (10135)
Comment - EIS001865 / 0011
Section 2.1.3.2 of the EIS first acknowledges that the NWPA Section 180(c) requires DOE to provide technical and financial assistance to states and tribes for training public safety officials in jurisdictions through which [DOE] plans to transport spent nuclear fuel and high-level radioactive waste (page 2-40). In Section 6.2.4.2, Transportation Accident Scenarios, (page 6-30) the document clarifies that Section 180(c) also provides for "technical assistance and funding" to "local ... public officials." This inconsistency is confusing. Please clarify whether local assistance is mandated by law. If, in fact, local assistance is available, please consider this response letter as the County's request to be provided with this assistance, including funding.

Response
DOE agrees that the wording used in the text box could be confusing, and has revised Section 6.2.4.2 of the EIS accordingly. Local governments are not eligible to apply for Section 180(c) grants directly. However, states and tribes, if they have subjurisdictions, would be required to coordinate their planning with local jurisdictions, and indicate in their applications for Section 180(c) assistance that they have considered the needs of local public safety officials and describe how the training assistance would be provided to local jurisdictions and their appropriate public safety officials.

8.10.2 (10227)
Comment - EIS002115 / 0002
The DEIS does not adequately address specific community, local government, statewide and regional impacts. Rural counties do not have money to handle radioactive accidents. The cost to ensure that the rural counties would be able to accommodate the transportation of the radioactive waste would probably exceed the no action alternative, uncertainty used in models and data used for site characterization and repository performance.

Response
Section 180(c) of the NWPA requires DOE to provide technical assistance and funds for emergency response training to states and tribes that would have shipments move through their jurisdictions on the way to a repository. A percentage of these funds may be used to obtain equipment. If additional resources are required to deal with an accident, assistance can be requested from Federal agencies. See Section M.6 of the EIS for additional information on Section 180(c) and emergency response.

It is the intent of Section 180(c) of the NWPA that first responders would be sufficiently trained to respond safely to an incident involving the shipment of spent nuclear fuel and high-level radioactive waste. The Department has committed to providing technical and financial assistance for training as mandated by Section 180(c) approximately 4 years before shipments commence. In addition, the Emergency Planning and Community Right-to-Know Act mandates the formation of emergency planning and response capability by the states. The *Federal Register* notices make it clear that the funding will go to states and tribes. Local governments will not be eligible to receive Section 180(c) grants directly. However, states and tribes would be required to coordinate their planning with local jurisdictions, indicating in the application that the needs of local public safety officials have been considered and how the training assistance will be provided to local jurisdictions and their appropriate public safety officials.

DOE recognizes that emergency preparedness capabilities and needs vary from jurisdiction to jurisdiction. To assist states and tribes to determine what their needs are and where the 180(c) funds and assistance can best be applied, DOE will provide a one-time planning grant to aid in making this determination. Additional discussion of Section 180(c) can be found in Section M.6 of the EIS.

In the event of an incident or accident involving radioactive materials, states, tribes, and local governments can request assistance from the Federal Government under the Federal Radiological Emergency Response Plan. Assistance is available from 17 different agencies. In addition, DOE maintains eight Regional Coordinating Offices across the country that are ready to provide assistance. Information concerning these resources can be found in Section M.5.1 of the EIS.

The Regional Servicing Contractor would be required to provide drivers and crews with specific written procedures that clearly define detailed actions to be taken in the event of an emergency or incident. The Draft Request for Proposals, *Acquisition of Waste Acceptance and Transportation Services for the Office of Civilian Radioactive Waste Management* (DIRS 153487-DOE 1998), focuses in detail on these responsibilities, as well as on other related responsibilities. Carrier and shipper responsibilities regarding emergency situations are discussed in Section M.3.2 of the EIS.

8.10.2 (10305)
Comment - EIS001873 / 0082
Lincoln County Independent Research:

The County, under its federally funded Nuclear Waste Oversight Program, has produced numerous studies containing information concerning local impacts of the Yucca Mountain Project. As the County has stated in comments on the DEIS, the DOE has evidently not made any use of the County effort, which has cost approximately five million dollars to date. Following are some of the findings of the County studies. (My own observations are in parentheses.)

Lincoln County Emergency Preparedness Inventory 1992

Documents the County's lack of preparedness to handle accidents involving nuclear waste.

Response times in much of the county would be in excess of one hour.

In a preamble on local perception of risk the study notes that less than half of Caliente residents believe that radioactive waste can be transported safely.

Response
As stated in Section 2.1.3 of the EIS, DOE intends to comply with all applicable regulations of the U.S. Department of Transportation and the Nuclear Regulatory Commission in the transport of spent nuclear fuel and high-level radioactive waste. In addition, the Department would comply with all aspects of the NWPA. Section 180(c) of the Act would provide funding and technical assistance for training of safety and emergency response personnel at least 4 years prior to the commencement of shipments. This should allow sufficient time to prepare for the shipments. In addition, as stated in the Draft Policy and Procedures for Section 180(c) (see Section M.6 of the EIS), if the route for a shipment was selected too close to the start of the shipment to allow for Section 180(c) implementation or if for any reason the responsible jurisdictions along a selected route lacked adequate training, DOE could use escorts with more training and equipment than those normally used for the purpose of security until a reasonable period for training has expired.

Regarding the commenter's concerns about response times, if there were an incident involving shipments of spent nuclear fuel and high-level radioactive waste, shipment drivers and escorts would be on the scene and trained to respond until local authorities arrived. Local first responders would respond in the same time period that they would respond to any emergency. Section 180(c) funds would help them prepare for this type of emergency. Given the integrity of the casks transporting the waste, and the fact that more than 2,700 shipments of spent nuclear fuel have been safely transported in the last 30 years with no fatalities, injuries, or environmental damage caused by the radioactive nature of the cargo, the chances of contamination of local communities and the environment from an incident involving this type of waste are extremely unlikely and not expected to occur. DOE feels that this waste can, indeed, be transported safely.

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in

predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Section 2.5.4 and Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty

- Much of the uncertainty is irreducible, and

- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

8.10.2 (10747)
Comment - EIS002101 / 0009
I just read the summary, but first responders? This place should be filled with ambulance and policemen. When I talk to them about it, because I drive that nuclear waste cask around in my time when I can, I talk to first responders a lot, and they say they're trained. If they hear there's a nuclear accident, they turn their lights on, head home, get their family and go. Because that's the only response.

Response
It is the intent of Section 180(c) of the NWPA that first responders would be sufficiently trained to respond safely to an incident involving the shipment of spent nuclear fuel and high-level radioactive waste. In the event that local capabilities are not considered adequate for the task, the state, tribe, or local government may request assistance from Federal agencies under the Federal Radiological Emergency Response Plan. Additional information on emergency response and Section 180(c) is available in Section M.6 of the EIS.

8.10.2 (10997)
Comment - EIS001952 / 0012
DOE is relying upon local community assistance for fire, EMT [emeergency medical technician], and police assistance, should [the] need arise. DOE must consider local interpretation of democracy. Charges against the Village of Sardinia's police chief were subject of special village council meeting. Council member who expressed concern that background checks may be less than adequate was told that she didn't ask to see the personnel file before employment. She didn't verify what she was told and she didn't ask the right questions, apparently. In response to members of council who felt village residents and council were entitled to answers:

The mayor told members who were questioning actions that he could air dirty laundry of people at this table. When asked by a councilman whether investigation would be appropriate response to residents concerns, the mayor responded by saying:

...if residents weren't happy they would have attended the meeting. (Attachment VII... THE BROWN COUNTY PRESS, "Sardinia Council Alleges Mayor Withholding Data, 2/27/00, pg. 1.)

Note that council met in special session!! Previous council meeting adjoined out of the public view to discuss matters of personnel.

Response
The commenter is correct in stating that DOE assumes that local, state, or tribal public safety officials would most likely be the first to respond to an accident involving radioactive materials. Section 180(c) of the NWPA requires

DOE to provide funds and technical assistance for emergency response training to states and tribes that would have shipments move through their jurisdictions.

DOE recognizes that emergency preparedness capabilities and needs vary from jurisdiction to jurisdiction. To assist states and tribes to determine what their needs are and where the 180(c) funds and assistance can best be applied, DOE will provide a one-time planning grant to aid in making this determination. Additional discussion of Section 180(c) can be found in Section M.6 of the EIS.

The remainder of the comment is outside the scope of this EIS.

8.10.2 (11365)
Comment - EIS002278 / 0002
I would also like to talk a little about my concerns about the fact that the Department of Energy and their predecessors have a track record that is abysmal.

We know that every place that they have dealt with nuclear energy, they have leaks and contaminations. We know Hanford now is leaking into the Columbia River, and it's becoming the most nuclear polluted river in the world. And yet here we have an aquifer that they are willing to perch massive amounts of plutonium above and seem to have no problem with: Well, oops, we made another mistake.

They say, you know, it will be dry waste they will be transporting; but they said that about the wastes that they transported from Fernald that was found leaking in a truck stop that came in outside of Kingman, Arizona.

Response
Spent nuclear fuel and high-level radioactive waste would be dangerous sources of radiation if they were not safely contained and shielded and, as with other hazardous materials, directly exposing people would lead to health, and possibly life-threatening, consequences. For these reasons, the regulations of the Nuclear Regulatory Commission and the U.S. Department of Transportation, as well as DOE's own internal orders, specify containment, shielding, thermal, and nuclear safety requirements for shipping containers (casks). These regulations are designed to preclude even a remote chance of direct exposure. Nonetheless, spent nuclear fuel and high-level radioactive waste are not easily dispersed; they do not dissolve in water; they are not liquids or gasses that can be easily spilled or leaked, and, with the exception of a very small, nearly undetectable effect, radiation from them does not make other materials radioactive. Spent nuclear fuel and high-level radioactive waste are solids. They are hard, tough, and dense ceramics, metals, or glasses contained within tough metal barriers.

The incident to which the commenter refers occurred in December 1997 and involved the shipment of low-level radioactive waste from the Fernald Site in Ohio to the Nevada Test Site. The driver of the truck noticed en route that the liquid was leaking from the container and followed the proper steps to notify local authorities and DOE of the leak. Subsequent investigation revealed that the liquid was not contaminated and that, while there are some steps that should be taken to prevent such an incident from occurring again, there was no harm to workers or the environment.

8.10.2 (11409)
Comment - EIS002251 / 0007
They have said that today, it would be 2010 before they begin shipments. In St. Louis, they said, quote, 2004 possibly. They said today that they would have four years of training before shipment. And so to me, that doesn't jibe if they are saying that it could start in 2004, and I know for a fact that there's been evidence in this room and Las Vegas that there's no training going on.

Response
Section 2.1.2 of the EIS discusses the schedule for the repository and other facilities and operations. The current schedule calls for shipments to begin in 2010. For a 2010 start of shipments, training of emergency response personnel would begin no later than 2006.

8.10.2 (11572)
Comment - EIS002281 / 0002
I do know toxic waste goes through Shoshone, and I was told just a few months ago a truck was stopped in Shoshone that was leaking, and I don't know how many hours before they finally got it cleaned up because Shoshone is so far – it's 60 miles from Baker and Baker isn't much to talk about. 60 miles from Death Valley, which has no services that could help for that.

Response
The spent nuclear fuel and high-level radioactive waste would be transported to the proposed repository in shipping casks which would be designed, manufactured, and operated under the regulations of the Nuclear Regulatory Commission. Of the thousands of shipments completed over the last 30 years, none has resulted in an identifiable injury through release of radioactive material. Additional information concerning cask safety can be found in Section M.4.1 of the EIS. The materials destined for the proposed repository would be in solid form, so there is no possibility of a leak.

DOE is required by Section 180(c) of the NWPA to provide technical assistance and funding to states for the training of public safety officials of appropriate units of local governments and tribes through whose jurisdictions these shipments would be made. Under this program, a one-time planning grant would be provided to determine the needs of these jurisdictions for safe routine transportation and emergency response. It would be appropriate in this assessment to determine how to handle incidents in remote areas.

8.10.2 (11582)
Comment - EIS002235 / 0005
What is the contingency plan? How will the responsive team be mobilized? Where are the workers to come from? To where will the victims be transported and how will they be housed during these days? How will 42 square miles and everything in it be decontaminated? In my brief 20 years cleaning up hazardous waste sites, I would expect decades, not 460 days.

Response
Local, state, and tribal governments are responsible for responding to accidents, including those involving radioactive materials, in their jurisdictions. The Federal Government and, in particular, DOE have radiological response resources available to assist when requested.

As required by Section 180(c) of the NWPA, DOE will provide financial and technical assistance to states and tribes for training local public safety officials in the areas of emergency response and safe routine transportation. DOE expects to provide this assistance beginning at least 4 years before shipments commence to a repository through a particular jurisdiction. Additional information on Section 180(c) is provided in Section M.6 of the EIS.

Although DOE and its contractors would develop their own emergency response plans, the preparation and implementation of emergency response, evacuation and contingency plans is a state or tribal responsibility for their jurisdictions. Section 180(c) funding will be provided to eligible jurisdictions for the preparation of these plans as well as emergency response and safe routine transportation planning and coordination activities.

In the unlikely event someone was contaminated as the result of an accident involving shipments to a repository, there are several means to deal with this. Major hospitals are equipped to deal with radioactive contamination because they routinely handle medical radioisotopes. In cases where there is no training or procedures to handle a contaminated individual, assistance can be obtained from the DOE Radiation Emergency Assistance Center/Training Site (REAC/TS). REAC/TS is on call 24 hours a day to provide direct or consultative help with cases where people have been involved in a radiation accident. Federal Government assistance is regionally based and can be mobilized and on the scene in a few hours, although it might take as long as 48 hours to be fully functional. A discussion of accident cleanup is in Section J.1.4.2.5 of the EIS. Additional information on emergency response can be found in Section M.5.2.

8.10.2 (11605)
Comment - EIS002237 / 0003
What happens if there is an accident? That's what everybody has talked about today. Nye County fears that the high level will follow the same avenue as low level is today.

You have got to realize that in my district where I live, I can leave home before daylight, drive all day, never pass through a town, get home after dark and never get out of the county. That's how big it is. And there's absolutely no radio communication out there, no medical facilities. We have to rely on our volunteers.

Just recently the Federal government funded the State of Nevada for safety and training, but what about Nye County? Is this how you thank Nye County for wanting to work with you?

Response
As required by Section 180(c) of the NWPA, DOE will provide financial and technical assistance to states for training public safety officials of appropriate units of local government and tribes in the areas of emergency response and safe routine transportation. DOE expects to provide this assistance beginning at least 4 years before shipments to the proposed repository commence in a jurisdiction. The proposed policy and procedures that address the implementation of Section 180(c) state it is DOE policy that each responsible jurisdiction would have the training necessary for safe routine transportation of spent nuclear fuel and high-level radioactive waste and to respond to incidents or accidents involving these shipments. DOE will provide the funds and technical assistance to obtain this training. Additional discussion of Section 180(c) can be found in Section M.6 of the EIS.

8.10.2 (12083)
Comment - EIS002310 / 0002
[The Oak Ridge Reservation Local Oversight Committee] strongly urges that the federal government provide sufficient funds to Nye County and other Nevada counties impacted by waste transport to Yucca Mountain for the purpose of ensuring adequate local capabilities for emergency preparedness, communications, and response.

Response
In response to comments, additional information has been provided in Section M.3.2.2 of the EIS on the proposed operational aspects of spent nuclear fuel and high-level radioactive waste transportation, emergency response planning, and financial assistance programs. Section 180(c) of the NWPA requires DOE to provide technical and financial assistance to states and tribes to train public safety officials in emergency response and safe routine transportation. As a result of this program first responders would likely have sufficient training to be knowledgeable of the hazards to which they could be exposed from spent nuclear fuel and high-level radioactive waste shipments. Part of the Section 180(c) funds are for planning and coordination activities. States and tribes may use a percentage of the funding to purchase equipment for training purposes, which may then be used for emergency response, if necessary. States and tribes may request additional support from various Federal agencies in the event of an incident.

8.10.2 (12250)
Comment - EIS000995 / 0016
What is the ratio of emergency personnel who are trained to respond to high-level radioactive waste transport accidents to the general population in any give area, or say, in Oakland, Missouri, where my family lives?

Response
Section M.6 of the EIS identifies the need for providing technical assistance and training for emergency response related to transportation of spent nuclear fuel and high-level radioactive waste. DOE did not determine the ratio of emergency responders to the general population in the EIS. Once a repository site was approved, DOE would implement Section 180(c) of the NWPA. Under this provision, DOE would provide technical assistance and funds to states to determine the need for and training of public safety officials of appropriate units of local government and tribes through whose jurisdictions shipment would be made to the repository. It is up to the eligible state and tribe, in consultation with local governments and first responders along the routes, to select who gets this funding and technical assistance. A one-time planning grant would be provided to every eligible state and tribe to determine the needs for this funding. In their applications for Section 180(c) funds, DOE expects states and tribes to consider the needs of, and show how training would be provided to, local jurisdictions and their appropriate public safety

officials. Additional information concerning implementation of Section 180(c) can be found in Section M.6 of the EIS.

8.10.2 (12251)
Comment - EIS000775 / 0002
First responders in such states should be notified and be on alert for potential exposure to radioactive material in case of an accident. 'First responders' should be added to the list of maximally exposed individuals on page J-43, Section J.1.3.2.2, with appropriate calculation of potential exposures (person-rem, dose-risk) added to appropriate tables throughout Chapter 6, Environmental Impacts of Transportation.

Section J.1.2.2, page J-23 states that the Office of Civilian Radioactive Waste Management plans to identify the preliminary routes for shipments of waste and notify governors and tribal leaders. It may be appropriate for the OCRWM to take responsibility to notify appropriate authorities regarding 'first responder' safety.

Response
One purpose of the DOE proposed policy and procedures (see Sections 6.2.4.2 and M.6 of the EIS) for implementing Section 180(c) of the NWPA is to describe the steps DOE plans to take to provide technical assistance and funding to states and tribes in the area of training, including training for emergency preparedness, for safe routine transportation and emergency response for shipments of spent nuclear fuel and high-level radioactive waste. DOE expects first responder safety would be fully addressed during training supported by DOE funds and technical assistance required under the provisions of Section 180(c).

At least 4 years prior to the first shipment of spent nuclear fuel and high-level radioactive waste from generator sites to Yucca Mountain through a state or tribal jurisdiction, DOE plans to notify the associated governors and tribal leaders. This notification would be the basis for states to submit applications to DOE for grants for determining training needs, and funding and technical assistance under Section 180(c).

Federal- and state-supported training for responding to accidents involving hazardous materials, including radioactive materials, as well as training that would be supported by DOE for shipments of spent nuclear fuel and high-level radioactive waste, makes it unlikely that a first responder would receive a dose as high as that estimated in the EIS for a maximally exposed individual. The estimated doses from accidents to maximally exposed individuals presented in Section 6.2.4.2 of the EIS are high estimates for maximum reasonably foreseeable accidents that could occur, which would have a likelihood of occurring between once in 1 million years and once in 10 million years. These doses are estimated with the assumption that a maximally exposed individual was present for the full duration of an accident at the location where exposure to radioactive materials in the air and on the ground would lead to the maximum dose that could occur. The doses for a legal-weight truck accident and for a rail accident show 0.75 rem and 29 rem, respectively, for the maximally exposed individuals. In addition, DOE has included estimates of the dose to an emergency responder to a severe accident. The largest estimated dose for a first responder is 0.83 rem. This dose is estimated for a first responder to a severe rail accident where a portion of the cask's lead shield had been displaced. This dose would lead to an estimated increase in the risk of a latent fatal cancer of about 3.3 in 10,000 over the individual's lifetime.

8.10.2 (12263)
Comment - EIS002175 / 0008
Many hospitals do not have isolation rooms for radioactively contaminated victims. This analysis should at least be done for the major population centers along the transportation routes (populations of 100,000 or more). The DEIS should indicate what emergency response equipment, facilities, and trained personnel are available in these communities, and what the effects of a transportation accident could be based on what is currently available.

Response
The analysis of the impacts of transportation accidents in the EIS did not take credit for the mitigating effects of emergency response activities. Therefore, no attempt was made to determine emergency response capabilities along the routes analyzed. In the unlikely event someone was contaminated as the result of an accident involving shipments to a repository, there are several means to deal with this. Major hospitals are equipped to deal with radioactive contamination because they routinely handle medical radioisotopes. In cases where there is no training or procedures to handle a contaminated individual, assistance can be obtained from the DOE Radiation Emergency

Assistance Center/Training Site (REAC/TS). REAC/TS is on call 24 hours a day to provide direct or consultative help with cases where people have been involved in a radiation accident.

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds for emergency response training to states and tribes that would have shipments move through their jurisdictions on the way to a repository. Under the current plan, a one-time planning grant will be provided to eligible states and tribes to assess the need for this technical assistance and funds. Additional discussion of Section 180(c) can be found in Section M.6 of the EIS.

8.10.2 (12604)
Comment - EIS001775 / 0004
Another person asked where was the EPA [Environmental Protection Agency]; not necessary for an environmental impact statement. Have you calculated the cost of training HAZMAT [hazardous material] teams all along the travel route? Is it even possible for local HAZMAT teams to cope with a nuclear incident should a train derail or a truck overturn? How many HAZMAT teams would there have to be, spaced how far apart? Are the utility companies going to pay for that, are local governments, are the U.S. Taxpayers? Can local hospitals even cope with such a nuclear accident?

The federal government does not have a flawless record on projects involving technology and you know about the Mars probe, the Y2 glitch and the spy satellite, MTVE and the EPA and then we see the failure of a new advanced anti-missile system. A miscalculation or a glitch or an accident would not only be another failure in technology, it could mean disaster for an entire community, an entire region of the country such as the midwest, indeed the whole nation itself.

Response
Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel or high-level radioactive waste. The costs of providing this technical assistance and training have not yet been determined but the funds would come from the Nuclear Waste Fund and would be authorized by the Congress. According to the Notice of Revised Proposed Policy and Procedures published in the *Federal Register* (63 *FR* 23753-23766, April 30, 1998), a one-time planning grant of $150,000 would be provided to eligible states and tribal jurisdictions for the determination of training and funding needs and for preparation of the application for funds about 5 years before shipments.

State and local governments deal with transportation accidents involving hazardous materials on a daily basis across the U.S. According to the Notice of Revised Proposed Policy and Procedures, DOE would provide funding and technical assistance to eligible jurisdictions along transportation routes to address incremental training requirements resulting from shipments of spent nuclear fuel and high-level radioactive waste to the repository. DOE would allow a variety of activities an applicant state or tribal jurisdiction might consider appropriate for training under the Section 180(c) program. Along a specific transportation route, it would be the applicant's decision as to who received training.

The DOE Radiation Emergency Assistance Center/Training Site (REAC/TS) has been working with state and local groups, including hospitals, to provide medical emergency response training, as well as providing treatment and medical consultation for injuries resulting from radiation exposure and contamination. Among the training courses offered are courses in the handling of radiation accidents by emergency staff, and medical planning and care in radiation accidents.

8.10.3 LIABILITY

8.10.3 (182)
Comment - 12 comments summarized
Commenters expressed concern regarding liability for transportation accidents involving spent nuclear fuel or high-level radioactive waste. Issues raised included who would be liable, who would pay the cost of cleaning up, and how would people be compensated for damages suffered as a result of a transportation accident. Commenters noted that insurance policies routinely exclude nuclear and radioactive accidents from policy coverage and wondered if taxpayers would be levied an additional tax burden for increased indigent medical funds. Commenters brought up

the financial burden that could be imposed on state or local governments as a result of a transportation accident. One commenter sought a total buyout of property damaged in a nuclear accident. Some commenters sought additional information regarding who would be responsible for cleanup.

Response
With respect to damages associated with an accident involving spent nuclear fuel and high-level radioactive waste, the Price-Anderson Act (see Section M.8 of the EIS) establishes a system of financial protection for persons who might be liable for, and for persons who might be injured by, a nuclear accident or incident. The Act provides liability coverage to DOE activities (including transportation) involving spent nuclear fuel and high-level radioactive waste. Specifically, the Price-Anderson Act establishes a system of private insurance and Federal indemnification that generally ensures that up to $9.43 billion is available to compensate for damages suffered by the public, regardless of who causes the damages. Persons indemnified include contractors, subcontractors, suppliers, state, local, and tribal governments, and any workers or persons who might be sued for damages. This indemnification would include operators of a spent nuclear fuel and high-level radioactive waste repository at Yucca Mountain and to transporters from commercial nuclear utilities and DOE sites to the repository. Congress will consider action on compensation plans to pay victims for damages that might exceed the $9.43 billion amount.

An accident that does not involve the release of radioactive materials or an authorized precautionary evacuation would not be covered by the Price-Anderson Act. Instead, it would be subject to normal state tort law applicable to any type of accident. Carriers may have private insurance to cover liability from a non-nuclear incident and for environmental restoration for such non-nuclear accidents. All motor vehicles carrying spent nuclear fuel or high-level radioactive waste are required by the Motor Carrier Act and implementing regulations (49 CFR Part 387), to maintain financial responsibility of at least $5 million. Federal law does not require rail, barge, or air carriers of radioactive materials to maintain liability coverage, although these carriers often voluntarily carry such insurance. Private insurance policies often have a nuclear exclusion to exclude coverage of nuclear accidents to reflect that those accidents involving the release of radioactive materials are covered under Price-Anderson Act indemnification. Thus, private insurance policies apply only to the extent that the Price-Anderson Act is not applicable.

Under the Price-Anderson Act, DOE does not require its contractors to carry private liability insurance as financial protection for nuclear incidents. Rather, DOE provides full indemnification to its contractors and all other persons indemnified to pay damages and provide compensation for nuclear incidents arising in connection with DOE contractual activity. To the extent Price-Anderson indemnification applies, there is no need or requirement to invoke existing private insurance policies.

DOE and the carrier would work with the appropriate government agencies to address who shall perform and who shall pay for cleanup activity where there was no release of radioactive material. In the case of a release of radioactive materials, payment for liability for the costs of the cleanup would be made under the Price-Anderson Act.

8.10.3 (7724)
Comment - EIS002018 / 0001
I am concerned about the side effects of a nuclear spill. Our health insurance will not cover us if we are exposed to the easterners waste. This isn't fair, because Nevada doesn't even produce nuclear waste.

Response
In Section 6.2.4 of the EIS, DOE recognizes the potential for transportation accidents and analyzed impacts resulting from transportation accidents. Although, given the number of shipments, traffic accidents are expected to occur, DOE does not believe that any accident would result in the release of radioactive material, primarily because of the structural integrity of the casks in which the material would be transported. In the more than 2,700 shipments involving spent nuclear fuel over the past 3 decades, there have been seven accidents, with no release of radioactive materials to the environment.

In the event of a nuclear accident or incident, the Price-Anderson Act establishes a system of private insurance and Federal indemnification that generally ensures that up to $9.43 billion is available to compensate for damages suffered by the public, regardless of who causes the damages. Damages that occur as a result of a nuclear accident or incident at the Yucca Mountain site or during the transportation campaign would be subject to the Price-Anderson Act indemnification. Additional information on liability for nuclear incidents is provided in Section M.8 of the EIS.

8.10.3 (9468)
Comment - EIS001888 / 0139
DEIS Statement (pg. 2.51) 2.1.3.3.3.1 - To enable intermodal transfers and heavy-haul shipments to the repository, an intermodal transfer station would be built and operated in Nevada.

Clark County Comment - The DEIS is silent as to who is responsible for protecting shipments during the intermodal transfer. Further, the DEIS states that "it could build and operate an intermodal station." Is DOE committed to constructing and operating the intermodal transfer station, or is DOE going to contract this to the private sector? If so, who will have the liability from an incident at the intermodal station? Since most accidents with spent fuel occur with the transfer of waste, it is very important to know who will be responsible for this task; how it will be managed; and what role if any will be expected of local governments. Further, will local governments have the right to access such a facility to ensure compliance with regulatory standards?

NEPA [National Environmental Policy Act] Regulation: Sec. 1502. 1 Purpose; Sec. 1502.14 A Alternatives including the proposed action; Sec. 1502.16 Environmental consequences.

Response
As discussed in Chapter 2 of the EIS, DOE would be responsible for shipments of spent nuclear fuel and high-level radioactive waste during the entire shipping campaign, regardless of whether private contractors were actually conducting the shipments or operating the associated facilities. In addition, the Department and its contractors would comply with all applicable regulations of the U.S. Department of Transportation and the Nuclear Regulatory Commission. Under these regulations, states and tribes could have authority to inspect shipments of spent nuclear fuel and high-level radioactive waste originating in or passing through their jurisdictions. Access to, or inspection of, facilities for enforcing compliance with Federal regulations would likely remain the responsibility of Federal agencies.

As discussed in Section 6.3 of the EIS, the shipping casks would remain sealed at all times during intermodal transfer facility operation. The forces to which the casks could be subjected during handling accidents at the facility would be significantly less than those required to cause a breach. Therefore, the radiological risks to the public from accidents at the intermodal facility would be very low.

The Price-Anderson Act establishes a system of private insurance and Federal indemnification that generally ensures that as much as $9.43 billion is available to compensate for damages suffered by the public in a nuclear accident or incident, regardless of who causes the damages. Damages that occurred as a result of a nuclear accident or incident at the Yucca Mountain site or during the transportation campaign, including at an intermodal transfer facility, would be subject to Price-Anderson Act indemnification. The liability of all responsible parties is limited to the amount of coverage provided by the Price-Anderson system. State and local governments cannot be required to provide additional compensation. Additional information on nuclear incident liability is provided in Section M.8 of the EIS.

As described in DOE's current planning for transportation operations, physical protection of shipments would be the responsibility of the Regional Servicing Contractors and transporters as described in Sections M.2 and M.7 of the EIS. Physical protection of shipments would comply with requirements of the U.S. Nuclear Regulatory Commission presented in 10 CFR Part 73.

8.10.3 (12543)
Comment - EIS001282 / 0002
The Draft Environmental Impact Statement acknowledges that it is not a question of whether an accident will happen while these high-level radioactive waste materials are being transported across our country. Section 6.2.4, "Accident Scenarios," explains that a certain number of accidents are "reasonably foreseeable." The questions are where and when the accidents will occur.

Will the emergency responders; the police, fire, and hospitals, be prepared? All responders, hospital personnel and anyone else coming in contact with this nuclear waste have the right to know how to respond when accidents take place! Who will provide support when accidents occur, a representative in Washington or somewhere else in the country? This is unacceptable! Who will be liable for the damages and expense resulting from these accidents?

Our highways and rail corridors are designed to connect population centers and to bring goods to market, not to transport high-level radioactive waste. Transporting this dangerous material via highway and rail pulls the City of Cleveland and the citizens of the City of Cleveland directly into harm's way. It will take a full-scale effort, well in advance of any transportation of radioactive material, to provide protection against the inevitable accidents. The cost of fully training and equipping the emergency responders, in all the cities along the transportation routes, to handle an accident involving high-level radioactive waste must be factored into the cost equation for the Yucca Mountain Project. The cost of the necessary preparation for accidents and liability for damages must be assigned to someone other than the local governments of cities standing, unfortunately, between the nuclear waste producers and the final disposal site.

Response
As required by Section 180(c) of NWPA, DOE would provide technical assistance and funds to states and for training public safety officials of appropriate units of local governments and Native American tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. Training would cover procedures required for safe routine transportation of these materials, as well as for dealing with emergency response situations. DOE would institute its program to implement the requirements of Section 180(c) before beginning shipments to the repository. In the event of an incident involving spent nuclear fuel or high-level radioactive waste, the vehicle crew would notify local authorities and the central communications station monitoring the shipment. DOE would make resources available to local authorities as appropriate to mitigate such an incident. Sections M.3.2.2, M.5, and M.6 of the EIS contain more information on emergency response capabilities and the provisions and implementation of Section 180(c), respectively.

In the event of a nuclear accident or incident, the Price-Anderson Act establishes a system of private insurance and Federal indemnification that generally ensures that as much as $9.43 billion is available to compensate for damages suffered by the public, regardless of who causes the damages. Damages that occurred as a result of a nuclear accident or incident at the Yucca Mountain site or during the transportation campaign would be subject to the Price-Anderson indemnification. Section M.8 of the EIS contains more information on liability for nuclear incidents.

8.11 Transportation - Affected Environment and Impacts

8.11.1 LAND USE

8.11.1 (134)
Comment - 11 comments summarized
Commenters expressed concern that the Draft EIS did not adequately examine the impacts to land use from the construction of a rail line in Nevada. Specific concerns include impacts to recreation (camping, hiking, fishing, hunting, nature study, back Country travel, sightseeing, and Wilderness Areas); continued access to recreation areas due to blocked roads; mining and mineral resource potential (especially through parts of north Central Nevada where active mining is occurring and where the mineral potential is high); timber lands; and private property (including ranches and patented mining land). Some wanted to know if private property would be condemned along and near the rail line, and if so, would the property owners be given fair market value for their land.

Some commenters said that any rail line in Nevada would conflict with existing land-use plans developed by the Bureau of Land Management. The EIS will remain insufficient until a complete inventory of land use and land management impacts are addressed, particularly in consultation with affected Federal and State of Nevada land management agencies.

Others said that construction of a branch rail line would be much more destructive than the use of trucks on existing roads, especially considering that the rail line would be used only for several decades.

Response

In Chapter 8 of the EIS, DOE considered past, present, and reasonably foreseeable actions of DOE, other agencies, and other organizations in its presentation of cumulative impacts. Future actions, which were included, were based on publicly announced and approved future actions and have documented evidence (for example, a Proposed Action would have a scheduled start and obligated funding, or there are other demonstrations of commitment that an action would occur and should be considered).

Section 6.3 discusses the scope of land-use information deemed appropriate for assessing potential impacts on land use of transportation implementing alternatives in Nevada. The sources of information need to identify the current ownership of the land that would be disturbed, and the present and anticipated future uses of the land. The region of influence for land-use and ownership impacts consists of land areas that would be disturbed or whose ownership or use would be changed as a result of the construction and use of a branch rail line, intermodal transfer station, midroute stopover for heavy-haul trucks, and an alternative truck route near Beatty, Nevada. These disturbances in land use would include camping, hiking, fishing, hunting, nature study, back-country travel, sightseeing, mining, ranching, timber, and wilderness areas.

In its assessment of potential land-use impacts, DOE considered the differences between land-use types, land disturbances, land ownership, and the creation of barriers. The assessment compared proposed use of land for Yucca Mountain transportation purposes to existing or other proposed land uses to estimate the magnitude and context of potential conflicts. If an action would result in continuing a current land use either due to little or no impact or through mitigation, the effects were considered insignificant or small. For example, as discussed in Chapter 6 of the EIS, impacts to livestock and Bureau of Land Management grazing allotments could be mitigated through the use of fencing, overpasses, and underpasses, which could provide a water source to animals cut off from current sources. With these mitigating measures, the impacts would be lessened and considered small. If an action could result in departures from existing uses, and mitigation could not remedy the conflict, the effects could be more substantial. For example, as discussed in the Carlin and Caliente Corridor sections of Chapter 6 (Sections 6.3.2.2.1 and 6.3.2.2.2), the Bonnie Claire Alternate passes directly through the portion of the newly established Timbisha Shoshone Trust Lands near Scottys Junction. If this alternate was chosen, the construction of a branch rail line could limit or enhance economic development in the Timbisha Shoshone Trust Lands parcel and could limit the use for housing by restricting access. Factors considered included the uniqueness of a geographic area; presence of historic, scientific, and cultural resources; potential effects on endangered species; and compliance with Federal, State, or local law. Based on information available, potential land-use impacts associated with Yucca Mountain transportation activities could be minimized through judicious alignment of the branch rail line or through mitigation. Overall, the land-use impacts would not be substantial because of the use of various optional and alternate routes within the corridor, mitigation measures, and the judicious routing of the branch rail line within the corridor.

Additional information about impact-reduction features, procedures and safeguards, and mitigation measures under consideration are included in Chapter 9 of the EIS. Chapter 9 identifies ongoing studies that could eventually influence mitigation measures related to the project plan and design. For example, Section 9.3 discusses mitigation measures intended to address impacts from the possible construction of a branch rail line or an intermodal transfer station in Nevada; construction of other transportation routes; upgrading of existing Nevada highways to accommodate heavy-haul vehicles; transportation of spent nuclear fuel and high-level radioactive waste from existing storage sites to the proposed repository; and fabrication of casks and canisters. As suggested in the Foreword to the EIS, if DOE pursued consideration of a specific rail alignment within a corridor or a specific location of an intermodal transfer station or the need to upgrade the associated heavy-haul truck routes, more detailed field surveys, government consultation, analyses, and appropriate National Environmental Policy Act reviews would be conducted that would help ensure potential land-use conflicts associated with Yucca Mountain transportation activities were minimized.

The documents cited in Section 3.2.2.1.1 of the EIS are source documents used by DOE for land-use considerations, and they include possible future actions within the transportation corridor. The more notable land-use features and potential influences that exist on lands within the corridors are presented in Section 6.3.2. For example, the land features within the Carlin Corridor are presented in Section 6.3.2.2.2. The listing of communities in Section 6.3.2.2.2 serves two purposes: (1) to identify communities potentially affected by the Carlin Corridor and (2) as map reference points. Gold Acres and Tenabo are historic reference points in the vicinity of the Carlin Corridor.

Commenters are referred to the corridor-specific parts of Section 6.3.2.2, where DOE identifies potential conflicts with existing or future land uses and land-use plans that could be affected by a given corridor.

Regarding private property along the rail corridor, DOE is required to use fair market value in the acquisition of real property. DOE must comply with the policies contained in the Uniform Relocation Assistance and Real Property Acquisition Policies Act, Title III, which includes the provision that the Agency (DOE) offer just compensation.

8.11.1 (1015)
Comment - EIS000254 / 0005
The project should offer up-front a reverter clause or a right of first refusal to recover the property ownership once the 30-year period of usage has expired. The clause should also state that all lands will be restored to existing conditions with the reversion. The reversion price would be the price at which the land was purchased. This would have the effect of making family ownerships whole at the end of the usage term.

Response
This comment concerns land for the candidate Carlin branch rail line for transporting spent nuclear fuel and high-level radioactive waste. The Carlin Corridor evaluated in the EIS passes through the Crescent Valley region of Nevada.

Regarding private property along the rail corridor, DOE is required to use fair market value in the acquisition of real property. DOE must comply with the policies contained in the Uniform Relocation Assistance and Real Property Acquisition Policies Act, Title III, which includes the provision that the Agency (DOE) offer just compensation.

Prior to a decision to dispose of lands it no longer needed for transporting spent nuclear fuel and high-level radioactive waste to the repository, DOE would consider alternatives for disposition. These alternatives would include restoration of the lands to their prior existing conditions.

8.11.1 (1186)
Comment - EIS000114 / 0007
Isn't - isn't it amazing that the proposed railroad route happens to follow the Valley Electric easement lines coming from Jean?

And - and - and I happen to notice that - that we rendered into an agreement with Yucca Mountain to provide them with power.

I would like to see Valley Electric provide me with a written copy of that agreement to see in fact if they made agreements with the Department of Energy to allow transportation along the east side of 160 along their easement corridor for power.

Response
The Jean Rail Corridor is one of five candidate corridors that DOE is considering as a possible route to the proposed Yucca Mountain Repository. Each rail corridor at some point along its route crosses or passes adjacent to existing rights-of-way for utility or road corridors, as described in Section 3.2.2.1.1 of the EIS.

In Section 2.6 of the EIS, DOE identified rail as its preferred mode of transportation both nationally and in Nevada. At this time, DOE has not identified a preference among the five candidate rail corridors within Nevada. If the Yucca Mountain site was recommended and approved, DOE would issue at some future date a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would then identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada.

8.11.1 (1239)
Comment - EIS000226 / 0002
Pages 25 and 26 of the County/City EIS Scoping Report note that construction and operation of a rail line may impair access to forage and water by domestic livestock. The DEIS indicates that rail corridors would cross grazing allotments but does not describe the impacts construction and use of a rail line would have on domestic livestock operations in Lincoln County.

Response
Land use and ownership impacts common to the construction and operation of all five of the branch rail lines are discussed Section 6.3.2.1 of the EIS and impacts specific to the Caliente Corridor are discussed in Section 6.3.2.2.1. The EIS determines that a branch rail line could create a barrier to livestock movement, and quantitatively addresses the acres of grazing lands potentially affected by candidate rail corridors.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

If a corridor was selected for construction of a branch rail line, DOE would conduct field studies along the corridor that would identify specific land uses to be avoided. DOE would avoid land-use impacts and private land to the maximum possible extent. For example, access to grazing areas, forage, and water could be addressed in the early design phase of the rail corridor/alignment. This process would address Bureau of Land Management standard operating procedures for rights-of-way, construction and operation. Water wells would be required along the rail corridor in some areas for soil compaction and dust control during rail construction. It could be possible to improve grazing allotments if the Bureau permitted the use of this water for grazing. Grazing allotment access could be accomplished by designing at-grade structures to permit cattle to cross underneath the railbed.

8.11.1 (1553)
Comment - EIS000357 / 0012
Page 1-14. 1.4.1. Is DOE considering withdrawal of rail and highway transport routes that would be constructed exclusively for transport of canisters to Yucca Mountain?

Response
For purposes of analysis, DOE assumed rail lines in Nevada for transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain would be devoted exclusively to the transport of materials to the repository (see Section 2.1.3.2.2 of the EIS). However, shared use could be considered later. For national highways and railways (non-Nevada) and Nevada highways, DOE is not considering exclusive use.

However, if the Yucca Mountain site was approved, and mostly rail selected as the transportation mode, then DOE would construct a branch rail line from an existing main track in Nevada to the site. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, DOE would consider the potential for shared use of the branch rail line, as discussed in Section 8.4.2 of the EIS. If the site was approved, then decisions regarding shared use would be made.

8.11.1 (1689)
Comment - EIS000804 / 0001
I live in Austin, Nevada. I understand that you folks want to put a nuclear railroad line running down behind my town. [It's] to run from [Beowawe] to Yucca Mountain. [It's] called the "Carlin" route.

Have you talked with the Forest Service? They want to shut down a bunch of roads so as to make some of the R.R. right-o-ways into [scenic] or "Wilderness" areas.

How come you can run a nuke train thru [potential] wilderness areas? What does the Forest Service say?

Response
Appendix C of the EIS addresses interagency and intergovernmental interactions. Although the Department has initiated many interactions (see Table C-1) and has received many requests for cooperating agency status (see Table C-2), the Department has not discussed this subject on a formal basis with the U.S. Forest Service. However, discussions regarding wilderness study areas and existing wilderness areas have occurred with the Bureau of Land Management.

Table J-38 of the EIS indicates that the Steiner Creek Alternate of the Carlin Corridor passes close to, but not through, the Steiner Creek Wilderness Study Area. Results of discussions with the Bureau of Land Management indicated that the corridor would not have an impact on wilderness areas or Wilderness Study Areas if a branch rail line was built.

8.11.1 (2204)
Comment - EIS000615 / 0002
Lander County has a public federally administrated land plan manual that is just coming into effect. I know you haven't taken that into consideration, but it will be available.

Response
DOE did obtain and review the *Lander County Revised Policy Plan for Federally Administered Lands* (DIRS 157310-Lander County 1999), as well as closely associated resource management plans issued by the Elko and Battle Mountain Districts of the Bureau of Land Management. The Lander County Policy Plan was developed to provide state and locally developed land management policies for use by the various Federal land management agencies. While DOE cannot at this time definitively identify specific tracts of land that could be affected along the Carlin Corridor (which traverses Lander County), DOE is sensitive to and aware of plan elements such as the County's desire to see certain Federal lands prospectively transferred to the private sector (see Appendix A of the Lander County Policy Plan). A number of other plan elements are to one extent or another considered in this EIS. For example, DOE has incorporated the best available population data from the Nevada State Demographer into its estimates of the socioeconomic impacts to the State, including Lander County; has identified mitigation measures that could be useful in the minimization of impacts to animal grazing units; and has identified the rail corridor's proximity to recreation and wildlife management areas, known cultural resource sites, and other potentially sensitive features. In the initial siting of potential transportation corridors, the Department attempted to minimize traversing private lands while remaining within engineering specifications. Should the Carlin rail corridor be selected as a likely transportation route for spent nuclear fuel and high-level radioactive waste, DOE would conduct more detailed route investigations.

8.11.1 (2324)
Comment - EIS000614 / 0011
The following issue needs to be addressed and thoroughly analyzed concerning direct impacts to Lander County in a detailed manner: the wilderness areas.

Response
Section 6.3.2.2.2 of the EIS provides a discussion of the Carlin Corridor implementing alternative, including potential impacts on land use and ownership and biological resources. Table J-42 indicates that the Steiner Creek Alternate of the Carlin Corridor pass close to, but not through, the Steiner Creek Wilderness Study Area. Results of discussions with the Bureau of Land Management indicated that the corridor would not have an impact on wilderness areas or Wilderness Study Areas if a branch rail line was built.

8.11.1 (2615)
Comment - EIS000692 / 0004
On page 3-121 in the chapter on affected environment, the DEIS states that: "Rainbow Canyon is used for variety of recreational purposes and is a route for the Union Pacific Railroad." I'm sure that many ranchers down the canyon would be delighted with the description of their livelihood.

<u>Response</u>
The quote from Section 3.2.2.2 of the Draft EIS is correct. The EIS has been modified to include ranching as an existing land use of Rainbow Canyon in Section 3.2.2.2.1.

8.11.1 (2747)
<u>Comment</u> - EIS000641 / 0006
The third area is near and dear to my heart and probably a few others in here, it is called property, taking of. The corridor as marked on the map, every other mile will probably pass through a portion of private property. Now, will this just be condemned? Will the people be compensated? Will it be assessed as market value? Will it be assessed at the BLM [Bureau of Land Management] value of the neighboring properties? Those questions weren't answered to my satisfaction.

Recreation and ranching, land use. We have a tremendous amount of trails, access roads, Jeep trails, some you can even barely walk on, some horses break their legs on, but they are all trails and usable all the time. We put this quarter mile corridor through here, are these trails going to be blocked off and have limited access? I didn't find that addressed either. And if they are blocked off and limited access, then you have just taken a lot larger portion of the property away from the citizens of the area than the quarter mile corridor.

And that also holds true for the ranchers for their historical or their - not historical, I guess. They haven't been here long enough to be history. But their normal ways of moving their livestock and animals and moving from place to place on their rangeland, grazing land, grazing permits, et cetera.

The other one was the corridors. It doesn't address that either, whether the corridors will be fenced and whether these corridors, if they are fenced, who is going to police them. The fence is just a novelty if you don't have somebody back there to kick you out of it.

<u>Response</u>
As discussed in Section 2.3.3.1 of the EIS, DOE chose candidate rail corridors in Nevada to maximize the use of Federal lands (with the exception of U.S. Air Force-controlled lands), provide access to regional rail carriers, and minimize, to the extent possible, obvious land-use conflicts. As discussed in Section 6.3.2.2, all of the candidate branch rail lines would require the use of mostly Federal land and very little private land. For example, the Caliente and Valley Modified Corridors would require the use of almost no private land (less than 1 percent). The Carlin and Jean Corridors would require only 7 and 5 percent private land, respectively.

Regarding private property along the rail corridor, the DOE is required to use fair market value in the acquisition of real property. The DOE must comply with the policies contained in the Uniform Relocation Assistance and Real Property Acquisition Policies Act, Title III, which includes the provision that the Agency (DOE) offer just compensation.

DOE acknowledges the recreational resources afforded by open space within parts of Nevada. In Section 6.3.2 of the EIS, DOE identifies potentially affected natural resource areas within each corridor. DOE would seek to minimize any restriction to or control over public lands used for recreational purposes and would develop specific mitigation measures to alleviate potential impediments to continued use of public lands. A branch rail line could be constructed across a trail or road access. However, access would not be restricted with the exception of that portion where the actual roadbed was constructed. Access to either side of a valley traversed by a branch rail line would be possible. Sufficient crossing structures would be constructed to allow access from either side.

Land use and ownership impacts common to the construction and operation of all five of the branch rail lines are discussed Section 6.3.2.1 of the EIS and impacts specific to each route are discussed in the appropriate subsection. The EIS determines that a branch rail line could create a barrier to livestock movement, and quantitatively addresses the acres of grazing lands potentially affected by proposed rail corridors.

If a corridor was selected for construction of a branch rail line, DOE would conduct field studies along the corridor that would identify specific land uses to be avoided. For example, access to grazing areas, forage, and water could be addressed in the early design phase of the rail corridor/alignment. This process would address Bureau of Land Management standard operating procedures for rights-of-way, construction, and operation. Water wells would be required along the rail corridor in some areas for soil compaction and dust control during rail construction. It could be possible to improve grazing allotments if the Bureau permitted the use of this water for grazing. Grazing allotment access could be accomplished by designing at-grade structures to permit cattle to cross underneath the railbed.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

8.11.1 (2826)

Comment - EIS001056 / 0001

We have reviewed the proposed rail corridor to link the UP [Union Pacific Railroad] line located in Carlin, Nevada to the Yucca Mountain facility. We note that all possible routes must pass through our Forest Service and BLM [Bureau of Land Management] winter grazing allotments.

If this project is to be [implemented], there are several factors that must be addressed to minimize the effects it would have on our permit and also to [ensure] the safe passage of rail traffic on this line.

Due to the topography of the area, there are few watering locations for our livestock to water. This is especially evident in the Rye Patch Canyon and the Smokey Valley portions of our grazing allotment. It is [mandatory] and obvious for the safety of this rail line that it be fenced on both sides to prevent not only grazing cattle but the wild horse and antelope populations from derailing a shipment. Since it is not hauling a load of potatoes, I think that this would only be obvious to insure [ensure] safe passage.

For this reason it would impair the ability of our livestock to utilize our permit without adequate [trestles] or DOE installed watering locations on both sides of the line.

Response

Land-use and ownership impacts common to the construction and operation of all five of the branch rail lines are discussed Section 6.3.2.1 of the EIS and impacts specific to the proposed Carlin route are discussed in Section 6.3.2.2.2. The EIS determines that a branch rail line could create a barrier to livestock movement, and quantitatively addresses the acres of grazing lands potentially affected by candidate rail corridors.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

If a corridor was selected for construction of a branch rail line, DOE would conduct field studies along the corridor that would identify specific land uses to be avoided. DOE would avoid land-use impacts and private land to the maximum possible extent. For example, access to grazing areas, forage, and water could be addressed in the early design phase of the rail corridor/alignment. This process would address Bureau of Land Management standard operating procedures for rights-of-way, construction and operation. Water wells would be required along the rail corridor in some areas for soil compaction and dust control during rail construction. It could be possible to improve grazing allotments if the Bureau permitted the use of this water for grazing. Grazing allotment access could be accomplished by designing at-grade structures to permit cattle to cross underneath the railbed.

8.11.1 (2940)
<u>Comment</u> - EIS001195 / 0002
Because of the nature of our business and the required permitting processes, Cortez Gold Mines has extensively studied the physical environment in the area. As such, we have detailed geologic, hydrologic, and other information which may be of interest to DOE should the Carlin route be seriously considered. We would be willing to discuss and perhaps share this data with DOE to help avoid or mitigate potential impacts.

<u>Response</u>
DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and the Carlin Corridor selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use. Cortez Gold Mines would be a part of these consultations and studies for selection of the final rail alignment.

8.11.1 (3066)
<u>Comment</u> - EIS000619 / 0006
Because over 87 percent of our county is managed by the Bureau of Land Management, it seems that more input is required from that agency regarding the variety of impacts that the rail route could have on land and resources that they manage.

We were surprised to read in Appendix C that the Department only met once with BLM and that there are no ongoing communication or interactions mentioned regarding the Department's multi-faceted proposal.

We would hope that BLM would not hold the Department's proposed action to any lesser standard than they require of the mining and the ranching industries.

<u>Response</u>
In the course of preparing the EIS, DOE coordinated with a number of government agencies and other organizations, including the Bureau of Land Management, by conducting formal consultations as required by the National Environmental Policy Act. Appendix C of the EIS documents these interagency and intergovernmental consultations. Nonetheless, Appendix C does not include the many staff-level interactions that occurred between the Bureau and DOE and were necessary for the development of the EIS. Information exchanges have occurred frequently in the past and are ongoing. These range from DOE providing informal status reports to the Bureau providing Geographic Information System data for utility corridors.

Should the Yucca Mountain site be approved, the branch rail line implementing alternative be selected, and a preferred rail corridor identified, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

8.11.1 (3164)
<u>Comment</u> - EIS001195 / 0001
Cortez Gold Mines is a large surface mining operation located in the southern end of Crescent Valley. Facilities and operations are located in both the eastern and western portions of the valley, with haulage and access roads linking both sides of the valley. Ancillary facilities include several infiltration basin galleries, some of which are located near the center of the valley. Attendant to the operations is a substantial private land position, along with numerous mining claims on public lands managed by the Bureau of Land Management. Part of our private land holding includes the 48,000 acre Dean Ranch, located in the center of the valley. The maps describing the Carlin rail corridor provided in the DEIS and those obtained at the December 9, 1999, public meeting in Crescent Valley depicts the corridor crossing portions of both the Dean Ranch and Cortez Gold Mines areas. Naturally, we are concerned about the impact that the rail corridor may have on our operations, land ownership, mining claims and future exploration.

Response
DOE is aware of the Cortez Gold Mines operation in Crescent Valley and has included a discussion of the mine area in Section 6.3.2.2.2 of the Final EIS. Table 8-1, Figure 8-5, and Sections 8.1 and 8.4 provide a discussion of the Cortez Gold Mines Pipeline Project and possible cumulative impacts.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

For any land that would be required, the Department would fairly compensate landowners under Federal acquisition procedures. DOE is required to use fair market value in the acquisition of real property. DOE must comply with the policies contained in the Uniform Relocation Assistance and Real Property Acquisition Policies Act, Title III, which includes the provision that the Agency (DOE) offer just compensation.

In other cases, as indicated in Section 9.3 of the EIS, mitigation measures would be developed where construction and operation of transportation facilities would result in (1) impacts to publicly used lands such as grazing allotments, (2) direct and indirect land loss, and (3) displacement of capital improvements.

8.11.1 (3166)
Comment - EIS001195 / 0004
As mentioned above, the [Carlin] corridor crosses a significant portion of our private lands and mining claims on public lands. Obviously, this raises several concerns related to right-of-way, access, land use, water rights, mining, exploration and agricultural activities such as grazing. We would expect DOE to work closely with us on resolving any conflicts that may arise in these areas.

Response
Section 6.3.2.2.2 of the EIS recognizes private and public land uses and lists the several Bureau of Land Management grazing allotments that could be affected, which includes 12 grazing areas, mining areas, and other land uses.

For any land that would be acquired, including mineral claims, landowners would be fairly compensated under Federal eminent domain procedures. When affected property was not acquired by eminent domain, mitigation measures would be evaluated and implemented as appropriate, as indicated in Section 9.3.1 of the EIS, when construction and operation of transportation facilities would result in (1) impacts to publicly used lands such as grazing allotments, (2) direct and indirect land loss, and (3) displacement of capital improvements.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and the Carlin Corridor selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

8.11.1 (3526)
Comment - EIS000721 / 0003
The 1,400 page Department of Energy's Impact Statement contains many sections that can be considered either inadequate or incomplete.

Land use and strategic plans that guide area development have not been considered in the DOE program. Some routes actually dissect large planned developments.

Response
Section 3.2.2.1.1 discusses the estimated current ownership or control of the land in each candidate rail corridor. Plans and documents that contain detailed land-use information are listed.

Land-use and ownership impacts are included in Section 6.3.2.2 of the EIS for each of the corridors.

Maps of potential land-use conflicts are presented in Section J.3.1.2.

8.11.1 (4306)
Comment - EIS001160 / 0116
Page 9-16: Not considered among the land use mitigation measures considered here is the need for additional 'safe havens' for operators of legal weight and heavy haul trucks along Nevada highways. Additional land areas, and resources, especially security resources will need to be allocated for provisions of safe havens along any and all designated routes.

Response
Legal-weight trucks would follow existing rights-of-way and hence no mitigation measures would be required for safe parking areas. As described in Section M.3.2.1.3 of the EIS, safe parking areas would be identified by the Regional Servicing Contractor and would include DOE facilities and specific designated areas such as U.S. Department of Defense facilities and rail sidings (with railroad concurrence)

Section 9.3.1 of the EIS states that mitigation would not necessarily be required if a heavy-haul truck route was selected, because these trucks would follow existing rights-of-way and would require little additional land disturbance for safe parking.

The security for the vehicles in the safe parking areas would be the same as the security used en route (see Section M.7 of the EIS).

8.11.1 (4465)
Comment - EIS001232 / 0009
Will mining claims be divided and access be restricted?

Will the free access of the residents be restricted across the valley (across the tracks)?

Response
A branch rail line could be constructed across a mining claim. However, access to claims would not be restricted with the exception of that portion where the actual roadbed was constructed. Access to either side of a valley traversed by a branch rail line would be possible. Sufficient crossing structures would be constructed to allow access from either side.

8.11.1 (5150)
Comment - EIS001444 / 0002
Impacts to Range
Two rail routes to Yucca Mountain go through our planning area. If either of these routes are selected we would have larger impacts during construction than after the railroad is finished.

Impacts from construction:
It may become difficult for livestock to gain access to areas and waters on the opposite side of the new construction. Cattle may avoid using areas with construction activity or temporary camps making it difficult to manage livestock or rotate use. This disruption might continue in an allotment for months. Construction would make more work for permittees. More cattle may be killed on the highway and along roads used during construction.

Impacts from the finished project:
There would be a small loss of AUMs [animal unit months] in large allotments that are unlikely to impact the operation. The loss of AUMs in small allotments may impact the permittee's operation.

The BLM [Bureau of Land Management] would request fencing along the railroad line. Drainage underpasses might allow cattle access to the opposite side of the railroad. These underpasses would need gates to allow access. When fenced, the railroad would block access to the opposite side of the track. This would cause problems in areas with few waters requiring water hauling. The track would divide allotment into pastures that could be used to rotate use allowing for new grazing management options. This would benefit livestock and vegetation management.

The Caliente route comes in from Lincoln County into Reveille, Stone Cabin, Ralston, Montezuma and Razorback allotments. The new route from Caliente, the Caliente Chalk Mountain Rail Corridor, will not cross our planning area.

Reveille allotment. Goes through south end of Railroad Valley up Reveille Valley across the Kawich near the Highway. This would split Reveille Valley into two pastures. This provides some good opportunities for some complete rest of the range in this valley and southern Railroad Valley. Dividing Reveille provides opportunities for improved grazing management. Livestock waters are well distributed in Reveille. Water hauling may not be necessary in Reveille. There would be a small loss of AUMs that would not likely affect the permittee's operation.

Stone Cabin allotment Colvin and Son. Goes southwest along the west side of the Kawich to the Test Site boundary into Ralston Allot. The potential rail corridor would split Tom Colvin's portion of the Stone Cabin Allotment into two separate pastures. This could be useful to us for management purposes. We could develop a three pasture rest-rotation with the two pastures in Stone Cabin and a third in the Ralston Allotment. The railroad corridor would have to be fenced off to keep Tom Colvin's cattle off the railroad tracks. New waters will also need to be developed and underpasses will need to be available for access into the other portions of the allotment. There would be a small loss of AUMs that would not likely affect the permittee's operation.

Ralston allotment Colvin and Son. Goes along the test site boundary into Montezuma allot. There are currently no permanent permits issued in the Ralston Allotment. The potential rail corridor runs through South Ralston along the test site boundary fence.

The BLM has issued a Temporary Nonrenewable Permit in South Ralston adjacent to the proposed track. The track will not cut off access to water and will not effect the AUMs permitted. The railroad corridor will need to be fenced through this area to keep cattle off the tracks.

Montezuma allotment. Follows the east side of the allotment until Scotty's Junction, crosses the highway and back to go around Scotty's Junction. Continues down the corridor to Razorback.

Razorback allotment. (Plate 12, C, D & E, 1 & 2) At this time the permittee in Razorback is taking nonuse and will not be affected by the railroad. If in the future the rancher activates his permit the railroad will cut through the private land in Oasis Valley cutting off Coffer's ranch from the rest of the allotment. Water is available at the ranch. The area east of the ranch does not have water. There is some water available north of Oasis Valley on the Test Site. If the railroad is fenced, drainage underpasses should allow cattle access to water. The rancher may need to provide water on the northeast side of the allotment. The railroad will also cut off approximately 16 sections in the southwest end of the allotment. This includes Bare mountain and Specie Spring. No water is available on the remaining 30 sections of valley south of Yucca Mountain, east of the railroad. Drainage underpasses will provide some access to specie spring. Cattle may tend to overuse the west side of the railroad. Water should be provided on the east side of the railroad to alleviate any overuse on the west side.

The Carlin route has 3 different routes in our area. It starts in Beowawe goes into Lander County and splits at Hickison Summit. One route goes through Monitor Valley the other through Smoky Valley.

The Smoky Valley route cuts through Smoky, San Antone, Monte Cristo and Montezuma allotments. It meets the Caliente route south of Tonopah.

The Monitor Valley route cuts through Monitor, Ralston, San Antone and Hunts Canyon. It meets the Smoky route either north of the San Antone Mountains or south of Tonopah.

Smoky allotment. The route cuts through the center of the valley not along the road. Near Round Mountain it crosses the highway into Francisco.

Francisco allotment. (Plate 4, A & B4) There are two possible routes in Francisco. The southern route will follow the highway fence in the south pasture opposite Round Mountain approximately 3 1/2 miles then turning southwest for 2 miles cutting approximately 640 acres off of the southeast corner of Francisco near the alfalfa field. The route has no benefit to the livestock operation. The rancher will loose a small amount of AUMs if the track does not cut through the winterfat flats. However it appears that the track will go through one of the winterfat flats. The rancher will need a reduction of permitted AUMS. This route does not appear to cut the rancher off from developed waters. It may cut access off to the winterfat in the 640 acres in the southeast corner if no underpasses are put in.

The northern route will cut the north pasture in half making a east and west half. It will also divide the south pasture into east and west sides (40% east and 60% west). When the corridor is fenced, Francisco will be a 4 pasture allotment. This will allow for new grazing management options. Drainage underpasses could be used to move cattle in and out of pastures. There are few developed waters on the west side. This might cause some difficulties for the permittee. They will need to haul water to new pastures. Some forage may be lost to the new railroad right of way but it may not significantly effect the livestock operation if the railroad does not run through the winterfat flats. If the railroad does there may need to be a reduction of AUMs for the permit.

San Antone allotment. The Smoky valley route enters San Antone just south of Francisco allotment and travels south to the Cypress Mine and south near the paved road to the highway. The Monitor Valley route enters San Antone from the east just above the Cypress Mine and then follow the Smoky route south.
Monte Cristo allotment. The railroad would only cut off the far eastern corner of this allotment near Tonopah. This does not impact the livestock operation in Monte Cristo.

Montezuma allotment. The Carlin route would cut through the far northeastern corner of the allotment. The route then meets the Caliente route north of Goldfield and follows that route to Yucca Mountain.

Monitor allotment. The Monitor Valley route travels down the middle of Monitor Valley to just east of Belmont. At this point there is no permit on this allotment. In the future if use is permitted on Monitor the railroad will cut the allotment in half making a east and west pasture. When fenced this will make Monitor into a two pasture allotment allowing for new grazing management options. Drainage underpasses could be used to move cattle in and out of pastures. There may be a need to haul water to the new pastures. Some forage may be lost to the new railroad right of way but it will not significantly effect any future permit.

Ralston allotment-Stone Cabin Partnership and Colvin and Son. The Monitor Valley route runs through Ralston allotment from Belmont to north of the San Antone Mountains. The southern route runs east of highway 376 to the Test Site near Mud Lake where it meets the Caliente route. This route would split the two smaller pastures into four pastures. The railroad corridor would possibly cut off part of the Thunder Mountain use area. If this occurs there would be access to the west side of the tracks through underpasses. There may need to be a small reduction in AUMs permitted in Thunder Mountain depending on the actual location of the tracks. Thunder Mountain is used on a temporary basis only. There is no permit in Ralston at this time.

Hunts Canyon allotment-Stone Cabin Partnership. The Monitor route runs south through the middle of Hunts Canyon allotment. This route will divide the Hunt's Canyon Allotment into east and west pastures. When fenced this will allow new grazing management options. Drainage underpasses could be used to move cattle in and out of pastures. There may be a need to haul water to the new pastures. Some forage may be lost to the new railroad right of way but it will not significantly effect any future permit if the tracks do not run through the winterfat flats in the center of the allotment. A reduction in AUMs may be necessary if winterfat is lost. This may affect the livestock operation. New grazing management in Hunts Canyon may alleviate the need for the temporary non-renewable permit outside the allotment by allowing periodic rests on Hunts Canyon. Water haul sites and access routes under the corridor would need to be established to make the pastures useable.

Razorback allotment. See the Caliente route.

The Caliente route appears to be less disruptive to livestock operations than the Carlin route. The Caliente route follows the Test Site boundary farther than the Carlin route can. Since the test Site boundary is already fenced and only one side of the railroad may need to be fenced. The portion of both routes which run through Montezuma, south of Stonewall, along the east of Highway 95, is in an area that is little used by livestock and may not require any fencing. The Caliente route would have less of an impact on range operations in our Field Station. There would be less impact if the train follows the test site boundary closely. Then only one fence would need to be built.

Response
Land-use and ownership impacts common to the construction and operation of all five of the branch rail lines are discussed in Section 6.3.2.1 of the EIS and impacts specific to the proposed Caliente route are discussed in Section 6.3.2.2.1. Land-use impacts specific to the Carlin route are discussed in Section 6.3.2.2.2. The EIS determines that a branch rail line could create a barrier to livestock movement, and quantitatively addresses the acres of grazing lands potentially affected by candidate rail corridors.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

If a corridor was selected for construction of a branch rail line, DOE would conduct field studies along the corridor that would identify specific land uses to be avoided. DOE would avoid land-use impacts and private land to the maximum possible extent. For example, access to grazing areas, forage, and water can be addressed in the early design phase of the rail corridor/alignment. This process would address Bureau of Land Management standard operating procedures for rights-of-way, construction and operation. Water wells would be required along the rail corridor in some areas for soil compaction and dust control during rail construction. It could be possible to improve grazing allotments if the Bureau permitted the use of this water for grazing. Grazing allotment access could be accomplished by designing at-grade structures to permit cattle to cross underneath the railbed.

8.11.1 (5154)
Comment - EIS001444 / 0007
The document does not identify what land use restrictions will be associated with the new 1/4 mile wide railroad. Will this restrict locatable/leasable minerals, surface occupancy, grazing, recreation, etc.?

The number of acres disturbed will be much greater than discussed in the document. A railroad grade and associated road will exceed the projections. This does not consider the number of acres that will be disturbed by construction and access.

Response
Land-use and ownership impacts common to the construction and operation of all five of the branch rail lines are discussed Section 6.3.2.1 of the EIS and impacts specific to each route are discussed in the appropriate subsections. Table 2-10 summarizes the amount of land that would be disturbed for each corridor. The EIS determines that a branch rail line could create a barrier to livestock movement, and quantitatively addresses the acres of grazing lands potentially affected by candidate rail corridors.

DOE acknowledges the recreational resources afforded by open space within parts of Nevada. In Section 6.3.2 of the EIS, DOE identifies potentially affected natural resource areas within each corridor. DOE would seek to minimize any restriction to or control over public lands used for recreational purposes and would develop specific mitigation measures to alleviate potential impediments to continued use of public lands.

For any land that would be acquired, including mineral claims, landowners would be fairly compensated under Federal eminent domain procedures. When affected property was not acquired by eminent domain, mitigation measures would be evaluated and implemented as appropriate, as indicated in Section 9.3.1 of the EIS, when construction and operation of transportation facilities would result in (1) impacts to publicly used lands such as grazing allotments, (2) direct and indirect land loss, and (3) displacement of capital improvements.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

If a corridor was selected for construction of a branch rail line, DOE would conduct field studies along the corridor that would identify specific land uses to be avoided. DOE would avoid land-use impacts and private land to the maximum possible extent. Grazing allotment access could be accomplished by designing at-grade structures to permit cattle to cross underneath the railbed. It is possible that a branch rail line could be constructed across a mining claim. However, access to claims would not be restricted with the exception of that portion where the actual roadbed was constructed. Access to either side of a valley traversed by a rail branch line would be possible. Sufficient crossing structures would be constructed to allow access from either side.

8.11.1 (5160)
Comment - EIS001444 / 0013
The "Carlin" rail transportation corridor passes through Cortez Canyon and adjacent areas which have a high potential for containing valuable mineral deposits. The document indicates that no preferred transportation corridor has been selected and that if/when such specific routes are to be selected additional field surveys, resource analysis, consultation, and NEPA [National Environmental Policy Act] review will be initiated. Also, Appendix J indicates that one of the alternative routes associated with the "Carlin" corridor would circumvent the Cortez area. The document provides no detailed maps depicting the corridors and the potential for additional significant mineral development in the Cortez area is a real possibility and could pose a definite conflict with the proposed rail corridor.

There is no discussion of the Cortez Gold Mine in the discussion of the Carlin corridor.

Response
DOE is aware of the Cortez Gold Mines operation in Crescent Valley and has included a discussion of the mine area in Section 6.3.2.2.2 of the EIS. Table 8-1, Figure 8-5 (map), and Sections 8.1 and 8.4 provide a discussion of the Cortez Gold Mines Pipeline Project and possible cumulative impacts.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

For any land that would be required, the Department would fairly compensate landowners under Federal acquisition procedures. DOE is required to use fair market value in the acquisition of real property. DOE must comply with the policies contained in the Uniform Relocation Assistance and Real Property Acquisition Policies Act, Title III, which includes the provision that the Agency (DOE) offer just compensation.

In other cases, as indicated in Section 9.3 of the EIS, mitigation measures would be developed where construction and operation of transportation facilities would result in (1) impacts to publicly used lands such as grazing allotments, (2) direct and indirect land loss, and (3) displacement of capital improvements.

8.11.1 (5394)
Comment - EIS001887 / 0102
Page 2-47; Section 2.1.3.3.2 - Nevada Rail Scenario

DOE's rail corridor selection study is flawed. The first selection criteria used by DOE to select potential routes was land use compatibility. For this criteria, DOE selected corridors based upon using "land under public ownership, to the greatest extent possible, to minimize land-use conflicts." Favorable topography was used as a selection criteria only within "areas not excluded because of land-use conflicts" (Nevada Potential Repository Preliminary Transportation Strategy, Study 1, April 1995, page 25).

There are serious problems with this approach. Land ownership does not accurately reflect land-use. Most western ranching operations are based upon a combination of privately owned fee land and grazing leases on publicly owned lands. In many, if not all cases, the ranching unit depends on these grazing leases to be economically viable. Most grazing leases are held by the ranches that can access the lease as a logical part of their operation. Splitting an existing operation with a rail line that will limit access to the leased land can have significant adverse effects on the operation of the ranch. Using the avoidance of privately owned land as the corridor selection process without regard to the existing ranching operations' use of private and public lands may very well result in greater impact on an operation than using private land.

Most of the private land in western States with high percentages of federally owned land is land with gentle topography. Early settlers selected the flatter land for their own. The land with rugged topography was not settled and remained in public ownership. This shift to rugged terrain to avoid private land is a dominant factor in most of the routes selected for further study in the 1990 Preliminary Rail Access Study, as reflected by the following: "An option was selected from the Caliente area in order to avoid land use impacts encountered in most of the southern areas of Nevada.... The base route has the most favorable land-use compatibility, but would incur significant costs due to the complex engineering and construction required to traverse rough terrain" (page 17). "However, the checkerboard pattern of private and public land ownership surrounding the railroads across northern Nevada makes the complete avoidance of private land difficult. The minimum impact departure point is a location about 5 miles west of Carlin. The terrain in this area is so rugged that private developers were uninterested in the land, and as a result, the greater portions of the terrain were left in BLM [Bureau of Land Management] ownership" (page 21).

By using land ownership for the first selection criteria, DOE's selection process actually favored more rugged terrain where construction of the proposed rail line is more difficult. This creates many additional land-use impacts due to the extensive cuts and fills required by unfavorable topography. These cuts and fills will further exacerbate the problem faced by ranchers in moving livestock and equipment across the rail line.

Response
Sections 2.1.3.3 and 2.3.3 of the EIS describe the methods used to select and describe the proposed alternative routes and modes for transportation in Nevada. Section 6.3 describes the potential impacts for these routes and modes.

DOE's objective, with respect to rail corridors, was to identify reasonable and representative 400-meter (0.25-mile)-wide corridors that would produce the least environmental and stakeholder impact based on published environmental and land-use data. Another consideration was to evaluate corridors that are cost-effective (for example, balancing cut and fill to the extent possible).

In its assessment of potential land-use impacts, DOE considered the differences between land-use types, land disturbances, land ownership, and the creation of barriers. The assessment compared proposed use of land for Yucca Mountain transportation purposes to existing or other proposed land uses to estimate the magnitude and context of potential conflicts. If an action would result in continuing a current land use either due to little or no impact or through mitigation, the effects were considered insignificant or small. For example, as discussed in Chapter 6, the impacts to livestock and Bureau of Land Management grazing allotments could be mitigated through the use of fencing, overpasses, and underpasses, which could provide a water source to animals cut off from current sources. By providing these mitigating measures, the impacts would be lessened and considered small. If an action could result in departures from existing uses, and mitigation could not remedy the conflict, the effects could be more substantial.

Factors considered included the uniqueness of a geographic area; presence of historic, scientific, and cultural resources; potential effects on endangered species; and compliance with Federal, State, or local law. Based on information available, potential land-use impacts associated with Yucca Mountain transportation activities could be minimized through judicious alignment of the branch rail line or through mitigation. Overall, the land-use impacts would not be substantial due to the use of various optional and alternate routes within the corridor, mitigation measures, and the judicious routing of the branch rail line within the corridor.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

8.11.1 (5396)
Comment - EIS001887 / 0104
Page 2-47, Section 2.1.3.3.2

Roadless areas are also more likely to be found in rugged terrain. Virtually all potential wilderness areas are located on public lands. The selection criteria that avoids private lands results in more potential impact to roadless areas and potential wilderness areas.

Response
Sections 6.3.2.1 and 6.3.2.2 of the EIS discuss the common impacts that could be caused by the construction and operation of branch rail lines in Nevada and the specific impacts that would occur for specific branch rail line alternatives, respectively. Although the candidate rail corridors pass through some roadless areas, Tables J-41 through J-45 list the variations for each of the corridors and describe potential conflicts, including those for wilderness study areas. For example, Table J-45 lists the two wilderness study areas involved in the Valley Modified Corridor as recommended by the Bureau of Land Management as “not recommended for Wilderness” designation.

In some instances, mountainous terrain could not be avoided with candidate corridors due to the fact that the majority of the mountains in Nevada are oriented in a north-south direction. Whenever possible, mountainous terrain was avoided for construction or operational purposes (speed and maintenance) and cost-effectiveness.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

8.11.1 (5489)
Comment - EIS001660 / 0024
The DEIS fails to analyze impacts of the proposed action on agriculture in Nevada. Some residents of Mineral County depend on agriculture for their livelihoods. The BLM [Bureau of Land Management] administers numerous grazing allotments that are leased to Mineral County ranchers. The DEIS must disclose the impacts upon Mineral County agriculture of: (1) construction and operation of access roads and railroads, (2) introduction and spread of noxious weeds, (3) increased risk of wildfire, and (4) increased risk to animals. The DEIS must address both the short-term construction impacts and the longer-term impacts upon the range.

Response
DOE does not expect any direct impacts to Mineral County because none of the candidate rail corridors, legal-weight truck routes, or heavy-haul truck routes pass through the County (see Figures 6-13, 6-14, and 6-20). The closest branch rail line would be the Carlin Corridor, which lies to the east in Nye County.

Similarly, because DOE does not anticipate that transportation or Yucca Mountain Repository workers would reside in Mineral County, it does not believe there would be discernible influences on the county's land-use and community development.

8.11.1 (5511)
Comment - EIS001660 / 0030
The DEIS fails to adequately address the impacts of the proposed action on land use and community development in Mineral County. Mineral County (MC) will be promoting tourism. One area for tourism is hiking and outdoor activities.

Another consideration for MC's land would be to have a private prison in an area close to one of the possible routes. Issues of concern to Mineral County residents include: (1) the protection of private property rights and value of land assets; (2) the fiscal, agricultural, and groundwater impacts from parcelization of land; and (3) the need to acquire land from the BLM [Bureau of Land Management] for community expansion, to increase the amount of private land, and to erase restrictions on the use of federal lands. The DEIS fails to describe impacts on Mineral County's land use and community development, and does not evaluate whether the proposed action conflicts with its policies. The DEIS does not adequately address the potential effects that this project could have on property values within Mineral County. Since agriculture is one of Mineral County's economic producers, the nuclear stigma could affect not only property values, but also crop prices. Such stigma could stymie Mineral County's efforts to diversify the local economy, retain existing businesses, and attract new businesses to the county. The DOE seems to assume that land uses of rural communities are not significant, while land uses by federal agencies are. The DEIS must disclose and evaluate: (1) the DOE's planned use of eminent domain to take private land for transportation routes and rail corridors; (2) the effect of the proposed action on private property values, including the perceived risk and stigmatization and the effects of improved or restricted access to private property; and (3) the potential growth-effects of the proposed action, and whether it would result in additional parcelization of private land.

Response
DOE does not expect any direct impacts to Mineral County because none of the candidate rail corridors, legal-weight truck routes, or heavy-haul truck routes pass through the County (see Figures 6-13, 6-14, and 6-20). The closest branch rail line would be the Carlin Corridor, which lies to the east in Nye County.

Similarly, because DOE does not anticipate that transportation or Yucca Mountain Repository workers would reside in Mineral County, it does not believe there would be discernible influences on the county's land-use and community development.

8.11.1 (5569)
Comment - EIS001887 / 0196
Page 3-100; Section 3.2.2.1.1 - Land Use and Ownership

The definition of region of influence for land use is too narrow. Impacts to land use may occur that do not result in a change of ownership or use. For example, bisecting a ranch with a rail line will have substantial impacts on that operation. It will be difficult for the rancher to move equipment and livestock from one side of the rail line to the other. Because of the difficulty in operating the ranch that is now split into two pieces, the value of the ranch will be reduced. This will have significant impact on the rancher without changing the ownership or the use of the land. The region of influence for land use should include all of the land under the ownership or lease of agricultural operations that will be crossed. (Note: this same discussion applies to the intermodal transfer station and heavy-haul routes.)

Response
Section 3.2.2.1.1 of the EIS does state that area disturbed and change in land ownership were criteria used in evaluating land use. However, Section 3.2.2 describes in more detail the information and data collected about the

alternative transportation routes in Nevada. The Department's objective, with respect to rail corridors, was to identify reasonable and representative 400-meter (0.25-mile)-wide corridors that would produce the least environmental and stakeholder impact based on published environmental and land-use data. Another consideration was to evaluate corridors that are cost-effective (for example, balancing cut and fill to the extent possible).

In its assessment of potential land-use impacts, DOE considered the differences between land-use types, land disturbances, land ownership, and the creation of barriers. The assessment compared proposed use of land for Yucca Mountain transportation purposes to existing or other proposed land uses to estimate the magnitude and context of potential conflicts. If an action would result in continuing a current land use either due to little or no impact or through mitigation, the effects were considered insignificant or small. For example, as discussed in Chapter 6, the impacts to livestock and Bureau of Land Management grazing allotments could be mitigated through the use of fencing, overpasses, and underpasses, which could provide a water source to animals cut off from current sources. By providing these mitigating measures, the impacts would be lessened and considered small. If an action could result in departures from existing uses, and mitigation could not remedy the conflict, the effects could be more substantial.

DOE is aware that a rail corridor would have impacts to ranching, recreational uses, and other activities and has described those potential impacts for the alternative rail corridors for legal-weight trucks in Section 6.3.2 of the EIS and 6.3.3 for heavy-haul trucks.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

8.11.1 (5693)
Comment - EIS001887 / 0308
Page 6-8 to 6-9; Section 6.1.2.1 - Land Use

DOE has not accurately identified or assessed the land use impacts of the Nevada transportation alternatives. Even where DOE has identified land use impacts, DOE has understated the nature and severity of the impacts. The failure by DOE to accurately describe the Proposed Action also prevents an adequate assessment of land use impacts. For example, the land use impacts associated with the development of ballast and sub-ballast quarries, solid waste disposal facilities, construction lay-down areas, and construction staging areas cannot be assessed until these areas are identified.

The conclusions regarding land use impacts in the Draft EIS rely primarily on disturbed acreage. Although this is one measure of land use impacts, it is not the only one. For linear facilities such as a branch rail line, an assessment of land use impacts should also include an evaluation of the impacts of bisecting current and future land uses. As discussed above in the comment on Section 2.1.3.3.2, Nevada Rail Scenario, splitting an area with a branch rail line can have significant impacts on the entire area, not just the area within the right-of- way. This is particularly true for ranching operations. DOE has not assessed this type of land use impact in the Draft EIS.

DOE has identified a number of land use conflicts with the proposed rail line, but has not accurately characterized the impact of these conflicts. For example, potential rail corridors cross the Simpson Park Habitat Management Area (Carlin), the Old Spanish Trail/Mormon Road special recreation management area (Jean), Wilderness Study Areas (Valley Modified), and the Desert National Wildlife Range (Valley Modified). A rail line through these special land use areas would have significant impact on the purpose of these special areas. The EIS does not even discuss these impacts. It is particularly difficult to understand why DOE has not eliminated the Caliente Chalk Mountain alternative. The U.S. Air Force has unequivocally stated that this alternative is unacceptable due to its impacts on the Nellis Air Force Range.

Proposed rail line corridors also cross areas of potential future community growth. Although DOE identifies these areas, the Draft EIS does not contain an assessment of the impacts of this conflict on future community growth patterns. The area of particular concern is the impact of the proposed Valley Modified route on growth in the north Las Vegas urban area.

Many of the areas crossed by potential rail corridors are currently remote, undeveloped areas. Much of the area is currently roadless, including Wilderness Study Areas. Regardless of the decision by the land management agency regarding classification as wilderness, construction of a rail line through a remote, roadless area will have land use impacts. These changes in land use should be identified and assessed.

From a land use perspective, the only rail alternative that does not have serious land use conflicts is the Caliente corridor. Even this corridor could impact the Nellis Air Force Range. All other rail alternatives cross or impact areas designated as special purpose land use. These conflicts are summarized below:

[Please see document image file to view table.]

DOE lists the Caliente/Chalk Mountain corridor as a non-preferred alternative, based upon the Air Force's statement that no route that traverses Nellis Air Force Range is acceptable. Based upon this comment, the route (and the associated heavy-haul route) should have been eliminated from the alternatives included in the Draft EIS and listed in Section 2.3 as an alternative considered but eliminated from detailed study.

Response

Sections 6.3.2.1 and 6.3.2.2 of the EIS address the potential common and specific impacts of Nevada rail implementing alternatives, respectively, including land-use impacts. In an effort to provide decisionmakers and stakeholders with the information needed to make a rail or heavy-haul truck transportation decision for Nevada, regions of influence were developed and the level of information needed within those regions defined.
In its assessment of potential land-use impacts, DOE considered the differences between land-use types, land disturbances, land ownership, and the creation of barriers. The assessment compared proposed use of land for Yucca Mountain transportation purposes to existing or other proposed land uses to estimate the magnitude and context of potential conflicts. If an action would result in continuing a current land use either due to little or no impact or through mitigation, the effects were considered insignificant or small. For example, as discussed in Section 6.3.2.1, the EIS determines that a branch rail line could create a barrier to livestock movement, and quantitatively addresses the acres of grazing lands potentially affected by rail corridors. However, the impacts to livestock and Bureau of Land Management grazing allotments could be mitigated through the use of fencing, overpasses, and underpasses, which could provide a water source to animals cut off from current sources. By providing these mitigating measures, the impacts would be lessened and considered small. If an action could result in departures from existing uses, and mitigation could not remedy the conflict, the effects could be more substantial. Factors considered when assessing impacts included the uniqueness of a geographic area; presence of historic, scientific, and cultural resources; potential effects on endangered species; and compliance with Federal, State, or local law.

As described in the introduction to Chapter 6, in response to interest and suggestions by the public and to better describe potential impacts of transportation alternatives in Nevada, DOE modified analyses and presentations of impacts in the EIS. For example, additional details, when available, and evaluations are included for wilderness study areas, grazing allotments, sensitive biological resources, management areas, cultural resources, and hydrologic resources.

Section 6.3.2.2.5 of the EIS describes the impacts from construction and operation of the Valley Modified Corridor Implementing Alternative. The land-use discussion has been expanded and discusses the relationship of the Sheep Mountain Alternate and the Wilderness Study Areas raised by the commenter. In addition, a new subsection has been added to Section J.3.1.2 that presents potential land-use conflicts. Figure J-20 shows the Quail Springs Wilderness Study Area and the Nellis A, B, and C Wilderness Study Areas in relation to the Valley Modified Corridor.

In comments on the Draft EIS, the Air Force restated its position that routes across the Nevada Test and Training Range would not be consistent with its national security uses. The Air Force concluded that use of such a corridor or route could adversely affect critical and sensitive national security activities. In response, DOE reevaluated whether the Caliente-Chalk Mountain Corridor and Caliente/Chalk Mountain heavy-haul truck route should be eliminated from further evaluation. DOE met with the Air Force (see Appendix C of the EIS), considered the information they provided, and concluded that the Caliente-Chalk Mountain Corridor and Caliente/Chalk Mountain heavy-haul truck route implementing alternatives should remain identified as "nonpreferred alternatives" in this Final EIS.

DOE believes, however, that the EIS adequately analyzes the environmental impacts that could result from the Proposed Action. In addition, the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

8.11.1 (5729)
<u>Comment</u> - EIS001887 / 0335
Page 6-43; Section 6.3.2.1 - Impacts Common to Nevada Branch Rail Line Implementing Alternatives
Land Use and Ownership: The Draft EIS fails to adequately evaluate potential land use impacts for the various rail spur alternatives. Table 1 below shows the land use conflicts that should have been fully studied:

[Please see document image file to view table.]

<u>Response</u>
Section 6.3.2.1 of the EIS describes the impacts common to the five branch rail line implementing alternatives. As discussed in Section 2.3.3.1, DOE chose candidate rail corridors in Nevada to maximize the use of Federal lands (with the exception of lands controlled by the Air Force), provide access to regional rail carriers, and minimize, to the extent possible, obvious land-use conflicts. As discussed in Section 6.3.2.2, all of the candidate branch rail lines would require the use of mostly Federal land and very little private land. For example, the Caliente and Valley Modified Corridors would require the use of almost no private land (less than 1 percent). The Carlin and Jean Corridors would require only 7 and 5 percent private land, respectively.

In its assessment of potential land-use impacts, DOE considered the differences between land-use types, land disturbances, land ownership, and the creation of barriers. The assessment compared proposed use of land for Yucca Mountain transportation purposes to existing or other proposed land uses to estimate the magnitude and context of potential conflicts. If an action would result in continuing a current land use either due to little or no impact or through mitigation, the effects were considered insignificant or small. For example, as discussed in Chapter 6, the impacts to livestock and Bureau of Land Management grazing allotments could be mitigated through the use of fencing, overpasses, and underpasses, which could provide a water source to animals cut off from current sources. By providing these mitigating measures, the impacts would be lessened and are considered small.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

8.11.1 (5760)
Comment - EIS001887 / 0363
Page 10-6; Section 10.1.2.1 - Land Use

The Draft EIS assumes that 0.04 square kilometers could be needed to construct a bypass near Beatty. The Draft EIS ignores the fact that at least two other locations will also require bypasses - Tonopah and Goldfield.

Response
As indicated in Section 6.3 of the EIS, DOE believes a new section of road would be required near Beatty, Nevada, to accommodate potential heavy-haul truck traffic. The road would be required because of the severity of road turns in the existing roadway. Based on the engineering studies that DOE has conducted, however, DOE does not believe new sections of road or bypasses would be required in Tonopah and Goldfield. The existing roadways could be sufficiently upgraded to accommodate the heavy-haul truck traffic.

8.11.1 (5989)
Comment - EIS001879 / 0014
Not only does the Draft EIS underestimate the radiological risk of routine transportation through rural communities along US-95, it also provides an incomplete assessment of the potential effects of routine transportation of highly radioactive wastes through these communities over a 30-40 year period. Specifically, the Draft EIS does not address the potential effects of such transport on the value of commercial and residential properties along the transportation routes, or the potential effects on visitors and travelers to patronize lodging along the transportation routes. The EIS must address the potential impacts of this lost socioeconomic opportunity.

Response
Based on the results of the impact analyses presented in Chapter 6 and Appendix J of the EIS, as well as the results published in numerous other studies and environmental impact analyses cited in the EIS, DOE is confident that spent nuclear fuel and high-level radioactive waste can be and would be safely transported to Yucca Mountain. DOE believes, as the EIS reports, that the potential impacts of this transportation would be so low for individuals who live and work along the routes that these individual impacts would not be discernible even if the corresponding doses could be measured. The analysis presented in the EIS factored in the characteristics of spent nuclear fuel and high-level radioactive waste, the integrity of shipping casks that would be used in transport, and the regulatory and programmatic controls that would be imposed on shipping operations (see Appendix M). The EIS analytical results are supported by numerous technical and scientific studies which have been compiled through decades of research and development by DOE and other Federal agencies of the United States, including the Nuclear Regulatory Commission and the U.S. Department of Transportation, as well as by the international community, including the International Atomic Energy Agency.

Regarding the potential for economic impacts along routes that shipments would use, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Section 2.5.4 and Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty

- Much of the uncertainty is irreducible, and

- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents,

which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

8.11.1 (6645)
Comment - EIS001878 / 0034
The land use descriptions for the rail corridors in Nevada are inadequate. (p. 3-101 to -103) The land use regions of influence are narrowly drawn (limited only to disturbed lands and changes in ownership), and the only information provided for the Carlin corridor (for example) is the amount of public and private land. Although the DEIS says that "detailed information on land use is available" in other documents, it fails to describe their contents even briefly, as required by 40 CFR 1502.21. According to testimony before the DOE at the Crescent Valley public hearing on December 9, 1999, the description in the DEIS of existing land uses is inadequate and inaccurate. On page 6-61, the DEIS names two towns, Gold Acres and Tenabo, that are not presently inhabited, witnesses said.

Response
Section 3.2.2.1 of the EIS provides the baseline environmental information for assessing the potential impacts of implementing Nevada rail implementing alternatives. The more notable land-use features and potential influences that exist or could exist on lands within the corridors are presented in Chapter 6. For example, the land features within the Carlin Corridor are presented in Section 6.3.2.2.2.

The listing of communities in Section 6.3.2.2.2 of the EIS served two purposes: (1) to identify potentially affected communities, and (2) as map references points. Gold Acres and Tenabo are historic reference points in the vicinity of the Carlin Corridor.

In its assessment of potential land-use impacts, DOE considered the differences between land-use types, land disturbances, land ownership, and the creation of barriers. The assessment compared proposed use of land for Yucca Mountain transportation purposes to existing or other proposed land uses to estimate the magnitude and context of potential conflicts. If an action would result in continuing a current land use either due to little or no impact or through mitigation, the effects were considered insignificant or small. For example, as discussed in Chapter 6, the impacts to livestock and Bureau of Land Management grazing allotments could be mitigated through the use of fencing, overpasses, and underpasses, which could provide a water source to animals cut off from current sources. By providing these mitigating measures, the impacts would be lessened and considered small. If an action could result in departures from existing uses, and mitigation could not remedy the conflict, the effects could be more substantial. Factors considered included the uniqueness of a geographic area; presence of historic, scientific, and cultural resources; potential effects on endangered species; and compliance with Federal, State, or local law.

As described in the introduction to Chapter 6, in response to interest and suggestions by the public and to better describe potential impacts of transportation alternatives in Nevada, DOE modified analyses and presentations of impacts in the EIS. For example, additional details, when available, and evaluations are included for wilderness study areas, grazing allotments, sensitive biological resources, management areas, cultural resources, and hydrologic resources.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

8.11.1 (6679)
Comment - EIS001878 / 0051
The DEIS fails to analyze impacts of the proposed action on agriculture in Nevada and specifically Eureka County. Many residents of Eureka County depend on agriculture for their livelihoods. The BLM [Bureau of Land Management] and the U.S. Forest Service administer numerous grazing allotments that are leased to ranchers in Eureka County and neighboring counties. The DEIS says that the Carlin corridor would cross 12 allotments, that

construction of the rail line would require "conversion of land" within those allotments, but that "functionality" would not be affected. (p. 6-61) These statements are vague and unsupported by any evidence.

The DEIS must disclose the impacts upon Eureka County agriculture of: (1) conversion of water rights or agricultural land to other uses, (2) fragmentation of range or grazing allotments, (3) damage to forage from land disturbance, introduction of weeds, increased wildfire, or other factors, (4) restrictions on livestock movement, (5) loss of water supplies, or restricted access to water supplies, (6) loss of livestock hit by trains or other motor vehicles, and the associated public safety implications, (7) changes in value of agricultural lands or permits, (8) changes in the costs of agricultural production, and (9) increases in harassment of livestock. The impact analysis must address both construction and operation of fences, water wells, the railroad bed and tracks, and access roads along and perpendicular to the tracks. The DEIS must also disclose whether fragmentation of grazing allotments or changes in values of agricultural lands and associated appurtenances would be a taking of private property rights requiring compensation under the Constitution of the United States.

Regarding fences, testimony at the public hearing before the DOE at Crescent Valley on December 9, 1999, indicated that numerous railroad right-of-way fences were destroyed during recent range fires in Eureka County and neighboring counties, and that requests by the Board of Eureka County Commissioners to the railroads to repair the fences have not been filled. Thus, the DEIS must disclose how fences will be maintained, as well as the possible impacts on agriculture from poorly maintained right-of-way fences.

Response
Section 6.3.2.2.2 of the EIS discusses the potential impacts specific to the Carlin Corridor. For example, the land-use section lists the 12 grazing allotments that the corridor crosses. The EIS determines that a rail line could create a barrier to livestock movement, and quantitatively addresses the acres of grazing lands potentially affected by candidate rail corridors.

If the Carlin Corridor was selected for construction of a branch rail line, DOE would conduct field studies along the corridor that would identify specific land uses to be avoided. DOE would avoid land-use impacts and private land to the maximum possible extent. For example, access to grazing areas, forage, and water could be addressed in the early design phase of the rail corridor/alignment. This process would address Bureau of Land Management's standard operating procedures for rights-of-way, construction and operation. Water wells would be required along the rail corridor in some areas for soil compaction and dust control during rail construction. It could be possible to improve grazing allotments if the Bureau permitted the use of this water for grazing. Grazing allotment access can be accomplished by designing at-grade structures to permit cattle to cross underneath the railbed. DOE would be responsible for track maintenance, including fencing.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

8.11.1 (6691)
Comment - EIS001878 / 0060
The DEIS fails to adequately address the impacts of the proposed action on land use and community development in Eureka County. (pp. 6-36, -43, -44, -60) Impacts on land use would extend far beyond a 60-meter construction zone or a 400-meter corridor with construction camps. (p. 6-44) Almost 60 percent of the assessed private parcels of land in Eureka County are within 10 miles of the Carlin rail corridor, which would affect 1,730 acres of private land along its length. (p. 6-7) (See Exhibit G.) County residents also use public lands for mining, agriculture, and other

uses. Eureka County's Master Plan (January 1997) and its Land Use Element (July 1998) identify land use issues of concern to county residents, including (among others):

- The protection of private property rights and the value of land assets;
- The fiscal, agricultural, and groundwater impacts from parcelization of land; and
- The need to acquire land from the BLM [Bureau of Land Management] for community expansion, to increase the amount of private land, and to ease restrictions on the use of federal lands.

The goals and policies of the Land Use Element:

- Discourage federal actions that threaten to impair the use or value of private property rights;
- Encourage the transfer of public land to private ownership; and discourage transfer of private land to public ownership.

The DEIS fails to describe the Eureka County Master Plan and its land use element, and fails to evaluate whether the proposed action conflicts with its policies. The DOE appears to assume that land uses of rural residents are not significant, while land uses by federal agencies are. The DEIS must disclose and evaluate: (1) the DOE's planned use, if any, of eminent domain to take private land for the rail corridor, (2) the effect of the proposed action on private property values, including the effects of perceived risk and stigmatization and the effects of improved or restricted access to private property, and (3) the potential growth-inducing effects of the proposed action, and whether it would result in additional parcelization of private land. The DEIS must also disclose whether changes in values of private lands affected by a rail corridor would be a taking of private property rights requiring compensation under the Constitution of the United States.

Response
DOE believes that the EIS adequately analyzes the environmental impacts that could result from the Proposed Action. In addition, the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative and the Carlin Corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

Specifically, Section 6.3.2.2 of the EIS notes that the branch rail lines would require conversion of land within existing grazing allotments. DOE expects the potential impacts of construction to have a greater effect upon grazing lands than would operations. During the construction phase, it could be difficult for cattle to access water if the construction zone divided the grazing allotment. Construction activity and temporary camps with the presence of construction crews could result in disrupting ranch operations and livestock rotations. There is a possibility that some livestock could be killed along roads used during construction.

DOE, however, expects that after construction, operational impacts would be less even though the branch rail lines could divide some grazing lands. Input received by DOE from the Bureau of Land Management indicates that dividing grazing lands would result in a small loss of animal unit months in large allotments but would be unlikely to affect ranch operations. The loss of animal unit months in small allotments could affect the grazing permittee's operation. The Bureau also indicated that if a branch rail line divided an allotment into separate pastures, such pastures could provide an opportunity to rotate grazing area use, allowing for new grazing management options. This opportunity could benefit livestock and vegetation management.

If the Carlin Corridor was selected for construction of a branch rail line, DOE would conduct field studies along the corridor that would identify specific land uses to be avoided. DOE would avoid land-use impacts and private land to the maximum possible extent. For example, access to grazing areas, forage, and water could be addressed in the early design phase of the rail corridor/alignment. This process would address Bureau of Land Management standard operating procedures for rights-of-way, construction and operation. Water wells would be required along the rail corridor in some areas for soil compaction and dust control during rail construction. As indicated in Section 9.3.1 of the EIS, DOE would evaluate appropriate mitigation actions that specifically address access to publicly owned lands, including grazing permits and leases. These actions could include providing access to lands on both sides of a branch rail line with underpasses and assisting in providing water should there be a need. It could be possible to improve grazing allotments if the Bureau permitted the use of this water for grazing.

Regarding private property along the rail corridor, DOE is required to use fair market value in the acquisition of real property. DOE must comply with the policies contained in the Uniform Relocation Assistance and Real Property Acquisition Policies Act, Title III, which includes the provision that the Agency (DOE) offer just compensation.

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Section 2.5.4 and Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty

- Much of the uncertainty is irreducible, and

- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

8.11.1 (6702)
Comment - EIS001878 / 0068
The DEIS fails to address the impacts of the proposed action on recreation in Eureka County and neighboring counties. Residents of Eureka County, as well as residents of other parts of Nevada and other states, rely on open spaces within the county for its unique recreation opportunities, including camping, hunting, fishing, nature study, history study, back country travel, horse pack trips, and sightseeing. Eureka County and its neighboring counties include large unspoiled areas that could be affected, directly or indirectly, by the proposed action.

The DEIS must analyze the anticipated impacts of the proposed action on recreation. Specifically, the DEIS must consider the impacts of: (1) constructing and operating a raised railroad bed and access road through back country areas and hunting ranges, (2) constructing and operating roads connecting the rail corridor to resources such as borrow pits, (3) constructing fences, (4) restricting or improving access to the back country, (5) direct and indirect damage to recreational, historical, and natural resources, and (6) direct and indirect impacts on fish and game.

The DEIS says, “Each corridor has areas the public uses and areas available for sale and transfer. As a consequence, the rail line could result in limited access to areas currently in use by the public.” (p. 6-44) Does this mean that areas traditionally available for outdoor recreation, including hunting and fishing, will be off limits? Does it mean that a person would need permission from the DOE or the rail operator to have access to such areas?

Response
DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative and the Carlin Corridor be selected, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

DOE acknowledges the recreational resources afforded by open space within parts of Nevada. In Section 6.3.2 of the EIS, DOE identifies potentially affected natural resource areas within each rail corridor. DOE would seek to minimize any restriction to or control over public lands used for recreational purposes and would develop specific mitigation measures to alleviate potential impediments to continued use of public lands.

A branch rail line could be constructed across a trail or road access. However, access would not be restricted with the exception of that portion where the actual roadbed was constructed. Access to either side of a valley traversed by a rail branch line would be possible. Sufficient crossing structures would be constructed to allow access from either side.

8.11.1 (6986)
Comment - EIS002068 / 0003
One question I have is what happens to the mineral and Steam rights etc? Personally I think the Mineral etc rights should still belong to the owners of the land at the time of the Sale to the Gov.

Response
Sections 6.3.1, 6.3.2, and 6.3.3 of the EIS address the potential impacts of Nevada legal-weight truck, heavy-haul truck, and branch rail line implementing alternatives, respectively, including land-use impacts. These sections recognize and describe the impacts related to rights-of-way acquisition for branch rail lines and developing or upgrading highways. The Department is interested in acquisition of rights-of-way or land withdrawal from public and private land only for constructing and operating a branch rail line or expanding existing roads for heavy-haul trucks. The acquisition of mineral or steam rights would not be sought.

8.11.1 (7150)
Comment - EIS001337 / 0047
The County [Lincoln] and City [Caliente] urged DOE to assess rail construction related losses in forage for livestock grazing. While the DEIS recognizes that some forage might be lost and that livestock movements might be impeded, no estimate of lost animal unit months (AUM’s) of forage is provided within the DEIS.

Response
Because definitive information is not available on specific tracts of land that could be required in a given transportation alternative, DOE did not quantify potential impacts to animal unit months. Input received from the Bureau of Land Management, however, indicated that dividing grazing lands would result in a small loss of animal unit months in large allotments but would be unlikely to affect ranch operations. The loss of animal unit months in small allotments could affect a permittee’s operation. The Bureau also indicated that if a branch rail line divided an allotment into separate pastures, this could provide grazing management options, potentially benefiting livestock and vegetation management.

8.11.1 (7212)
Comment - EIS001337 / 0092
Page 3-101 Table 3-33. This table does not appear to reflect Bureau of Indian Affairs lands that would be crossed in the vicinity of U.S. 95 north of Las Vegas.

<u>Response</u>
Table 3-33 of the EIS does not include the Bureau of Indian Affairs lands referred to in this comment because the DOE analysis was limited to lands within the candidate rail corridors. However, Figure 3-1 does recognize lands controlled by Native American tribes in Nevada.

Section 6.3.2.2.5 of the EIS indicates that the Valley Modified Corridor would pass within about 1.6 kilometers (1 mile) of the Las Vegas Paiute Indian Reservation north of Las Vegas.

8.11.1 (7237)
<u>Comment</u> - EIS001337 / 0119
Page 8-87 Section 8.4.2.1. This section should recognize that before the Caliente Intermodal site could be used by DOE the existing City of Caliente wastewater treatment facilities would have to be relocated. A site for such relocation would need to be obtained by DOE.

<u>Response</u>
Section 6.3.3.2.1 of the EIS acknowledges that the northern site includes an existing wastewater treatment plant. The EIS has been revised by stating that a transfer of property from the Bureau, the City of Caliente, or other entities to DOE would be required.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

Nonetheless, should the heavy-haul truck implementing alternative be selected for transporting large rail casks to the Yucca Mountain site, and the Caliente Route implementing alternative be identified as preferred, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including location of facilities.

8.11.1 (7416)
<u>Comment</u> - EIS001912 / 0011
Lander County is opposed to the Crescent Valley rail alternative. The lack of proposed mitigation, limited impact analysis, and failure to consult appropriate land management agencies brings into question DOE's commitment to building a transportation facility which adequately protects public health and implement mitigation which eliminates the radiological risks again imposed on Nevada communities.

<u>Response</u>
DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada. DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada.

If the Yucca Mountain site was approved, DOE would issue at some future date a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

With regard to risk reduction and mitigation, DOE is committed to protecting human and environmental health as its first priority. Transportation of spent nuclear fuel and high-level radioactive waste would be conducted and risks would be managed in accordance with Federal regulations. DOE would consider the costs and benefits of additional protective and mitigative measures as more detailed transportation planning and studies are conducted to support the proposed repository. Section 9.3 of the EIS discusses potential measures under consideration by DOE to mitigate the impacts of transporting spent nuclear fuel and high-level radioactive waste to the proposed repository.

Appendix C of the EIS presents a list of Federal, state, local, and tribal government agencies and other organizations with which DOE has initiated interactions during the preparation of the EIS. As stated in Section C.2.4, Lander County is one of the units of local government that has been offered the opportunity to submit documents providing perspectives of issues associated with the EIS. DOE has held formal meetings twice a year with the affected units of local government.

8.11.1 (7453)
Comment - EIS001969 / 0009
The need for rights of way across public lands to access the Yucca Mountain Facility could create conflicts with existing land uses in the area through traffic, construction, accidents and incidental spillage of nuclear materials containers. How will these be addressed?

Response
Sections 6.3.1, 6.3.2, and 6.3.3 of the EIS address the potential impacts of Nevada legal-weight truck, heavy-haul truck, and branch rail line implementing alternatives, respectively, including land-use impacts. These sections recognize and describe the impacts related to construction and operation of branch rail lines and developing or upgrading highways, including traffic impacts. Section 6.2.4.2 addresses impacts from accidents, including spills.

DOE acknowledges that some land-use conflicts could be inevitable during the construction and operation of a transportation corridor for the Yucca Mountain Repository. The implementing alternatives for transportation described in the EIS were based in part on attempts to avoid or minimize potential land-use conflicts.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

8.11.1 (7518)
Comment - EIS001912 / 0049
Section 3.2.2.1. The Baseline Description in the DEIS does not provide for the following:

- Outdoor recreation use
- Appropriate visual analysis including visual characteristics of surrounding lands.
- Specific land uses residential, commercial, agricultural
- Mining claims and activity-patented mining claims
- Grazing-allotment, name of permit holder, season of use, total aums

Land use maps showing types of ownership and uses along the routes should be included in the DEIS. Simply referencing other BLM [Bureau of Land Management] documents is not sufficient. Lander County is not in the Tonopah Resource Area. All of the aforementioned resources and uses need to be shown on maps with discussion of various resources. Did any DOE staff or contractors actually visit the areas along proposed routes? Please identify the resource expert and the type of site visits made.

Response
Sections 6.3.2.1 and 6.3.2.2 of the EIS address the potential common and specific impacts of Nevada rail implementing alternatives, respectively, including land-use impacts. As described in the introduction to Chapter 6,

in response to interest and suggestions by the public and to better describe potential impacts of transportation alternatives in Nevada, DOE modified analyses and presentations of impacts in the EIS. For example, additional details, when available, and evaluations are included for wilderness study areas, grazing allotments, sensitive biological resources, management areas, cultural resources, and hydrologic resources.

Section 3.2.2.1 of the EIS is based on a combination of published information and field observations. Based on published environmental data, 54 springs, perennial streams, and Bureau of Land Management-designated riparian areas were visited by DOE biologists to determine if those sites contain wetlands (DIRS 155378-Reilly and Smith 1997). Fifteen locations with sensitive species were visited to ensure that the sites still had suitable habitat for the species (DIRS 154825-CRWMS M&O 1997). In addition, DOE engineers made an initial visual survey of all rail corridor alternatives as a part of the routing analysis. Topography, land use, and known areas of environmental concern were observed as a part of the corridor centerline selection to minimize impacts to stakeholders (DIRS 131242-CRWMS M&O 1997). Cultural resources, noise, aesthetics, and existing visual conditions were observed by contractor personnel on a field trip along proposed heavy-haul truck routes and rail corridors. Additional interviews with responsible State and Federal agencies were conducted and additional literature searches were performed during the trip. A report has been prepared detailing the information obtained during the trip (DIRS 155826-Nickens and Hartwell 2001) and the relevant information is included in Chapter 6 of the EIS.

DOE acknowledges the recreational resources afforded by open space within parts of Nevada. In Section 6.3.2 of the EIS, DOE identifies potentially affected natural resource areas within each corridor. DOE would seek to minimize any restriction to or control over public lands used for recreational purposes and would develop specific mitigation measures to alleviate potential impediments to continued use of public lands.

For any land that would be acquired, including mineral claims, landowners would be fairly compensated under Federal eminent domain procedures. When affected property was not acquired by eminent domain, mitigation measures would be evaluated and implemented as appropriate, as indicated in Section 9.3.1 of the EIS, when construction and operation of transportation facilities would result in (1) impacts to publicly used lands such as grazing allotments, (2) direct and indirect land loss, and (3) displacement of capital improvements.

DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

8.11.1 (7625)
Comment - EIS001912 / 0081
P. 6-36 looks only at disturbed lands and not lands which are surrounding the corridors which could be impacted.

Response
DOE has not limited its assessment of land use to disturbed lands or changes in ownership. In fact, impacts to land use could occur even if ownership did not change or there was no direct land disturbance. For example, dividing grazing land in a rail corridor could result in the creation of a barrier to cattle movement and could affect a rancher's ability to get cattle to water.

DOE is aware of the possible restrictions inherent in the construction and operation of a transportation corridor and would consider appropriate mitigation actions. For example, the discussions of the corridors in Section 6.3.2.2.1 of the EIS identify potential conflicts with existing or future land uses that a corridor could affect.

8.11.1 (8044)
Comment - EIS000391 / 0010
Other transportation issues of the waste to the Yucca Mtn. site are:

Land use consideration of present and planned land uses along possible routes identified.

Response
In its assessment of potential land-use impacts, DOE considered the differences between land-use types, land disturbances, land ownership, and the creation of barriers. The assessment compared proposed use of land for Yucca Mountain transportation purposes to existing or other proposed land uses to estimate the magnitude and context of potential conflicts. If an action would result in continuing a current land use either due to little or no impact or through mitigation, the effects were considered insignificant or small. For example as discussed in Chapter 6, the impacts to livestock and Bureau of Land Management grazing allotments could be mitigated through the use of fencing, overpasses, and underpasses, which could provide a water source to animals cut off from current sources. By providing these mitigating measures, the impacts would be lessened and considered small. If an action could result in departures from existing uses, and mitigation could not remedy the conflict, the effects could be more substantial.

Factors considered when assessing impacts included the uniqueness of a geographic area; presence of historic, scientific, and cultural resources; potential effects on endangered species; and compliance with Federal, State, or local law. Based on information available, potential land-use impacts associated with Yucca Mountain transportation activities could be minimized through judicious alignment of the branch rail line or through mitigation. Overall, the land-use impacts are not deemed substantial because of the use of various optional and alternate routes within the corridor, mitigation measures, and the judicious routing of the branch rail line within the corridor.

Section 8.4.2 of the EIS discusses the impacts that reasonably foreseeable future actions could have on the construction and operation of a branch rail line.

8.11.1 (8100)
Comment - EIS000406 / 0019
The following issues need to be addressed and thoroughly analyzed concerning direct impacts to Lander County in a detailed manner:

Ranching and grazing allotment impacts

Response
Land-use and ownership impacts common to the construction and operation the five branch rail lines are discussed Section 6.3.2.1 of the EIS and impacts specific to the Carlin Corridor are discussed in Section 6.3.2.2.2. The EIS determines that a branch rail line could create a barrier to livestock movement, and quantitatively addresses the acres of grazing lands potentially affected by candidate rail corridors.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

If a corridor was selected for construction of a branch rail line, DOE would conduct field studies along the corridor that would identify specific land uses to be avoided. DOE would avoid land-use impacts and private land to the maximum possible extent. For example, access to grazing areas, forage, and water can be addressed in the early design phase of the rail corridor/alignment. This process would address Bureau of Land Management standard operating procedures for rights-of-way, construction and operation. Water wells would be required along the rail corridor in some areas for soil compaction and dust control during rail construction. It could be possible to improve grazing allotments if the Bureau permitted the use of this water for grazing. Grazing allotment access could be accomplished by designing at-grade structures to permit cattle to cross under the railbed.

8.11.1 (8128)
Comment - EIS001653 / 0080
Pg. 6-38 Section 6.3.1 states, "As a consequence, impacts to land use ... would not be large. With respect to land use, what process or methodology did DOE use to determine that impacts would not be large? Did DOE consider impacts to real estate development and values along the proposed route?

Response
In its assessment of potential land-use impacts, DOE considered the differences between land-use types, land disturbances, land ownership, and the creation of barriers. The assessment compared proposed use of land for Yucca Mountain transportation purposes to existing or other proposed land uses to estimate the magnitude and context of potential conflicts. If an action would result in continuing a current land use either due to little or no impact or through mitigation, the effects were considered insignificant or small. For example, as discussed in Chapter 6, the impacts to livestock and Bureau of Land Management grazing allotments could be mitigated through the use of fencing, overpasses, and underpasses, which could provide a water source to animals cut off from current sources. By providing these mitigating measures, the impacts would be lessened and considered small.

In light of the comments received on the Draft EIS concerning perceived risk, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state-of-the-science in predicting future behavior based on perceptions had advanced sufficiently since scoping to allow DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities (see Appendix N of the EIS). Of particular interest were those scientific and social studies carried out in the past few years that directly relate to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. DOE reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods whereby such impacts could be predicted with any degree of certainty
- Much of the uncertainty is irreducible, and
- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as accidents, which would not be expected to occur. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this Final EIS.

8.11.1 (8145)
Comment - EIS001653 / 0088
DOE has not considered impacts to grazing allotments, mining, recreation use, and hunting. Are there any patented mining claims within the proposed rail corridor? How will DOE compensate mining claim holders? How many animal units months will be lost? What will DOE do to maintain access to water and movement of livestock in and around the rail corridor? What are BLM's [Bureau of Land Management's] standard operating procedures for rights of way, construction and operation?

Response
Land-use and ownership impacts common to the construction and operation of all five of the branch rail lines are discussed in Section 6.3.2.1 of the EIS and impacts specific to each proposed route are discussed in the appropriate subsection. The EIS indicates that a branch rail line would affect grazing allotments, mobility of grazing animals, watering capabilities, and recreational access. Based on current information provided by the Bureau of Land Management, the patented mining claims were skirted as much as possible by the five candidate rail corridors.

DOE acknowledges the recreational resources afforded by open space within parts of Nevada. In Section 6.3.2 of the EIS, DOE identifies potentially affected natural resource areas within each corridor. DOE would seek to minimize any restriction to or control over public lands used for recreational purposes and would develop specific mitigation measures to alleviate potential impediments to continued use of public lands.

For any land that would be acquired, including mineral claims, landowners would be fairly compensated under Federal eminent domain procedures. When affected property was not acquired by eminent domain, mitigation measures would be evaluated and implemented as appropriate, as indicated in Section 9.3.1 of the EIS, when construction and operation of transportation facilities would result in (1) impacts to publicly used lands such as grazing allotments, (2) direct and indirect land loss, and (3) displacement of capital improvements.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

If a corridor was selected for construction of a branch rail line, DOE would conduct field studies along the corridor that would identify specific land uses to be avoided. DOE would avoid land-use impacts and private land to the maximum possible extent. For example, access to grazing areas, forage, and water could be addressed in the early design phase of the rail corridor/alignment. This process would address Bureau of Land Management's standard operating procedures for rights-of-way, construction and operation. Water wells would be required along the rail corridor in some areas for soil compaction and dust control during rail construction. It could be possible to improve grazing allotments if the Bureau permitted the use of this water for grazing. Grazing allotment access can be accomplished by designing at-grade structures to permit cattle to cross underneath the railbed.

A branch rail line could be constructed across a mining claim. However, access to claims would not be restricted with the exception of that portion where the actual roadbed was constructed. Access to either side of a valley traversed by a rail branch line would be possible. Sufficient crossing structures would be constructed to allow access from either side.

8.11.1 (9505)
Comment - EIS001888 / 0164
[Summary of comments noted by Clark County Nuclear Waste Division staff at various citizens' meetings.]

It seems obvious that DOE did not look at the site plan for Summerlin or the Las Vegas Valley and all the residential and commercial uses planned along the western beltway.

Response
The representative highway routes identified for the EIS analysis conform to U.S. Department of Transportation regulations (49 CFR 397.101). These regulations, developed for transport of Highway Route Controlled Quantities of Radioactive Materials, require such shipments to be on preferred routes selected to reduce the time in transit. A preferred route is an Interstate System highway, bypass, or beltway, or an alternate rout designated by a state or tribal routing agency. Alternate routes could be designated by states or tribes under Department of Transportation regulations (49 CFR 397.103) that require consideration of the overall risk to the public and prior consultation with local jurisdictions and other states and tribes. The State of Nevada has not designated an alternate route, so DOE used the western Las Vegas Beltway for the EIS analysis.

8.11.1 (9646)
Comment - EIS001888 / 0310
Another issue is ongoing interaction between the Bureau of Land Management and the local governments in southern Nevada and California. Although the BLM [Bureau of Land Management] manages most of the land in the region, the BLM has made agreements with various local governments in the region. It is likely that major

construction of rail lines, heavy haul roads, and intermodal facilities will conflict with these agreements. The DEIS does not address the issue.

Response
Section 6.3 of the EIS describes the methods that were used to analyze the potential impacts to the many resource areas in Nevada from implementation of alternative transportation modes and routes. These analyses, discussed in subsequent sections, include land use and ownership and describe land-use and ownership issues for all three modes and the five candidate rail corridors. Existing land use and ownership is described, as are potential impacts on private, Bureau of Land Management, and other landowners.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

8.11.1 (9851)
Comment - EIS001888 / 0415
[Clark County summary of comments it has received from the public.]

Commenters suggested that the EIS evaluate the impacts to current land uses along the potential regional rail and heavy-haul routes. Land uses and related issues identified for evaluation include: (1) the availability of public lands, (2) the ease of obtaining rights-of-way, (3) consideration of eminent domain, (4) impacts to hunting and fishing opportunities and other recreational water uses, (5) effects on grazing allotments and livestock permittees, (6) public travel across Big Smokey Valley, and (7) potential interference with U.S. Air Force operations on the Nellis Bombing and Gunnery Range.

Response
Section 6.3.2.2 of the EIS notes that the branch rail lines could require conversion of land within existing grazing allotments. DOE expects the potential impacts of construction to have a greater effect upon grazing lands than would operations. During the construction phase, it could be difficult for cattle to access water if the construction zone divided the grazing allotment. Construction activity and temporary camps with the presence of construction crews could result in disrupting ranch operations and livestock rotations. There is a possibility that some livestock could be killed along roads used during construction.

DOE, however, expects that after construction, operational impacts would be less even though the branch rail lines could divide some grazing lands. Input received by DOE from the Bureau of Land Management indicates that dividing grazing lands would result in a small loss of animal unit months in large allotments but would be unlikely to affect ranch operations. The loss of animal unit months in small allotments could affect the grazing permittee's operation. The Bureau indicated that if a branch rail line divided an allotment into separate pastures, such pastures could provide an opportunity to rotate grazing area use, allowing for new grazing management options. This opportunity could benefit livestock and vegetation management.

As indicated in Section 9.3.1 of the EIS, DOE would evaluate appropriate mitigation actions that specifically address access to publicly owned lands, including grazing permits and leases. These actions could include providing access to lands on both sides of a branch rail line through underpasses and assisting in providing water should there be a need.

DOE acknowledges the recreational resources afforded by open space within parts of Nevada. In Section 6.3.2 of the EIS, DOE identifies potentially affected natural resource areas within each corridor. DOE would seek to minimize any restriction to or control over public lands used for recreational purposes and would develop specific mitigation measures to alleviate potential impediments to continued use of public lands.

For any land that would be acquired, including mineral claims, landowners would be fairly compensated under Federal eminent domain procedures. When affected property was not acquired by eminent domain, mitigation measures would be evaluated and implemented as appropriate, as indicated in Section 9.3.1 of the EIS, when construction and operation of transportation facilities would result in (1) impacts to publicly used lands such as grazing allotments, (2) direct and indirect land loss, and (3) displacement of capital improvements.

DOE is aware of the operational issues associated with the Nellis Air Force Range. Section 8.1.2.2 of the EIS discusses Nellis in the context of potential cumulative impacts. DOE has initiated interagency and intergovernmental interactions with a number of governmental agencies and other organizations, including the U.S. Air Force. Appendix C provides a summary of DOE's interactions with other organizations.

8.11.1 (10851)
Comment - EIS000359 / 0007
DOE also doesn't assume any mitigation for the transportation accident scenario, which is misleading given that in the unlikely event of a severe accident, emergency response will occur swiftly and a comprehensive plan will be developed to mitigate the consequences of an accident. We have emergency response capability on a federal level to respond to the radiation accidents in the United States, and radiation workers would be available to assist in the unlikely event of an accident, as well as to train emergency response workers across the states.

Response
The analysis of the impacts of transportation accidents in the EIS did not take credit for the mitigating effects of emergency response activities. However, in response to comments, additional information on emergency response activities following transportation accidents has been added to Section M.5 of the EIS.

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. The training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would provide the assistance based on the training needs of the states and tribes, as they determined using an up-front planning grant and based on availability of funds in annual Program budgets specified by Congress. Additional Federal response capabilities, such as expert services from the Radiological Assistance Program Team, could be activated, as requested by states and tribes. The schedule in the proposed policy and procedures for implementation of Section 180(c) (63 *FR* 23753, April 30, 1998) is designed to provide adequate time for training of first responders in advance of the first shipments. Should a decision to proceed with the development of a repository at Yucca Mountain be made, shipping routes would be identified at least 4 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. See Section M.6 of the EIS for a discussion of the DOE Section 180(c) Policy and Procedures.

DOE has several programs available to provide assistance to state, tribal, and local governments in response to radioactive material accidents. The Radiological Assistance Program, for example, provides trained personnel with equipment to evaluate, assess, advise, and assist in the mitigation and monitoring of potential immediate hazards associated with a transportation accident. As part of the program, DOE maintains eight Regional Coordinating Offices across the country that are staffed 24 hours a day, 365 days a year The staff consists of nuclear engineers, health physicists, industrial hygienists, public affairs specialists, and other personnel who provide field monitoring, sampling, decontamination, communications, and other services, as requested. In addition DOE's Radiation Emergency Assistance Center/Training Site (REAC/TS) focus on providing rapid medical attention to people involved in radiation accidents. REAC/TS maintains a 24-hour response center to provide direct support, including deployable equipment and personnel trained and experienced in the treatment of radiation exposure to assist Federal, state, tribal, and local organizations.

8.11.1 (11282)
Comment - EIS001814 / 0016
DEIS Page 2-47
Under this scenario, DOE would construct and operate a branch line in Nevada. Based on previous studies (described in Section 2.3), DOE has narrowed its consideration for a new branch rail line to five potential rail corridors Caliente, Carlin, Caliente Chalk Mountain, Jean, and Valley Modified.

DOE's corridor selection study is flawed. The first selection criteria used by DOE to select potential routes was land use compatibility. For this criteria, DOE selected corridors based upon using "land under public ownership, to the greatest extent possible, to minimize land-use conflicts." Favorable topography was used as a selection criteria only within "areas not excluded because of land-use conflicts" (Nevada Potential Repository Preliminary Transportation Strategy, Study 1, April 1995, page 25).

There are serious problems with this approach. Land ownership does not accurately reflect land-use. Most western ranching operations are based upon a combination of privately owned fee land and grazing leases on publicly owned lands. In many, if not all cases, the ranching unit depends on these grazing leases to be economically viable. Most grazing leases are held by the ranches that can access the lease as a logical part of their operation. Splitting an existing operation with a rail line, that will limit access to the leased land, can have significant adverse effects on the operation of the ranch. Using the avoidance of privately owned land as the corridor selection process without regard to the existing ranching operations' use of private and public lands may very well result in greater impact on an operation than using private land.

Most of the private land in western States with high percentages of federally owned land is land with gentle topography. Early settlers selected the flatter land for their own. The land with rugged topography was not settled, and remained in public ownership. This shift to rugged terrain to avoid private land is a dominant factor in most of the routes selected for further study in the 1990 Preliminary Rail Access Study as reflected by the following: "An option was selected from the Caliente area in order to avoid land use impacts encountered in most of the southern areas of Nevada, ... The base route has the most favorable land-use compatibility, but would incur significant costs due to the complex engineering and construction required to traverse rough terrain" (page 17). "However, the checkerboard pattern of private and public land ownership surrounding the railroads across northern Nevada makes the complete avoidance of private land difficult. The minimum impact departure point is a location about 5 miles west of Carlin. The terrain in this area is so rugged that private developers were uninterested in the land, and as a result, the greater portions of the terrain were left in BLM [Bureau of Land Management] ownership" (page 21).

By using land ownership for the first selection criteria, DOE's selection process actually favored more rugged terrain where construction of the proposed rail line is more difficult. This creates many additional land use impacts due to the extensive cuts and fills required by unfavorable topography. These cuts and fills will further exacerbate the problem faced by ranchers of moving livestock and equipment across the rail line.

Crucial habitat for big game is frequently located in or near rugged terrain. This is especially true for crucial winter habitat. Daylight cuts required to traverse rugged terrain also pose a significant threat to big game, which tend to use these areas for movement, especially in times of heavy snow cover. When trapped in a daylight cut, big game cannot escape from an oncoming train, resulting in significant mortality rates for big game in these areas. Thus, the selection criteria that favors more rugged terrain by virtue of avoiding private land ownership greatly increases the potential impact on biological resources.

Roadless areas are also more likely to be found in rugged terrain. Virtually all potential wilderness areas are located on public lands. The selection criteria that avoids private lands results in more potential impact to roadless areas and potential wilderness areas.

Response
Sections 2.1.3.3 and 2.3.3 of the EIS describe the methods used to select and describe the alternative routes and modes for transportation in Nevada. Section 6.3 describes the potential impacts for these routes and modes.

DOE's objective, with respect to rail corridors, was to identify reasonable and representative 400-meter (0.25-mile)-wide corridors that would produce the least environmental and stakeholder impact based on published environmental and land-use data. Another consideration was to evaluate corridors that are cost-effective (for example, balancing cut and fill to the extent possible).

In its assessment of potential land-use impacts, DOE considered the differences between land-use types, land disturbances, land ownership, and the creation of barriers. The assessment compared proposed use of land for Yucca Mountain transportation purposes to existing or other proposed land uses to estimate the magnitude and context of potential conflicts. If an action would result in continuing a current land use either due to little or no impact or through mitigation, the effects were considered insignificant or small. For example, as discussed in Chapter 6, the impacts to livestock and Bureau of Land Management grazing allotments could be mitigated through the use of fencing, overpasses, and underpasses, which could provide a water source to animals cut off from current sources. By providing these mitigating measures, the impacts would be lessened and considered small. If an action could result in departures from existing uses, and mitigation could not remedy the conflict, the effects could be more substantial.

Factors considered included the uniqueness of a geographic area; presence of historic, scientific, and cultural resources; potential effects on endangered species; and compliance with Federal, State, or local law. Based on information available, potential land-use impacts associated with Yucca Mountain transportation activities could be minimized through judicious alignment of the branch rail line or through mitigation. Overall, the land-use impacts are not deemed substantial because of the use of various optional and alternate routes within the corridor, mitigation measures, and the judicious routing of the branch rail line within the corridor.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

8.11.1 (11298)
Comment - EIS001814 / 0027
DEIS Page 2-70
One new route, Valley Modified, was added in the 1995 Study based on updated information from the Bureau of Land Management on the status of two Wilderness Study Areas that represent possible land-use conflicts for the Valley route in the original evaluation.

The potential land use constraints for the Valley Modified route have not been eliminated. 1995 Study states "The original Valley route identified in the Preliminary Rail Access Study was considered not feasible due to possible land use conflicts with two BLM [Bureau of Land Management]-administered areas (Quail Springs WSA NV-050-411 and Nellis WSA NV-050-4R A, B, and C) that were studied for potential designation as Wilderness Areas. Due to uncertainties on the final land use of these areas (based on recent discussion with BLM Las Vegas District personnel), the Valley Modified route was added to the list of alternatives" (Nevada Potential Repository Preliminary Transportation Strategy, Study 1, TRW, April 1995, p. 34). Uncertainty in the final land use for an area does not mean that the land-use constraint has been eliminated. These same land-use conflicts with the wilderness study areas are reiterated in the 1996 analysis (Nevada Potential Repository Preliminary Transportation Strategy, Study 2, TRW, February 1996, p. 2-18).

Response
Section 2.3.3.1 of the EIS discusses the process used to evaluate the 13 candidate rail routes in Nevada and which routes were eliminated from further study.

Section 6.3.2.2.5 of the EIS describes the impacts from construction and operation of the Valley Modified Corridor Implementing Alternative. The land-use discussion has been expanded and discusses the relationship of the Sheep Mountain Alternate and the Wilderness Study Areas raised by the commenter. Although the Bureau of Land Management considers the Wilderness Study Areas unsuitable for inclusion in the National Wilderness System, DOE would have to consult with the Bureau before it could build a branch rail line.

In addition, based on public comments, a new subsection has been added to Section J.3.1.2 of the EIS that discusses potential land-use conflicts. Figure J-20 shows the Quail Springs Wilderness Study Area and the Nellis A, B, and C Wilderness Study Areas in relation to the Valley Modified Corridor.

8.11.1 (11309)
Comment - EIS001814 / 0038
DEIS Page 6-8
Land-use impacts would be greatest for the mostly rail scenario, with disturbed land areas ranging from about 5 square kilometers (1,200 acres) for the Valley Modified route to 19 square kilometers (5,000 acres) for the Carlin route.

DOE has not accurately identified or assessed the land-use impacts of the Nevada Transportation alternatives. Even where DOE has identified land-use impacts, DOE has understated the nature and severity of the impacts. The failure by DOE to accurately describe the proposed action also prevents an adequate assessment of land-use impacts. For example, the land-use impacts associated with the development of ballast and sub-ballast quarries, solid waste disposal facilities, construction lay-down areas, and construction staging areas cannot be assessed until these areas are identified.

The conclusions regarding land-use impacts in the DEIS rely primarily on disturbed acreage. Although this is one measure of land-use impacts, it is not the only one. For linear facilities such as a branch rail line, an assessment of land-use impacts should also include an evaluation of the impacts of bisecting current and future land-uses. As discussed above in the comment on Section 2.1.3.3.2 Nevada Rail Scenario, splitting an area with a branch rail line can have significant impacts on the entire area, not just the area within the right-of-way. This is particularly true for ranching operations. DOE has not assessed this type of land-use impact in the EIS.

DOE has identified a number of land-use conflicts with the proposed rail line, but has not accurately characterized the impact of these conflicts. For example, rail potential corridors cross the Simpson Park Habitat Management Area (Carlin), the Old Spanish Trail/Mormon Road special recreation management area (Jean), Wilderness Study Areas (Valley Modified) and the Desert National Wildlife Range (Valley Modified). A rail line through these special land-use areas would have significant impact on the purpose of these special areas. The EIS does not even discuss these impacts. It is particularly difficult to understand why DOE has not eliminated the Caliente Chalk Mountain alternative. The U.S. Air Force has unequivocally stated that this alternative is unacceptable due to its impacts on the Nellis Air Force Range.

Proposed rail line corridors also cross areas of potential future community growth. Although DOE identifies these areas, the EIS does not contain an assessment of the impacts of this conflict on future community growth patterns. The area of particular concern is the impact of the proposed Valley Modified route on growth in the North Las Vegas urban area.

Many of the areas crossed by potential rail corridors are currently remote, undeveloped areas. Much of the area is currently roadless, including Wilderness Study Areas. Regardless of the decision by the land management agency regarding classification as wilderness, construction of a rail line through a remote, roadless area will have land-use impacts. These changes in land-use should be identified and assessed.

From a land-use perspective, the only rail alternative that does not have serious land-use conflicts is the Caliente corridor. Even this corridor could impact the Nellis Air Force Range. All other rail alternatives cross or impact areas designated as special purpose land-use. These conflicts are summarized below:

Caliente: Requires use of land on Nellis AF [Air Force] Range. Alternatives cross difficult terrain.

Carlin: Requires use of land on Nellis AF Range. Alternatives cross difficult terrain.
Bates Mountain Antelope Release Area
Simpson Park Habitat Management Area

Caliente/Chalk Mountain: Traverses Nellis AF Range, which is unacceptable to AF.

Jean: Impacts Pahrump potential community growth
Old Spanish Trail/Mormon Road special recreation management area
Adjacent to Stateline Wilderness Area

Valley Modified: Encroaches on the Desert National Wildlife Range
Impacts community growth in the North Las Vegas urban area
Crosses Nellis A, B, & C and Quail Spring WSA [Wilderness Study Area]
Impacts Nellis AFB small arms range
Impacts Indian Springs Auxiliary Field facilities

Response
Sections 6.3.2.1 and 6.3.2.2 of the EIS address the potential common and specific impacts of Nevada rail implementing alternatives, respectively, including land-use impacts. In an effort to provide decisionmakers and stakeholders with the information needed to make a rail or heavy-haul truck transportation decision for Nevada, regions of influence were developed and the level of information needed within those regions defined.

In its assessment of potential land-use impacts, DOE considered the differences between land-use types, land disturbances, land ownership, and the creation of barriers. The assessment compared proposed use of land for Yucca Mountain transportation purposes to existing or other proposed land uses to estimate the magnitude and context of potential conflicts. If an action would result in continuing a current land use either due to little or no impact or through mitigation, the effects were considered insignificant or small. For example, as discussed in Section 6.3.2.1, the EIS determines that a branch rail line could create a barrier to livestock movement, and quantitatively addresses the acres of grazing lands potentially affected by candidate rail corridors. However, the impacts to livestock and Bureau of Land Management grazing allotments could be mitigated through the use of fencing, overpasses, and underpasses, which could provide a water source to animals cut off from current sources. By providing these mitigating measures, the impacts would be lessened and considered small. If an action could result in departures from existing uses, and mitigation could not remedy the conflict, the effects could be more substantial. Factors considered when assessing impacts included the uniqueness of a geographic area; presence of historic, scientific, and cultural resources; potential effects on endangered species; and compliance with Federal, State, or local law.

As described in the introduction to Chapter 6, in response to interest and suggestions by the public and to better describe potential impacts of transportation alternatives in Nevada, DOE modified analyses and presentations of impacts in the EIS. For example, additional details, when available, and evaluations are included for wilderness study areas, grazing allotments, sensitive biological resources, management areas, cultural resources, and hydrologic resources.

Section 6.3.2.2.5 of the EIS describes the impacts from construction and operation of the Valley Modified Corridor. The land-use discussion has been expanded and discusses the relationship of the Sheep Mountain Alternate and the Wilderness Study Areas raised by the commenter. In addition, a new subsection has been added to Section J.3.1.2 that discusses potential land-use conflicts. Figure J-20 shows the Quail Springs Wilderness Study Area and the Nellis A, B, and C Wilderness Study Areas in relation to the Valley Modified Corridor.

DOE acknowledges the recreational resources afforded by open space within parts of Nevada. In Section 6.3.2 of the EIS, DOE identifies potentially affected natural resource areas within each corridor. DOE would seek to minimize any restriction to or control over public lands used for recreational purposes and would develop specific mitigation measures to alleviate potential impediments to continued use of public lands.

In comments on the Draft EIS, the Air Force restated its position that routes across the Nevada Test and Training Range would not be consistent with its national security uses. The Air Force concluded that use of such a corridor or route could adversely affect critical and sensitive national security activities. In response, DOE reevaluated whether the Caliente-Chalk Mountain Corridor and Caliente/Chalk Mountain heavy-haul truck route should be eliminated from further evaluation. DOE met with the Air Force (see Appendix C of the EIS), considered the information they provided, and concluded that the Caliente-Chalk Mountain Corridor and Caliente/Chalk Mountain heavy-haul truck route implementing alternatives should remain identified as “nonpreferred alternatives” in this Final EIS.

DOE believes, however, that the EIS adequately analyzes the environmental impacts that could result from the Proposed Action. In addition, the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

8.11.1 (11760)
Comment - EIS001660 / 0054
The land use descriptions for the rail corridors in Nevada are inadequate. (p. 3-101 to -103). The land use regions of influence are narrowly drawn (limited only to disturbed lands and changes in ownership), and the only information provided for the Carlin corridor (for example) is the amount of public and private land. Although the DEIS says that “detailed information on land use is available” in other documents, it fails to describe their contents even briefly, as required by 40 CFR 1502.21.

Response
Section 3.2.2.1 of the EIS provides the baseline environmental information for assessing the potential impacts of implementing Nevada rail implementing alternatives. The more notable land-use features and potential influences that exist or could exist on lands within the corridors are presented in Chapter 6. For example, the land features within the Carlin Corridor are presented in Section 6.3.2.2.2.

In its assessment of potential land-use impacts, DOE considered the differences between land-use types, land disturbances, land ownership, and the creation of barriers. The assessment compared proposed use of land for Yucca Mountain transportation purposes to existing or other proposed land uses to estimate the magnitude and context of potential conflicts. If an action would result in continuing a current land use either due to little or no impact or through mitigation, the effects were considered insignificant or small. For example, as discussed in Chapter 6, the impacts to livestock and Bureau of Land Management grazing allotments could be mitigated through the use of fencing, overpasses, and underpasses, which could provide a water source to animals cut off from current sources. By providing these mitigating measures, the impacts would be lessened and considered small. If an action could result in departures from existing uses, and mitigation could not remedy the conflict, the effects could be more substantial.

Factors considered included the uniqueness of a geographic area; presence of historic, scientific, and cultural resources; potential effects on endangered species; and compliance with Federal, State, or local law. Based on information available, potential land-use impacts associated with Yucca Mountain transportation activities could be minimized through judicious alignment of the branch rail line or through mitigation.

As described in the introduction to Chapter 6, in response to interest and suggestions by the public and to better describe potential impacts of transportation alternatives in Nevada, DOE modified analyses and presentations of impacts in the EIS. For example, additional details, when available, and evaluations were included for wilderness study areas, grazing allotments, sensitive biological resources, management areas, cultural resources, and hydrologic resources.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

8.11.1 (11873)
Comment - EIS001887 / 0388
The statement in the last sentence of the second paragraph that "no new land acquisition and construction would be required to accommodate these shipments" is misleading. There may well be additional land acquisitions and construction required once DOE identifies the specific shipping routes nationwide (something the Draft EIS fails to do). In the case of transuranic waste shipments to the Waste Isolation Pilot Plant in New Mexico, DOE agreed to pay for bypasses around/near Santa Fe and Roswell. There were also safe parking facilities that needed to be improved in other states. It is very likely that, once states and cities become aware of the nature, volume, and duration of the shipping campaign needed to support the Proposed Action, DOE will be forced to assist with the construction of bypasses or other infrastructure improvements.

Response
Section 6.2 of the EIS discusses other potential impacts of national transportation of spent nuclear fuel and high-level radioactive waste. Because existing rail and highway systems would be adequate for transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain, except under conditions where heavy-haul trucks would be used, infrastructure upgrades would not be necessary and therefore are not included in the analysis. The EIS assumes that sites identified as being served by a railroad would use rail and that sites that do not have rail service (for example, needing rail spur upgrades) would ship using heavy-haul trucks or barges to the nearest railheads.

8.11.1 (12530)
Comment - EIS000630 / 0004
The EIS does not have adequate information about the impacts on grazing. The EIS states that fencing decision rests with the Bureau of Land Management and US Fish and Wildlife. The information on fencing is not definitive and excludes local government, the local community, and most of all, those livestock permittees that will be impacted. They need input.

Response
Land-use and ownership impacts common to the construction and operation of all five of the branch rail lines are discussed Section 6.3.2.1 of the EIS and impacts of specific routes are discussed in appropriate subsections. The EIS determines that a branch rail line could create a barrier to livestock movement, and quantitatively addresses the acres of grazing lands potentially affected by rail corridors.

DOE has identified mostly rail as its preferred mode of transportation, both nationally and in Nevada. At this time, however, the Department has not identified a preference among the five candidate rail corridors in Nevada. Should the branch rail line implementing alternative be selected and a preferred rail corridor identified, additional engineering and environmental studies would be conducted as a basis for detailed design and for appropriate National Environmental Policy Act reviews. During this process, DOE would initiate consultations with responsible local, State, Federal, and tribal agencies, landowners, and other stakeholders to identify, acquire, and evaluate additional information and develop mitigative actions necessary to minimize potential impacts, including land use.

If a corridor was selected for construction of a branch rail line, DOE would conduct field studies along the corridor that would identify specific land uses to be avoided. DOE would avoid land-use impacts and private land to the maximum possible extent. For example, access to grazing areas, forage, and water could be addressed in the early design phase of the rail corridor/alignment. This process would address Bureau of Land Management standard operating procedures for rights-of-way, construction and operation. Water wells would be required along the rail corridor in some areas for soil compaction and dust control during rail line construction. It could be possible to improve grazing allotments if the Bureau permitted the use of this water for grazing. Grazing allotment access can be accomplished by designing at-grade structures to permit cattle to cross underneath the railbed.

8.11.2 AIR QUALITY

8.11.2 (1410)
Comment - EIS000355 / 0005
I'm as much concerned about the excess heat in the summertime, and the potential below zero temperatures in the wintertime. And I don't see anything like that being addressed with my scientific accuracy. And if you're going to

do an environmental impact statement, you have to consider every aspect of the environment all along the way. Because each is particular, each is specific.

Response
The EIS describes the means of extreme temperature data given current climatic conditions in Section 3.1.2.2. DOE evaluated the effect of extreme temperatures on facility safety systems and transportation casks in the preliminary repository design and preliminary transportation operational plans. Section 4.1.8 describes accident scenario impacts where extreme weather (including extreme episodes of fog, frost, hail, ice cover, etc.) were considered as accident-initiating events. Appendix I provides detailed supporting information on the calculation of the environmental consequences of long-term repository performance, which included evaluating three different climate scenarios and its effect on repository performance.

8.11.2 (4362)
Comment - EIS001157 / 0007
Air quality in the Las Vegas Valley is in the "serious" non-attainment category for carbon monoxide and PM10 particulates. Any induced traffic congestion, such as that created by slow-moving vehicles on a heavy-haul route through the valley, and its associated air quality impacts must be quantified and addressed. Using 10,815 as the number of shipments (Appendix J), there would be about 2 heavy-haul trucks using the roadways every day for 24 years. The DEIS did not propose any mitigation measures to alleviate the deterioration in air quality caused by oversized, heavy-haul vehicles creating congestion.

Response
Section 6.3.3.1 of the EIS notes the potential impacts of temporary but large traffic obstructions on the planned Las Vegas Beltway from heavy-haul trucks. Each of the three implementing alternatives with Las Vegas Valley routes (Caliente/Las Vegas, Sloan/Jean, and Apex/Dry Lake) note the air quality impacts to the Las Vegas Valley airshed from the operation of a few heavy-haul trucks and associated traffic congestion would be very small in comparison to the amount of pollutants emitted by automobile travel and other commercial vehicles in the basin. DOE believes that quantification of such comparatively small impacts is unnecessary. However, DOE anticipates transportation authorities of the State of Nevada and Clark County would require heavy-haul trucks that used the Las Vegas Beltway to travel at times that would not coincide with the heaviest traffic densities (rush-hour periods). Travel-time restrictions and other requirements for heavy-haul vehicles using the Beltway would mitigate impacts to traffic congestion and associated potential air quality impacts.

8.11.2 (5497)
Comment - EIS001660 / 0025
The DEIS fails to analyze impacts of the proposed action on air quality in Nevada and Mineral County (pp. 6-9,-36). Residents and visitors of Mineral County benefit from excellent air quality conditions that could be affected by the proposed action. The DEIS says that air emissions would affect a very large area (p. 6-44) but provides little or no additional information.

The DEIS must disclose the impacts upon Mineral County's air quality from: (1) fugitive dust releases during construction and operations, (2) diesel engine emissions during construction and operations, including emissions from water trucks, and (3) increased risk of wildfire. The analysis must address visual range (i.e., haze) in addition to bulk emissions and concentrations of criteria pollutants.

Response
The Proposed Action would cause no air quality impacts to Mineral County. None of the proposed transportation routes that would require road or rail construction or upgrade activities enter Mineral County. The "large area" in Section 6.3.2.1 of the Draft EIS noted by the commenter refers to the area that could be affected by construction activities that could generate fugitive dust emissions along the length of a corridor. As noted in the EIS, these effects would be temporary and limited to those areas affected by the construction activities. Because of the distance from Mineral County to the proposed repository, there would be no air quality impacts in Mineral County due to repository construction, operation, and closure.

With the exception of the Las Vegas Valley, the areas potentially affected by transportation activities in Nevada are unclassified and therefore “in attainment” with National Ambient Air Quality Standards. Section 3.1.2.1 of the EIS has been clarified to note that these areas are unclassified and in attainment.

8.11.2 (6669)
Comment - EIS001878 / 0052
The DEIS fails to adequately analyze impacts of the proposed action on air quality in Nevada and Eureka County. (pp. 6-9, -36) Appendix G, Air Quality, does not address transportation-related impacts at all. Residents of Eureka County benefit from excellent air quality conditions that could be affected by the proposed action. The DEIS says that air emissions would affect a very large area (p. 6-44) but provides little or no additional information.

The DEIS must disclose the impacts upon Eureka County’s air quality from: (1) fugitive dust releases during construction and operations, (2) diesel engine emissions during construction and operations, including emissions from water trucks, and (3) increased risk of wildfire. The analysis must address visual range (i.e., haze) in addition to bulk emissions and concentrations of criteria pollutants.

Response
Chapter 6 and Appendix J of the EIS address potential impacts of repository-related transportation on air quality. Impacts to air quality from the construction and operation of a branch rail line, including one in the Carlin Corridor that could cross the northwest corner of Eureka County, are discussed in Section 6.3.2.1. Emissions during construction would be temporary and would move as construction progressed along the length of the corridor. Based on Federal standards for locomotives, train emissions would not have a significant impact on air quality. Because potential highway upgrades, construction of an intermodal transfer station, or heavy-haul truck operations would not occur in Eureka County, the air quality in the county would not be affected by these activities.

With the exception of the Las Vegas Valley, all areas of Nevada potentially affected by transportation activities addressed in the EIS are “unclassified” and, therefore, considered to be “in attainment” with National Ambient Air Quality Standards. Section 3.1.2.1 of the EIS has been revised to clarify this issue.

There would be no meaningful impacts related to increased risk of wildfire and visual haze in Eureka County from Yucca Mountain Repository-related transportation impacts.

8.11.2 (6901)
Comment - EIS001539 / 0005
Meteorology: The potential for atmospheric inversions increases risks to Denver residents from accidental releases. DEH assumes these risks are unacceptable, until demonstrated otherwise by DOE.

In the DOE/EIS, accidental release scenarios are calculated using two meteorological conditions, the most conservative of which is stated to be “...stable (slowly dispersing) conditions that would not be exceeded (more still) about 95 percent of the time...” (p. 6-30), as based on national weather data (p. J-8). Weather conditions in the Denver area can differ significantly from those in other parts of the country. During the winter months, the Denver air basin commonly experiences atmospheric inversion layers that trap air constituents near ground level and prevent dispersion. DOE must provide documentation that the air modeling procedures conducted in the DOE/EIS are conservative for the inversion/stable weather conditions that may occur in the Denver area.

Response
The national meteorological data set included 5 years of meteorological data from Denver. The data DOE used in its analysis represented stable inversion-type atmospheric conditions that are not unique to Denver. The 95th-percentile characteristics noted are Pasquill-Gifford stability class F (moderately stable) and a wind speed of 0.89 meter per second (2 miles per hour). DOE believes that the 95th-percentile meteorological data used with other selected accident analysis parameters represent conditions that tend to maximize potential credible accident consequences. Selection of worst-case values for all parameters, including meteorology, would lead to accident consequence estimates that are very unrealistic and even incredible when the analysis considers probabilities of occurrence.

8.11.2 (7082)
Comment - EIS001337 / 0031
The County [Lincoln] and City [Caliente] noted that the DEIS should include a description of ambient air quality conditions within potentially impacted basins of Lincoln County. Information regarding current air quality conditions in the County were provided to DOE during EIS scoping. The DEIS Affected Environment section on Air Quality does not even refer to Lincoln County specifically and offers only very general observations not useful to determine impacts.

The County and City noted in scoping comments that although construction and operation of repository system components within Lincoln County will not likely affect regional climate, local climatic conditions may impact upon safe operation of the repository system, particularly transportation. The County and City recommended that DEIS consider impacts of climate upon safe transport of radioactive wastes. Aspects of the climate recommended by the County and City for consideration included precipitation (particularly snow and ice), temperature (as may impact upon highway infrastructure and road surface conditions), and fog. The DEIS section on Affected Environment offers only a modest description of the climate within Lincoln County which provides insufficient information upon which to determine potential effects of climate upon safe transportation.

Response
With the exception of the Las Vegas Valley, all areas of Nevada potentially affected by transportation activities are unclassified for air quality and, therefore, "in attainment" with National Ambient Air Quality Standards. A change in air quality resulting from transportation activities associated with the proposed repository project would be unlikely. DOE has revised Section 3.1.2.1 of the EIS to note that these areas of Nevada are unclassified and, therefore, in attainment.

DOE used U.S. Department of Transportation accident and vehicle fatality rate data (DIRS 103455-Saricks and Tompkins 1999) to analyze the impacts presented in Chapter 6 of the EIS. These data include accident statistics for each state under the full range of climatic, road, and traffic conditions that occurred in the United States from 1994 to 1996. Thus, the EIS analysis considered the effects of weather and road conditions in Nevada such as those identified in the comment. In response to public comments, DOE has included Section M.3 to the EIS to discuss transportation protocols that would be implemented for the travel of vehicles carrying spent nuclear fuel or high-level radioactive waste in the event of inclement weather.

U.S. Department of Transportation regulations for routing shipments of Highway-Route Controlled Quantities of Radioactive Materials (49 CFR Part 397) include rules to minimize radiological risk and consider overall public safety. Highway shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain would comply with these regulations. Preferred routes (see 49 CFR 397.103) that the State of Nevada might designate would comply with these regulations.

8.11.2 (9568)
Comment - EIS001888 / 0241
The DEIS fails to examine the likely interaction of the Yucca Mountain Program Federal activities in Nevada. For example, Clark County is non-attainment for National Ambient Air Quality Standards (NAAQS). The DEIS does not analyze the effect construction of the Heavy Haul infrastructure improvements or a rail line will have on the Regional Transportation Plan.

Response
DOE has updated the information on potential impacts of Yucca Mountain transportation activities in Nevada throughout the EIS. For the example cited in the comment, repository activities would cause no air quality impacts to Clark County; potential impacts at the land withdrawal boundary would be small fractions of the National Ambient Air Quality Standards (see Section 4.1.2 of the EIS). Section 6.3 describes potential air quality impacts from transportation-related construction and infrastructure improvements. While portions of Clark County do not comply with National Ambient Air Quality Standards because of vehicular traffic, any Yucca Mountain-related activities would not cause further deterioration of the existing air quality in this area. The three heavy-haul truck route scenarios through the Las Vegas basin evaluated in the EIS assumed that the affected segments of the Las Vegas Beltway would be completed by 2010, the same year shipments would begin under current DOE plans. Because the required construction and infrastructure upgrades on the planned Las Vegas Beltway would be

completed an estimated 10 years before the current estimated completion date of 2020, traffic congestion in the Las Vegas Valley would be improved and the action would complement the Regional Transportation Plan. If DOE selected one of the three heavy-haul truck routes through the Las Vegas basin, it would consult with Clark County on specific impacts to the transportation system caused by the heavy-haul truck route improvements.

8.11.2 (9644)
Comment - EIS001888 / 0309
The DEIS is insufficient because it fails to consider how the Yucca Mountain Program may impact other federally mandated programs that are ongoing in Clark County, Nevada. The best example of this is the issue of air quality. Clark County is nonconforming for Federal air quality standards for both ozone and particulate matter emissions. Construction of rail lines or heavy haul infrastructure proposed in the DEIS will have an effect on air quality in Clark County. It is likely that the Regional Transportation Plan, the Statewide Implementation Plan and Transportation Improvement Program will all be affected by the construction of the infrastructure necessary to support the Yucca Mountain Project. The DOE must establish a provision to perform a conformity analysis for the proposed projects necessary to demonstrate that these construction activities will have no impact on Clark County's air quality. Other federal activities related to the environment, endangered species, flood control and land management must also be addressed by the DEIS.

Response
All of the areas cited in this comment are addressed in Section 4.1.2 of the EIS for the proposed repository and Sections 6.1.1 and 6.1.2 for transportation-related activities. The specific examples noted for air quality are addressed below.

The Las Vegas Air Basin, part of Clark County, is in nonattainment for carbon monoxide and particulate matter (PM_{10}), but is in attainment for ozone. An analysis of the transportation options that specifically focused on carbon monoxide and PM_{10} has been conducted for the EIS (see Chapter 6) and in a separate Clean Air Act conformity review.

Potential air quality impacts from construction of a branch rail line that would cross the Las Vegas Air Basin are addressed in Section 6.3.2.2.5 of the EIS. DOE used comparisons to Clark County's EIS for the northern and western Las Vegas Beltway project to determine there would be no significant impacts to air quality in this area from branch rail line construction.

The potential impacts of the intermodal transfer station that is part of the Sloan/Jean heavy-haul truck implementing alternative are discussed in Section 6.3.3.1 of the EIS. The site of this intermodal transfer station could be in the Las Vegas Air Basin, and thus subject to analysis of air quality attainment status. However, the results of the analyses in Section 6.3.2.1 show that impacts from the construction and operation of the intermodal transfer station would be below the emission threshold rates and, therefore, would meet the requirements for Clean Air Act conformity. Highway upgrades in the Las Vegas Air Basin would not be necessary, so there would be no associated emissions.

In addition, DOE conducted a conformity review to evaluate the potential for air quality impacts of vehicle emissions in the Las Vegas Air Basin arising from transport of materials and personnel for constructing and operating a repository at Yucca Mountain. Because the estimated direct and indirect emissions would be below threshold emission rates for each pollutant of concern established by Environmental Protection Agency regulations (see Section 6.3.3.2.4 of the EIS), DOE determined conformity requirements for the Las Vegas Air Basin would not apply to repository-related transportation activities.

DOE believes that the EIS adequately analyzes the potential for air quality impacts of transportation in the Las Vegas Air Basin. Section 6.3.2.1 of the EIS addresses resource areas common to Nevada branch rail line implementing alternatives and Section 6.3.3.1 addresses those for Nevada heavy-haul truck implementing alternatives. Sections 6.3.2.2 and 6.3.3.2 discuss impacts specific to each Nevada branch rail line or heavy-haul truck implementing alternative, respectively. Once a specific rail corridor or heavy-haul truck route was selected, additional engineering and environmental studies and appropriate National Environmental Policy Act reviews would be conducted, together with consultations with responsible Federal, State, tribal, and local authorities. Mitigative actions would be developed to preclude or compensate for potential impacts.

8.11.2 (9808)
Comment - EIS001888 / 0395
[Clark County summary of comments it has received from the public.]

Several commenters noted that construction and operation of the repository and transportation facilities could degrade current air-quality attainment status (Lincoln and Clark Counties), and that emissions of fugitive dust could impair visibility and reduce the safety of waste transport. Thus, the EIS should describe existing air- quality and meteorological conditions (severity of storms, temperature extremes, fog) in each affected area, and assess the potential environmental consequences to air quality and the extent to which meteorological conditions could affect waste transport.

Response
With the exception of the Las Vegas Valley, all areas of Nevada potentially affected by transportation activities are unclassified and therefore "in attainment" with National Ambient Air Quality Standards. The text in Section 3.1.2.1 has been clarified to specifically note that those areas of Nevada potentially affected by the Proposed Action (including Lincoln County) are unclassified and, therefore, in attainment.

Potential air quality impacts from construction and operations at the repository are described in Section 4.1.2 of the EIS. There would be no impacts to air quality on Lincoln or Clark counties from activities at the repository site. Potential air quality impacts from transportation-related construction and operation are described in Sections 6.3.2 and 6.3.3. If DOE selected the Valley Modified Corridor, which passes through the Las Vegas Valley, for the construction and operation of a branch rail line, the final plans, specifications, and estimates would include the Clark County Health District PM_{10} emissions control measures.

No additional climate description is necessary for those areas where the only potential inputs are related to candidate transportation routes. Any roads that would be considered or designated for transportation of spent nuclear fuel and high-level radioactive waste would have to meet the criteria for safe transportation, meaning that they must be constructed in such a manner to allow for safe transportation considering normal meteorological conditions such as rain, snow, ice, and fog. Normal roadway maintenance such as snow removal can be considered, and in the event of severe meteorological conditions such as a blizzard, trucks could be ordered off the road to wait out such conditions.

8.11.2 (10248)
Comment - EIS002115 / 0010
Weather and natural disasters. Although weather does not seem to be an issue, Mineral County believes it's a big issue. Most of the radioactive waste would be transported through the northern part of Nevada. This part of the state may have bad weather from November to May as well as many other states from east, central and northwest America. Will the radioactive waste be transported during their timeframe? The DEIS does not have adequate information in case of road closures due to inclement weather, nor provide complete information about safe havens or alternate trucks and siting for rail.

Response
The climate along the transportation routes being considered in the EIS was not described because DOE would consider or designate for the transportation of spent nuclear fuel and high-level radioactive waste only those roads that meet the criteria for safe transportation of these materials. Such roads must be constructed in a manner that enables safe transportation considering normal meteorological conditions such as rain, snow, ice, and fog. DOE would purchase services and equipment from Regional Servicing Contractors, who would perform waste acceptance and transportation operations. As described in Section M.3.2.1.4 of the EIS, the Regional Servicing Contractor would obtain route weather forecast information as part of the preshipment planning and notification and shipment process. At the time of departure, current weather conditions would have to be acceptable for safe vehicle operation. Shipments would not travel when severe weather conditions developed along routes or adverse road conditions made travel hazardous. In the event of severe meteorological conditions such as blizzards, trucks could be ordered off the road to wait out such conditions. Similar types of requirements would apply for rail shipments. The appropriate documentation would be prepared on safe havens when a specific route and mode of transportation were selected.

8.11.2 (10886)
Comment - EIS000817 / 0147
P. 6-89. What is the total of pollutants from the total transport of the waste? Here we are trying to cut back on all this, and instead, this project adds to the problem. Are we creating more air hazards to bury a waste?

Response
DOE did not calculate the total quantity of pollutants generated over time from transportation activities and determined that national transportation of spent nuclear fuel and high-level radioactive waste by truck and rail would not constitute a meaningful source of air pollution along the nation's highways and railroads. As noted in Section J.1.3.2.3 of the EIS, human health impacts to vehicle exhaust depend principally on the distance traveled in an urban population zone and on the impact factors for particulates and sulfur dioxide from truck or rail emissions, fugitive dust generation, and tire abrasion. National transportation of spent nuclear fuel and high-level radioactive waste would use existing highways and railroads and would average 14.2 million truck kilometers (8.8 million miles) per year for the mostly truck case and 3.5 million railcar shipments per year from the mostly rail case. The national yearly average for total highway and railroad traffic is 186 billion truck kilometers (116 billion miles) and 49 billion railcar kilometers (30 billion miles) (DIRS 148081-BTS 1999). Therefore, the transport of spent nuclear fuel and high-level radioactive waste would represent 0.008 percent and 0.007 percent of truck and railcar-kilometers traveled, respectively.

8.11.2 (11008)
Comment - EIS001896 / 0006
Section 3.2.2.1.2

The Valley-Modified Rail Corridor crosses Clark County, which could impact PM_{10} attainment.

Response
Section 6.3.2.1 of the EIS provides a summary discussion of the Conformity Review of the Nevada Rail Implementing alternatives for PM_{10}. Part of this Conformity Review evaluates PM_{10} emissions in the Las Vegas nonattainment area. A significant portion of PM_{10} emissions in the nonattainment area are the result of construction activities (DIRS 155557-Clark County 2001). The Valley Modified Corridor would require construction within the nonattainment area. DOE has made quantitative estimates of PM_{10} releases from rail-line construction, based on the limited amount of information available. These PM_{10} releases would include the emissions from disturbing the ground and from fuel combustion of the construction equipment. Dust abatement measures (for example, water applications) are assumed to reduce fugitive dust PM_{10} emissions by 70 percent. Given these assumptions, PM_{10} emissions during the construction phase of the Valley Modified Corridor are estimated to be up to 190 percent [120 metric tons (130 tons) per year] of the General Conformity threshold level for a PM_{10} serious nonattainment area, 64 metric tons (70 tons) per year (40 CFR 93.153). This value could be reduced by lengthening the construction time, extremely diligent attention to dust suppression measures, or more detailed task planning to reduce the sources of particulate emissions. Valley Modified Corridor emissions into the nonattainment area would occur during the much longer operations phase, as locomotives passed through the nonattainment area on their way to the Yucca Mountain site. The operations emissions of PM_{10} for the Valley Modified Corridor were estimated to be less than 3 percent of the General Conformity threshold levels. In addition, the Conformity Review compared the PM_{10} release estimates to the Nevada PM_{10} State Implementation Plan's (DIR 155557-Clark County 2001) estimated annual [154,788 metric tons (170,625 tons) per year (2001 estimate)] and daily [653 metric tons (719.78 tons) per year (2001 estimate)] inventories of PM_{10} for the nonattainment area. The Valley Modified Corridor PM_{10} emissions estimates are less than 0.08 percent of these inventories during construction.

8.11.2 (11009)
Comment - EIS001896 / 0007
Section 3.2.2.2.2

The Sloan/Jean Intermodal Transfer Station could impact PM_{10} attainment.

Response
Section 6.3.3.1 of the EIS discusses potential impacts from constructing and operating an intermodal transfer station that could be part of the Sloan/Jean heavy-haul truck implementing alternative. Implementation of this

implementing alternative could result in an intermodal transfer station in the Las Vegas Air Basin. Tables 6-83 and 6-84 of the EIS lists annual criteria pollutant releases from constructing and operating an intermodal transfer station over 24 years. The results of the analyses discussed in Section 6.3.3.1 demonstrate that the PM_{10} emissions from construction and operation of the intermodal transfer station would not exceed General Conformity threshold levels for areas such as the Las Vegas Valley, which is classified as a serious nonattainment level.

8.11.2 (13187)

Comment - EIS010243 / 0034

The EPA [Environmental Protection Agency] issued transportation conformity regulations on Nov 24, 1993 to implement section 176(c)(4) of the Clean Air Act as amended. The transportation conformity regulations apply to actions of the FHWA [Federal Highway Administration] and FTA [Federal Transit Administration]. Actions of other federal agencies, including other transportation agencies are covered by the general conformity regulations issued by the EPA on November 30, 1993. The DOE is covered by these general conformity regulations.

The Las Vegas Valley is classified by the U.S. Environmental Protection Agency as a serious non-attainment area for carbon monoxide (CO) and particulate matter (PM_{10}). The Clark County Regional Transportation Commission is responsible for establishing CO and PM_{10} emissions and for demonstrating conformity. Because Clark County is a non-attainment area for air quality emissions, the pollutants generated by the NPA are of concern. Air quality impacts are important to Clark County for regulatory purposes that are not considered in the SDEIS. The construction and operation of NPA transportation facilities effects the ability of Clark County to meet national air quality standards. Failure to meet these standards will harm Clark County's ability to obtain Federal funding for transportation facilities and will generally harm the quality of life in Clark County.

Vehicular emissions are the primary source of CO pollutants, whereas construction activities are the primary source of dust (PM_{10}) in the Valley. In addition to vehicle miles of travel, congestion is a significant contributor to increased CO emissions.

Projected carbon monoxide emissions calculated by the Regional Transportation Commission for the projected roadway types, travel speed characteristics, and emission factors using the Mobile 5b model are:

Facility Type Major Arterial (four lane)
Posted Speed 45 mph
Free Flow Speed 45 mph
Average Travel Speed 35 mph
Congested Speed 20 mph

Figure 3 Uncongested Travel Speed Characteristics and Carbon Monoxide Emissions

45 mph 4.87 grams/mile
35 mph 6.82 grams/mile
20 mph 13.51 grams/mile

Figure 2 Emission Factors and carbon dioxide emission factors

These emission factors are used to calculate the amount of air quality impact on Clark County attributable to the YMP [Yucca Mountain Project].

The emissions for the construction phase air quality impact cannot be calculated because not enough information is provided by the SDEIS on the vehicle trips required to construct and operate the facility. During the operational phase of the NPA there will be significant air quality problems. The impacts on air quality due to legal-weight truck shipments will be very substantial. The results of the analysis are presented below.

Pollutants Truck Air Quality Impacts
CO2 48,213,000
PM10 47,223,000

Figure 3 Total Grams of Air Pollutants During the Operational Phase

The cumulative impacts due to the shipment of LLW [low-level radioactive waste] to the NTS [Nevada Test Site] are assumed to be the emissions from the legal-weight trucks that will traverse the valley en route to the NTS. Because these shipments take place on the region's freeways, the emission factors for higher speeds are used. The cumulative impacts of LLW transportation are below.

Air Quality Impact Cumulative Impacts
CO2 182,274,840
PM10 869,450,987

Figure 4 Cumulative Air Quality Impacts

The air quality impacts due to the YMP [Yucca Mountain Project] will substantially degrade Clark County's air quality. They will make it increasingly difficult for local government to meet air quality goals and could cause other Federal agencies to take punitive action on Clark County due to the YMP. The NPA should have been prepared to accommodate the regional transportation plans and conform to the FHWA's [Federal Highway Administration] regulations for statewide planning.

Response

DOE agrees with the Clark County Regional Transportation Commission comment that the Las Vegas Valley is classified by the Environmental Protection Agency as a serious nonattainment area for carbon monoxide and particulate matter less than 10 micrometers in diameter (PM_{10}). Section 6.3 of the EIS describes the impacts of these emissions and other listed pollutants from cars, trucks, rail, and other conveyance vehicles that would travel through the Las Vegas Valley and construction activities within the Valley. In Appendix J of the EIS, DOE states that it has developed the transportation conformity documentation to demonstrate that carbon monoxide and particulate matter emissions would not hinder the Las Vegas Valley in their efforts to meet national ambient air quality standards. DOE has recognized the carbon monoxide and PM_{10} State Implementation Plans in the EIS and would abide by the requirements of the plan in any actions taken following a decision to proceed with the repository and related transportation program.

DOE has converted the results of the analyses performed by the Clark County Regional Transportation Commission, as presented in the comment, to the units used in the Carbon Monoxide State Implementation Plan (Table 8-3) (DIRS 156706-Clark County 2000) and determined the percent of 2000 "daily budget" that they would represent. For legal-weight trucks transporting spent nuclear fuel and high-level radioactive waste, the 48,213,000 grams of carbon monoxide emissions during the repository operation period (24 years) would be 0.0029 percent of the "daily budget" for on-road mobile sources. For legal-weight trucks transporting low-level radioactive waste to the Nevada Test Site, the 182,274,840 grams of carbon monoxide emissions during the same period would be 0.011 percent of the "daily budget".

DOE converted the results of the analyses performed by the Clark County Regional Transportation Commission, as presented in the comment, to the units used in the Particulate Matter (PM_{10}) State Implementation Plan (Table 3-8) (DIRS 155557-Clark County 2001) and determined the percent of 2001 "annual inventory" that they would represent. For legal-weight trucks transporting spent nuclear fuel and high-level radioactive waste, the 47,223,000 grams of PM_{10} emissions during the repository operation period (24 years) would be 0.0027 percent of the "annual inventory" for on-road mobile sources. For legal-weight trucks transporting low-level radioactive waste to the Nevada Test Site, the 869,450,987 grams of PM_{10} emissions during the same period would be 0.051 percent of the "annual inventory." Note that the transportation of low-level radioactive waste to the Nevada Test Site is not part of the proposed Yucca Mountain Repository action but would be a cumulative impact under the National Environmental Policy Act going on at the same time in the same area as the proposed action. Cumulative impacts, including the transportation of low-level radioactive waste to the Nevada Test Site, are given in Chapter 8 of the EIS.

It is DOE's opinion that these potential air quality impacts would be very small and that adequate information on potential air quality impacts of transportation of spent nuclear fuel and high-level radioactive waste, including cumulative impacts, is provided in the EIS to support current decisionmaking.

8.11.3 HYDROLOGY/GEOLOGY

8.11.3 (3019)
Comment - EIS000593 / 0004
Mineral County's flood plain map is incorrect. If this is so, how reliable is the information gathered for Yucca Mountain and other areas?

Response
DOE has added more information to the floodplain/wetland assessment in Appendix L of the EIS to address flooding along candidate Nevada transportation routes. Appendix L now identifies 100-year flood zones that the rail corridors and their alternative alignment segments would cross, based on information from the Federal Emergency Management Agency.

The EIS does not, however, show or discuss floodplain areas in Mineral County, because none of the rail corridors or heavy-haul truck routes under consideration in the EIS pass through Mineral County.

8.11.3 (3020)
Comment - EIS000593 / 0005
The flood plain report in the DEIS is too generalized. Mineral County would like to have a detailed flood plain analysis done of Yucca Mountain and each affected county.

Response
The floodplain/wetland assessment in Appendix L of the EIS examines the effects to floodplains and wetlands of the construction of a branch rail line or intermodal transfer station, along with its associated route for heavy-haul trucks to Yucca Mountain. Appendix L compares the impacts from construction on the floodplains/wetlands along the candidate rail corridors, and at candidate intermodal transfer stations and associated heavy-hail truck routes. The assessment does not evaluate potential effects along existing routes because such roads should be designed to meet 100-year floodplain design specifications. For the Final EIS, DOE selected rail as the preferred mode of waste transport to the repository. A more detailed floodplain/wetland assessment of the rail alignment in Nevada would be conducted.

8.11.3 (4197)
Comment - EIS001160 / 0015
White Pine County has recently adopted a plan for managing the abundant and high-quality surface and ground water resources which characterize the area. Said plan envisions significant portions of these waters being put to beneficial use by way of beverage bottling to meet an ever-growing demand for beverages in the Western United States. The DEIS does not reference the White Pine County Water Resources Management Plan nor the potential for transportation of radioactive wastes through the County to stigmatize area water resources.

Response
If the repository was to be approved, and if a mode and route to transport waste through Nevada were selected, DOE would conduct additional detailed field surveys, government consultations, analyses, and appropriate National Environmental Policy Act reviews. If any waste-transport route could affect White Pine County, the Water Resources Management Plan for the County would be examined, along with other county-specific information on the physical, biological, cultural, and socioeconomic conditions in the County.

During scoping for the EIS, DOE received comments on the need to address perception-based and stigma-related impacts. DOE considered these issues and was guided by the results of its own research and those of the State of Nevada, and by relevant conclusions reached by reviews of this subject matter by the Nuclear Waste Technical Review Board (an independent board established by the Nuclear Waste Policy Act of 1982) in 1995 and other researchers up through about 1997. During preparation of the Draft EIS, DOE concluded that analysis of perception-based or stigma-related impacts would be uncertain or speculative at best and thus would not have been meaningful in the context of the EIS. Therefore, DOE addressed, but did not quantify, whether or how individual members of the public, or the public collectively, could or would respond to the perception of risk, whether or not this risk was real.

For this Final EIS, however, DOE elected to reexamine the relevant literature and the state of research into perception-based impacts and stigma effects. DOE reevaluated the independent reviews conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others, and identified and assessed relevant studies that have been published in the interim. DOE has concluded that while there might be a modest relationship between negative perceptions and human behaviors that could adversely affect the local economy, there are no known analytical methods by which the occurrence, timing, and extent of such impacts can be accurately predicted as they relate to the transportation or disposal of radioactive materials.

8.11.3 (5539)
Comment - EIS001660 / 0041
The DEIS fails to adequately disclose the impacts of the proposed action on water and water rights (pp. 6-10,-36,-61,62). The State Engineer oversees use of waters of the State of Nevada for the long-term benefit of residents. Given the and climate and the scarcity of surface water resources, the quality and quantity of groundwater are particularly important to Mineral County and the state as a whole. The DOE must consult the State Engineer to determine whether the utilization of groundwater from wells in the Nevada affected counties (p. 6-10) would be consistent with the water laws of the State of Nevada, affect the water rights of the existing holders of such rights, or affect the cost of water for domestic and agricultural use. The DEIS must also disclose the risk to groundwater resources that could be affected by a radiological accident and hazardous waste discharge associated with the proposed action on any surface transportation route. The DEIS must describe the permitting, construction, and closure of the wells, and any environmental impacts (i.e., impacts caused by drilling muds).

Response
Section 3.1.4.2.1 of the EIS summarizes the status of water usage and appropriations in the region of the proposed repository. The EIS recognizes that there are large water appropriations in surrounding areas such as Oasis Valley, Crater Flat, and Amargosa Desert, compared to estimates of the amount available (the perennial yield), but that the actual amounts withdrawn are much lower. With regard to areas of the State that candidate transportation routes would cross, the EIS does not present the level of detail it does for the repository area. However, Sections 3.2.2.1.3.2 and 3.2.2.2.3.2 identify each groundwater basin or hydrographic area that each rail corridor and heavy-haul truck route would cross and that the State classifies as "designated groundwater basins." These are the areas where permitted water rights approach or exceed the estimated perennial yield and where the water resources are depleted or require additional administration by the State. The analyses performed for Chapter 6 indicate that impacts to water resources along the transportation routes would be minor and, with respect to groundwater, would be limited to the possibility of withdrawing water. In addition, Chapter 6 discusses the options available to DOE to obtain water for construction activities. If water was unavailable in one area of the corridor or route, DOE could consider alternative areas and means for getting water. Chapter 6 discusses the fact that the quantities of water and the duration of the need would be relatively small for construction.

The level of detail required to obtain a water appropriation permit is not required for this EIS, but DOE has identified the requirement as being applicable to the project. Section 11.2.2 of the EIS identifies Nevada Statutes related to water and water quality that would be applicable to the Proposed Action. These statutes address the water appropriation process and licensing requirements for drilling, construction, and plugging of wells.

With respect to the evaluation of transportation accidents, the EIS does not consider possible impacts to groundwater resources because DOE believes the scenario of contaminants reaching groundwater does not represent a realistic contributor to exposures from a transportation accident. Accident scenarios evaluated in the EIS assume releases of radionuclides from the transportation cask.

The predominant threats to human health from a transportation accident, and those considered in the EIS analysis, would be exposures that occurred relatively quickly before the start of controls and countermeasures. Exposure pathways considered in the accident evaluations were associated with people close to the release (direct exposure) or exposed to materials in the air (gases and particulates). Exposure to airborne materials includes inhalation of and direct exposure to a passing cloud of contaminants, direct exposure to materials deposited on the ground, and inhalation of materials resuspended from the ground by wind. Ingestion from contaminated crops is an exposure pathway for accidents in rural areas. DOE believes that these acute exposures present a conservative estimate of the risks associated with a serious transportation accident. Contamination of groundwater and subsequent exposure of people to that groundwater would be a long-term chronic condition, and it would include assumptions of the availability of a contaminant migration pathway and a long period of inaction with respect to responding to the accident release. DOE believes such assumptions are not realistic and, even if they were included in the evaluations, the exposures would be minor in comparison to the acute exposures that are included. Section J.1.4.2 of the EIS contains more information on transportation accident scenarios.

8.11.3 (5601)
Comment - EIS001887 / 0227
Page 4-24; Section 4.1.3.2 - Impacts to Surface Water from Construction, Operation and Monitoring, and Closure

The statement "If DOE selected a rail corridor or heavy-haul route..." should be changed to "When a rail corridor or heavy-haul route is selected...." Also, wouldn't NEPA [National Environmental Policy Act] documents other than a floodplain/wetlands assessment be required?

Response
DOE believes that the EIS text is appropriate because: (1) the mostly legal-weight truck scenario described in the EIS is still a viable option; and (2) more importantly, if the proposed repository action did not go forward, there would be no need to select a transportation corridor or route.

Section 4.1.3.2 of the EIS deals with potential impacts to surface waters from repository construction, operation and monitoring, and closure, so discussion of the floodplain/wetlands assessment (Appendix L) is appropriate. This is not an appropriate section to discuss other National Environmental Policy Act-type documents or assessments. As stated in the EIS (Chapter 6), DOE would conduct more detailed field surveys, government consultation, analyses, and appropriate National Environmental Policy Act reviews before deciding on a specific route.

8.11.3 (7225)
Comment - EIS001337 / 0098
Page 3-130 The text here implies that heavy-haul routes are in proximate parallel location to flowing surface waters. This is not the case at all. In most cases, these routes are 800 or meters from any flowing surface water, except for the occasional spring. Additional field work and revision to this section is needed.

Response
The text on the cited page that appears to fit this comment is in the discussion of the candidate Caliente-Las Vegas heavy-haul truck route. The opening paragraph of this discussion states, "From Crystal Springs to Las Vegas, the route parallels the White River through Pahranagat Valley, and then through Coyote Springs…." This statement does not imply anything about the nature of the White River or its proximity to the route (U.S. Highway 93), only that the highway and the river both head southward through the Pahranagat Valley. The White River flows only intermittently over much of its length. The important issue with respect to the White River in this area is that flow from Ash Springs is toward the White River channel and that U.S. 93 crosses the flow from the spring in the area between the spring and the river. Section 3.2.2.2.3.1 of the EIS identifies Ash Springs as a water resource associated with the Caliente-Las Vegas route, and Section 3.2.2.2.4 discusses biological resources, including the endangered White River springfish that occurs in the Ash Springs flow.

Before selecting a specific rail alignment in a corridor, the Department would conduct additional consultations, field surveys, analyses of water and biological resources, and appropriate National Environmental Policy Act reviews.

8.11.3 (7901)
Comment - EIS001653 / 0051
Section 3.2.2.1.3.1 contains two small paragraphs and a table of surface waters for alternative rail corridors. This section needs to have maps which show the location of surfaces waters in relationship to corridors, flow and discharge information, uses of the water permitted or otherwise, and flood plain information, and information on recharge.

Response
Sections 3.2.2.1.3.1 and 3.2.2.2.3.1 of the EIS include tables that identify surface-water features near the candidate Nevada transportation routes. The tables identify water resources along route segments to provide a general idea of the location of water resources. In addition, the discussion of heavy-haul truck routes identifies flood zones in areas

DOE is considering for the associated intermodal transfer stations. The floodplain/wetlands assessment in Appendix L of the EIS contains additional information on areas of potential flooding along the Nevada transportation routes. Specifically, Appendix L identifies 100-year flood zones that rail corridors cross, based on information from the Federal Emergency Management Agency.

The comparable groundwater discussions in Sections 3.2.2.1.3.2 and 3.2.2.2.3.2 of the EIS include information on recharge estimates. These sections identify each groundwater basin, or hydrographic area, that each rail corridor or heavy-haul truck route crosses, and contain estimates of perennial yield for each area. Perennial yield is the amount of water that can be withdrawn from the basin on an annual basis without adversely affecting the reservoir; it can be considered the average amount of recharge and underflow that reaches the area's groundwater each year.

DOE believes that the amount of detail in the EIS on water resources along alternative rail corridors and heavy-haul truck routes is appropriate. Before selecting a specific rail alignment in a corridor, the Department would conduct additional consultations, field surveys, analyses of water and biological resources, and appropriate National Environmental Policy Act reviews.

8.11.3 (8473)
Comment - EIS000817 / 0145
Can DOE "lease temporary water rights from individuals along the rail corridor?" Do those individuals own the water to give the right to DOE? This needs a great deal of thought. The future is full of water concerns. Just how much water will Nevada lose to DOE in this whole operation of transport and disposal? Water is scarce in Nevada, isn't it? Who uses and needs that water? Are water predictions correct? Who really has the right to give that water to DOE? It almost appears as a threat here to the State of Nevada, saying, "If you don't give us water rights to drill wells, we'll pay off private individuals for rights."

Response
DOE did not intend to sound as if it was making threats when it stated that it could obtain water necessary to support construction of transportation routes from individuals already holding water rights. The Department views this simply as a potentially available option; not to discuss it in the EIS would be contrary to the objective of full disclosure. State statutes, as stated in the *Nevada State Water Plan* (DIRS 155775-NDWP 1999), allow this option: "Water right owners are entitled to buy, sell or trade their water rights to others under free market conditions. However, changes in the point of diversion, or place or manner of use must be approved prior to the change in accordance with the state water law, and state and Federal Court decrees and regulations."

Section 4.1.3.3 of the EIS estimates the amount of water DOE would need to support the repository. Sections 6.3.2.2 and 6.3.3.2 estimates water needs for each rail corridor and heavy-haul truck route, respectively. With respect to the amount of groundwater available in the areas discussed in the EIS, DOE identifies estimates of perennial yield used by the State of Nevada. Because most of the water demand associated with the Proposed Action would occur at the repository, the EIS presents a range of water availability (or perennial yield) estimates for the groundwater basin in that area.

8.11.3 (9794)
Comment - EIS001888 / 0379
[Clark County summary of a comment it received from a member of the public.]

Another commenter requested that the EIS identify sites in Lincoln County for borrow material (chiefly for the railbed) and include geologic and soil maps for all potentially impacted areas in Lincoln County.

Response
DOE has examined information from the Natural Resource Conservation Service to determine if the candidate rail corridors would cross prime farmlands and to identify potential serious engineering constraints caused by soil conditions. DOE did not include the level of geologic and soil data requested by the commenter for several reasons. The Department believes that most variations in soil and geologic conditions in a rail corridor or along a heavy-haul truck route would primarily present construction and cost issues rather than environmental issues. If unique resources (water, cultural, biological, etc.) are associated with a type of geology or soil, the EIS discussion is in terms of those resources rather than the type of geology or soil.

DOE agrees that site-specific information on geology and soils would be necessary before the construction of a branch rail line or road upgrades to support heavy-haul truck shipping. As stated in Chapter 6 and Section 11.2.2 of the EIS (subsection on Compliance with Floodplain/Wetlands Environmental Review Requirements), more detailed field surveys, government consultation, analyses, and appropriate National Environmental Policy Act reviews would be prepared if a decision was made to select a specific rail alignment within a corridor or a specific location of an intermodal transfer station or the need to upgrade the associated heavy-haul truck routes. These would include consultations with State wildlife management agencies, the Bureau of Land Management, the Army Corps of Engineers, and other applicable government agencies. They also would include field surveys (as applicable) and more detailed assessments and analyses of wetlands and other waters; floodplains; sensitive species; soils; and other related issues.

With regard to the commenter's request that the EIS identify potential sites for borrow material, DOE believes that this information would be of little value at this stage of the project. For a rail corridor, the normal design process would include an effort to lay out track elevations such that excavation and borrow quantities are roughly equal. This would minimize the amount of new material DOE would have to bring to the construction site. In addition, it assumes that excavated material would be suitable for fill. However, the design has the flexibility to control where borrow material is needed along the corridor, if at all. During construction of a branch rail line, it would be fairly easy to get borrow materials to the construction area. That is, the fact that the project consists of building a railroad greatly enhances the ability to bring in construction materials. A review of geologic and soil maps could help identify potential borrow sites, but until the repository project enters a more detailed rail-design process, such an effort would not provide meaningful information to support current decisionmaking. As stated in the Overview to the Summary:

"DOE believes that the EIS provides the environmental impact information necessary to make certain broad transportation-related decisions, namely the choice of a national mode of transportation outside Nevada (mostly rail or mostly legal-weight truck), the choice among alternative transportation modes in Nevada (mostly rail, mostly legal-weight truck, or heavy-haul truck with use of an associated intermodal transfer station), and the choice among alternative rail corridors or heavy-haul truck routes with use of an associated intermodal transfer station in Nevada…Other transportation decisions, such as selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews."

8.11.3 (9803)
Comment - EIS001888 / 0390
[Clark County summary of comments it has received from the public.]

Commenters stated that the EIS must fully describe the existing environment (wells, springs, drinking and agricultural water sources including the Humboldt River, depth to groundwater, water quantity and quality, spring-discharge rates), and examine possible impacts to these resources from construction and operation of regional transportation facilities and the repository, including acts from repository failure.

Response
DOE believes that the EIS adequately addresses the baseline environmental conditions mentioned in the comment in Chapters 3 and 6 of the EIS. There are no permanent bodies of surface water in the immediate vicinity of the proposed repository, as described in Section 3.1.4.1. On a regional basis, Section 3.1.4.1 describes significant areas of spring discharge, particularly those in the Ash Meadows area. Discussions of groundwater in the region of the repository (see Section 3.1.4.2) include depths to the water table, direction of flow, water quality, water-use rates, and water appropriations.

The EIS does contain less detail for the alternative rail corridors and heavy-haul truck routes compared to the repository site. DOE believes that areas over which transportation routes would cross are much less susceptible to environmental impacts because of the safety of the shipping casks. As stated in Chapter 6 of the EIS, DOE would conduct more detailed field surveys, government consultation, analyses, and appropriate National Environmental Policy Act reviews before deciding on a specific route. However, the information in the EIS does present a broad overview of existing surface-water (springs, creeks, reservoirs, riparian areas, etc.) and groundwater conditions along the rail corridors and heavy-haul truck routes. Groundwater conditions are described in terms of the basins that the route would cross, their perennial yields, and whether the State considers them "designated groundwater basins." Designated basins are areas where permitted water rights approach or exceed the estimated perennial yield and the water resources are being depleted or require additional administration by the State.

With regard to the evaluation of potential impacts to water resources from construction and operation of regional transportation facilities and the repository, DOE believes that the scope of analysis in the EIS is consistent with the concern expressed in the comment. Sections 6.3.2 and 6.3.3 of the EIS discuss potential impacts to water resources in areas along rail corridors and heavy-haul truck routes, respectively. Section 4.1.3 addresses environmental impacts to water resources from the construction, operation and maintenance, and closure of the proposed repository. Chapter 5 addresses the long-term performance of the repository. A major element of Chapter 5 is the projection of potential impacts associated with the eventual failure of waste packages (over tens of thousands to hundreds of thousands of years) where migration of contaminants to and through groundwater would be the primary mechanism of exposure to the environment. Section 5.7 discusses disruptive events such as earthquakes and volcanic activity that could disturb the repository. The conclusion of the analysis, even with disruptive events, is that repository impacts would not exceed standards established for protection of health and safety and the environment.

8.11.3 (11150)
Comment - EIS000692 / 0006
Also, so far I find no mention in the DEIS that Lincoln County water drains into the Colorado River system, water which is used, haggled and fought over, with five western states.

Response
DOE recognizes that water is a valuable and scarce resource in southern Nevada. Because of the limited amount of surface water along the candidate Nevada transportation routes, the EIS analyses assumed that water to support the construction of a transport route would come from groundwater resources. Accordingly, the EIS discusses the potential to affect local surface water through activities such as disturbing flow, increasing sedimentation, or releasing contaminants; the discussion of groundwater includes more regional concerns such as availability over entire groundwater basins. The EIS identifies the groundwater basins, or hydrographic areas, over which rail corridors or heavy-haul truck routes would pass and which the State classifies as "designated groundwater basins." These are areas where permitted water rights approach or exceed the estimated perennial yield and where water resources are being depleted or require additional administration by the State. In discussing the more regional issues associated with groundwater, the EIS (Section 3.2.2.2.3.2) recognizes that the site of the intermodal transfer station under consideration near Caliente is in the Colorado River Basin.

8.11.3 (12453)
Comment - EIS001337 / 0032
The County [Lincoln] and City [Caliente] recommended that they include a description of wells and springs within Lincoln County hydrographic basins potentially hosting repository system construction activities, including rail or highway improvements. DOE was encouraged to include in said description depth to groundwater, flow attributes of existing springs, and existing water quality. While the DEIS Affected Environment section does address surface and groundwater conditions along candidate transportation corridors in Lincoln County, the baseline data is not sufficient to enable conclusions about impact to hydrologic resources to be derived. For example, despite a request by the County and City for said information be included in the document, the DEIS does not describe depth to groundwater, flow attributes of potentially impacted springs or existing water quality of potentially impacted water resources.

During scoping, the County and City suggested that surface hydrology might impair safe transport and/or handling of radioactive wastes and might be significantly altered by construction activities. The County and City recommended that for all areas within Lincoln County potentially impacted by repository system construction and operations (including transportation), mapping of surface hydrology and estimates of baseline flows should be included within the DEIS. The DEIS section on Affected Environment does not include any description of existing surface hydrologic conditions (particularly estimates of the duration and intensity of peak flows) within Lincoln County. This is despite the fact that the DEIS does attempt to describe potential hydrologic impacts of transportation in Lincoln County (Section 6 of EIS).

Response
The EIS identifies surface-water resources along the candidate rail corridors and heavy-haul truck routes (see Sections 3.2.2.1.3 and 3.2.2.2.3 of the EIS, respectively). The description in Section 3.2.2.2.3 of the Caliente sites DOE would consider for an intermodal transfer station includes a discussion of the candidate locations in relation to 100- and 500-year flood zones of Meadow Valley Wash. The floodplain/wetlands assessment in Appendix L of the EIS contains additional information on potential flooding areas along the Nevada transportation routes. Specifically, Appendix L identifies 100-year flood zones that rail corridors and their alternative alignment segments would cross, based on information from the Federal Emergency Management Agency. However, as noted in the EIS, these maps provide only limited coverage for Lincoln County.

DOE believes that the amount of detail in the EIS on water resources along candidate rail corridors and heavy-haul truck routes is appropriate. However, as stated in the EIS in Chapter 6 and Section 11.2.2 (subsection on Compliance with Floodplain/Wetlands Environmental Review Requirements), more detailed field surveys, government consultation, analyses, and appropriate National Environmental Policy Act reviews would be prepared if a decision was made to select a specific rail alignment within a corridor or a specific location of an intermodal transfer station or the need to upgrade the associated heavy-haul truck routes. These would include consultations with State wildlife management agencies, the Bureau of Land Management, the Army Corps of Engineers, and other applicable government agencies. They also would include field surveys (as applicable) and more detailed assessments and analyses of wetlands and other waters; floodplains; sensitive species; and other related issues.

8.11.4 BIOLOGY AND SOILS

8.11.4 (42)
Comment - 7 comments summarized
The Draft EIS does not adequately address the impacts of development of a rail line or heavy haul route on springs, streams, and other waters; floodplains; wetlands; groundwater resources; soils; native vegetation; spread of noxious weeds; risk of wildfire; game and nongame wildlife habitat and migration; loss of hunting revenue; and wild horses and burros. The EIS should include a detailed inventory of the biological and surface-water resources along the potential routes and conduct a species- and site-specific analysis of impacts, particularly if DOE wishes to decide among rail corridors or heavy-haul truck routes.

Response
The *Environmental Baseline File for Biological Resources* (DIRS 104593-CRWMS M&O 1999, all) includes descriptions and maps of springs, riparian areas, and other potential wetlands; game habitat and migration corridors; sensitive species; and wild horse and burro herd management areas within 5 kilometers (3 miles) of the transportation alignments and routes considered within Nevada. Sections 3.2.2.1.3, 3.2.2.1.4, and 3.2.2.2.4 and associated tables of the EIS highlight the biological resources close to the corridors and routes that are most likely to be affected by Nevada transportation activities. Impacts on those resources are discussed in Chapter 6. DOE agrees with the commenters that site-specific information would be necessary prior to construction of a branch rail line or road upgrades to support heavy-haul truck shipments. However, DOE believes that the EIS provides sufficient information on impacts to biological resources to make informed decisions regarding the basic approaches (for example, mostly rail or mostly truck shipments), as well as the choice among alternative transportation corridors and routes in Nevada. If the site was approved, DOE anticipates that the project plan and design will continue to evolve, creating additional opportunities for mitigation and potentially eliminating the need for some mitigation measures currently under consideration. Section 9.1.1 (and subsequent sections in Chapter 9) describes DOE's initial list of commitments available at this time and identifies DOE-determined impact reduction features, procedures and safeguards and mitigation measures under consideration for inclusion in the project plan and design. Chapter 9 identifies ongoing studies that could influence mitigation measures related to the project plan and design.

As noted in Chapter 6 and Section 11.2.2 of the EIS, if a repository was to be constructed at Yucca Mountain, more detailed field surveys, government consultations, analyses, and appropriate National Environmental Policy Act reviews would be conducted with regard to the transport of waste to Yucca Mountain. These activities would include consultations with State wildlife management agencies, the Bureau of Land Management, the Army Corps of Engineers, and other applicable government agencies. They also would include field surveys (as applicable) and more detailed assessments and analyses of wetlands and other waters; floodplains; sensitive species; effects of habitat fragmentation, interruption of movements, mortality, and harassment on wildlife, horses, and burrows; loss of hunter-generated revenue, spread of noxious weeds, and soils.

8.11.4 (1412)
Comment - EIS000355 / 0007
We have renewable resources, as well, which will be probably destroyed for years and years and years to come.

Response
As discussed in Section 10.1.3.4 of the EIS, DOE expects limited short- or long-term impacts to renewable biological resources. Vegetation and wildlife would be lost from small areas that DOE would develop for the repository or for transportation routes. Long-term impacts would be related to maintenance of the routes and to the repository. Over the long term, destruction of any resource would be unlikely to be more significant than impacts from original construction. If a specific road or rail route was proposed, DOE would consider specific mitigation measures to avoid or minimize adverse impacts to biological resources in additional National Environmental Policy Act documentation.

8.11.4 (5568)
Comment - EIS001887 / 0197
Page 3-100; Section 3.2.2.1.1 - Land Use and Ownership

The region of influence for biological resources is also too narrowly defined. Habitat outside the corridor is considered in the regional of influence only if that habitat is disturbed by rail line construction and operations. Several of the corridors cross or pass near to crucial big game habitat. Human activity is known to reduce the value of crucial habitat, particularly crucial winter habitat. Frequent trains passing through or near to crucial habitat could significantly reduce the value of that habitat even though the habitat was not physically “disturbed” by construction or operation. The region of influence for biological resources should include all habitat potentially affected, not just disturbed, by construction and operation of the rail line (Note: This same discussion applies to the intermodal transfer station and heavy-haul routes.)

Response
Lists of the threatened and endangered species, sensitive species, game habitat, springs, and riparian areas known to occur within 5 kilometers (3 miles) of rail corridors have been added to Section 3.2.2.1.4 of the EIS. Sections 6.3.2.1 and 6.3.2.2 have been modified to better describe the impacts to biological resources within 5 kilometers of the corridors.

The region of influence for heavy-haul truck implementing alternatives remains as habitat that would be disturbed, and the EIS only lists and discusses biological resources within 400 meters (0.25 mile) of the heavy-haul truck routes and intermodal transfer station. This region of influence was not changed because highway construction would occur on and adjacent to existing roads and therefore should have no additional effect on biological resources distant from those roads. An intermodal transfer station would not be large enough to disrupt movements or otherwise affect distant biological resources. Section 6.3.3.1 of the EIS has been modified to clarify DOE’s conclusion about the lack of impacts to biological resources distant from heavy-haul truck routes or intermodal facilities.

8.11.4 (5905)
Comment - EIS001622 / 0024
Need for Complete Description and Analysis of Impacts on Wildlife, Natural Habitat and Public Use Parks

The California State Park system includes 265 park units encompassing 1.4 million acres within which the State is responsible for preserving representative samples of the extraordinary natural and cultural resources and biological diversity of our State. Along these routes is approximately half of California’s park units including State parks, State historic parks, State beaches as well as National parks. The EIS should evaluate the potential impacts along shipment corridors to fish and wildlife populations, natural habitat, and public parks in California, as well as proposed mitigation measures to offset these impacts.

There is no discussion in the DEIS of potential long-term adverse impacts to animals and plants. All of the DEIS' long-term evaluations are based on human health considerations. The DEIS makes the faulty assumption that the few predicted latent cancer fatalities from the proposed project will result in no impacts on the aquatic, wildlife, and plant populations that are dependent upon the water resources potentially affected by the project. These natural populations have taken tens of thousands to millions of years to adapt to their current habitats. These time scales should be considered in determining potential impacts to these populations.

Further, transportation routes could potentially impact habitat for threatened or endangered species. The DEIS should include a description of transportation routes, including road or rail construction or improvements in California, and impacts to species identified as of concern. (See the attached letter from the California Department of Fish and Game.) For example, desert bighorn sheep in California could be adversely impacted by potential transportation corridors in the Death Valley region. Bighorn sheep movement, and consequently their ability to forage for food and reach water sources, could be severely impacted by the construction of new highways, railroads, or road improvements that include barriers or fences.

Recommendation: The DEIS should provide a complete description and analysis of potential transportation impacts on wildlife, natural habitat and public use parks.

Response
DOE does not plan to modify existing public highways or rail lines in California or elsewhere outside Nevada that would be used to transport materials, personnel, or shipments of spent nuclear fuel and high-level radioactive waste to Yucca Mountain. The only potential impacts to parks in California would be those described and analyzed in Sections 6.2.3 of the EIS for incident-free transportation and 6.2.4 for potential accidents. These activities would not further fragment habitat for bighorn sheep or other wildlife in California and additional information on those routes, therefore, is not necessary.

The potential long-term adverse impacts of the Proposed Action are analyzed in Section 5.9 of the EIS. DOE did not assume that relatively few predicted latent cancer fatalities would result in no impacts to aquatic, wildlife, and plant populations. Instead, DOE based its conclusion on the results of calculations that estimated dose rates would be less than 100 millirad per day. The International Atomic Energy Agency concluded that chronic dose rates of less than 100 millirad per day are unlikely to cause measurable detrimental effects in populations of even the more radiosensitive species in terrestrial ecosystems (DIRS 103277-IAEA 1992).

8.11.4 (5946)
Comment - EIS001622 / 0049
The Department commented on the Site Characterization Plan (SCP) on March 23, 1989, and those comments are hereby incorporated by reference. In addition, the Amargosa nitrophila, Nitrophila mohavensis, a plant species listed as Endangered by both the State of California and U.S. Fish and Wildlife Service, should be included on the list of species contained in the March 23, 1989 letter. [Text of March 23, 1989, memorandum follows.]

The Department of Fish and Game has reviewed the U.S. Department of Energy's Site Characterization Plan (SCP) for the proposed Yucca Mountain, Nevada, high-level nuclear waste repository. The SCP describes the detailed studies that will be performed to determine the suitability of the site for nuclear waste disposal, and the potential environmental impacts of construction and operation of the repository. The Department is interested in the SCP because of potential impacts the waste repository could have on water supplies for California fish and wildlife populations in and near Death Valley National Monument.

The Death Valley area is one of the most arid regions in North America. Perennial water supplies in the region are available only where groundwater surfaces in springs or short reaches of streams. Many fish and wildlife species are totally dependent on the unique habitats that these isolated water supplies provide. Some of these species occur nowhere else on earth. The Department is particularly interested in the following species:

Amargosa pupfish:	*Cyprinodon nevadensis amargosae*
Saratoga Springs pupfish:	*Cyprinodon nevadensis nevadensis*
Salt Creek pupfish:	*Cyprinodon nevadensis salinus*
Cottonball Marsh pupfish:	*Cyprinodon salinus milleri*
Shoshone pupfish:	*Cyprinodon nevadensis shoshone*
Amargosa vole:	*Microtus californicus scirpensis*
Saratoga Springs Belostoman bug:	*Belostoma saratogae*

In addition, two as yet unclassified forms of Amargosa speckled dace (Rhinichthys osculus ssp.) occur in the area, and some endemic snail species have recently been discovered in the area as well. Of these species, the Amargosa vole is both State- and Federally-listed as endangered, and the Cottonball Marsh pupfish is listed by the State as threatened. Other species may well qualify for listing in the future, when more is known about them.

Because these species are totally dependent on surfacing groundwater, the Department is concerned about any effects the waste repository may have on groundwater flows and groundwater supplies. The SCP indicates that the groundwater that supplies the springs and streams in California originates from recharge areas in Nevada. These groundwaters flow underground, past the Yucca Mountain disposal site, and then to California in a slow, complicated underground path that the SCP indicates is not well understood. If the construction or operation of the waste repository interrupts or depletes these groundwater flows, water supplies for the many fish and wildlife species listed above, and other plant and animal species as well, could be reduced or cut off. Because some of these species occur nowhere else on earth, this could cause the extinction of several fish and wildlife species.

The Department believes that the U.S. Department of Energy should perform the necessary studies to determine if the project will reduce or cut off groundwater flows to California. The Department notes that the SCP describes several planned studies that relate to groundwater. However, the SCP does not include a study element specifically aimed at addressing potential project effects on fish and wildlife populations dependent on groundwater supplies. The Department recommends that such a study element be added to the SCP as a separate and significant part of the overall study plan. Furthermore, the Department recommends that if this study determines that impacts on California's fish and wildlife populations could occur, the U.S. Department of Energy should implement alternative project features or modifications, or develop adequate mitigation measures, so that these impacts do not occur.

Response

Nitrophila mohavensis is listed in the description of sensitive species at Ash Meadows (Section 3.1.5.1.3 of the EIS). As stated in Section 4.1.3.3, DOE does not anticipate that groundwater withdrawals would affect the regional groundwater system to an extent that could affect downgradient groundwater use or users.

8.11.4 (6294)

Comment - EIS001727 / 0009

There's a failure to adequately assess impacts beyond radiation impacts in Nevada, and I don't have time to tell you about the potential impacts of building a rail spur to Yucca Mountain on big horn sheep migration routes, but it's important to remember we have a sensitive and fragile desert ecology, and radiation is not the only issue with this facility.

Response

The EIS (Sections 4.1.4, 5.9, 6.1.2.4, 6.3.1.2, 6.3.2, and 6.3.3) provide analyses of both the radiological and nonradiological impacts on the biological resources. Regarding impacts on bighorn sheep, EIS Sections 3.2.2.1.4 and 3.2.2.2.4 highlight the sheep populations most likely to be affected. The *Environmental Baseline File for Biological Resources* (DIRS 104593-CRWMS M&O 1999), which is referenced in the EIS, further describes and maps bighorn sheep populations and migration corridors near candidate rail corridors that were considered. It is acknowledged in Section 9.3.4.2 that construction of some transportation routes could disrupt movements of game animals. Section 9.3.4.2 states that DOE would mitigate to reduce habitat fragmentation and barriers to animal movements in the design and construction of branch rail lines, routes, and fencing after seeking advice from wildlife agencies and organizations. As stated in Chapter 6 and elsewhere, DOE would conduct more detailed field surveys, government consultation, analyses, and appropriate National Environmental Policy Act reviews if a proposal was made to select a specific rail alignment within a corridor or a specific location of an intermodal transfer station or the need to upgrade the associated heavy-haul truck routes. These would include consultations with State wildlife management agencies, the Bureau of Land Management, the Army Corps of Engineers, and other applicable government agencies. They also would include field surveys (as applicable) and more detailed assessments and analyses of wetlands and other waters; floodplains; sensitive species; effects of habitat fragmentation, interruption of movements, mortality, and harassment on wildlife, horses, and burrows; loss of hunter-generated revenue, spread of noxious weeds, and soils.

8.11.4 (7223)
Comment - EIS001337 / 0097
Page 3-129 2nd paragraph. The Caliente intermodal site is the location of the City of Caliente's wastewater treatment facility. Lands on the site are irrigated with effluent. The site is fully developed. Moist areas are likely the result of irrigation and are not springs or wetlands. This site has been previously cleared through NEPA [National Environmental Policy Act] for construction of wastewater treatment facilities using federal funding.

Response
Sections 3.2.2.2.1 and 6.3.3.2.1 of the EIS state that there is a wastewater treatment facility near the site of a candidate intermodal transfer station at Caliente. DOE has changed the text of Section 3.2.2.2.4 to clarify that moist areas within the site might be wetlands or other waters of the United States resulting from adjacent springs or they might be caused by irrigation from the treatment facility.

8.11.4 (7441)
Comment - EIS001969 / 0003
Transportation of high level radioactive waste to Yucca Mountain by truck or rail from nuclear facilities nationwide also has the potential to impact wildlife resources should a breach in containment occur. There is an inherent risk associated with transportation of any hazardous material. Although DOE has conducted detailed analysis of worst case scenarios, even the best waste management strategies cannot predict every possibility. We understand that the radioactive waste would be transported in a virtually leak-proof stainless steel cask in the form of dry pellets which would make release of any waste material extremely remote. Nevertheless, there remains a potential environmental risk, albeit minuscule, at any given point along the proposed rail or highway transportation corridor.

Response
DOE agrees that a release of hazardous materials during accidents involving spent nuclear fuel or high-level radioactive waste would be very unlikely. With regard to the potential impacts to wildlife resources, a transportation accident could result in the dispersal or death of individual members of a species within a localized area but would be unlikely to have long-term detrimental effects upon a population as a whole.

8.11.4 (10189)
Comment - EIS001888 / 0560
[Clark County summary of comments it has received from the public.]

The EIS should evaluate the impacts to game habitat and protect species from potential transportation accidents.

Response
Sections 6.3.2 and 6.3.3 of the EIS assess the impacts of transportation activities on game habitat and protected species, including the extent of habitat disturbances and the possibility that trucks or trains could accidentally kill animals. DOE did not evaluate impacts from potential transportation accidents directly because their estimated rates (see Section J.1.4.2.3.2) would be so low (3.21×10^{-7} accidents per truck-kilometer; 5.39×10^{-8} per railcar-kilometer) that losses of habitats or individuals would be unlikely to have detectable impacts on the regional populations of any species. In addition, impacts would be small in comparison to losses due to other traffic on the highways or rail lines.

8.11.4 (11311)
Comment - EIS001814 / 0040
DEIS Page 6-10
Loss of habitat from construction of a branch rail line would be the greatest potential impact to biological resources, potentially affecting the desert tortoise, a threatened species.

DEIS Page 6-46
Game and Game Habitat. Each candidate rail corridor would cross or be near [within 5 kilometers (3 miles)] several areas the Bureau of Land Management and the Nevada Division of Wildlife have designated as game habitat. Construction activities in these areas would result in a loss of some habitat. Each rail corridor has the potential to disrupt movement patterns of game animals. The design of fences, if built, along the rail corridor, would accommodate the movement of these animals. Large animals including game species (elk, bighorn sheep, mule deer, etc), wild horses, and burros probably would avoid contact with humans at construction locations and would temporarily move to other areas during construction. Numerous special status species occur along each of the branch rail lines. Construction of a branch rail line could lead to habitat loss and fragmentation for the special status species, as well as to mortality of individuals.

DOE has significantly understated the impact to biological resources. Loss of habitat would not be limited only to the physical loss of habitat due to the construction of the rail line. The operation of the rail line would reduce the value of habitat crossed or near to the line, resulting in significantly greater loss in habitat than just the area physically within the rail line right-of-way.

All of the rail corridors except the Valley Modified cross and are near to critical habitat for many species of wildlife. Critical habitat is absolutely necessary for wildlife. Human activity, such as the operation of a rail line, in or even near critical habitat can seriously degrade the value of that habitat for wildlife. This is especially true of linear facilities, such as a rail line, that pass through habitat areas. Without undisturbed access to critical habitat, the wildlife using that habitat may abandon large areas of year-round habitat. Critical habitat crossed by or near to rail corridors includes bighorn sheep crucial winter range, mule deer crucial winter range, pronghorn winter range, sage grouse strutting areas, sage grouse nesting areas, chukar crucial habitat and quail crucial habitat.

The Carlin and Jean corridors also cross migration corridors for big game. Linear facilities such as rail lines can significantly impact the movement of big game. This is particularly true in areas where steep cuts or fills are required. The Jean corridor also crosses a potential migration corridor for bighorn sheep from winter range in the Devils Hole Hills to historic but currently unoccupied habitat at the northwest end of the Spring Mountains. Although currently not used, the disruption of this migration corridor would be a significant impact. Bighorn sheep are particularly susceptible to disease. An unoccupied habitat area represents the potential to establish another herd unit that could provide greater protection for the continued recovery of the bighorn sheep.

The Environmental Baseline File for Biological Resources (TRW 1999k) lists the following crucial habitats within each of the 400 meter wide rail corridors:

Caliente: Bighorn Sheep Crucial Winter Habitat (Cedar Range), Mule Deer Crucial Winter Range (Cedar Range), Quail Crucial Habitat in Meadow Valley

Carlin: 3 Sage Grouse Strutting Areas (Grass Valley, Rye Patch Canyon, and Monitor Valley), Sage Grouse Nesting Area (Monitor Valley), Pronghorn Winter Range, Ungulate Migration Corridor between Simpson and Toquima Ranges, Bates Mountain Antelope Release Area, Simpson Park Habitat Management Area

Caliente Chalk Mountain: Bighorn Sheep Crucial Winter Habitat (Cedar Range), Mule Deer Crucial Winter Range (Cedar Range), Crucial Areas for Quail (Meadow Valley)

Jean: Crucial Bighorn Sheep Winter Habitat (Wilson Pass) and Winter Habitat (west of Wilson Pass), Bighorn Sheep Migration Corridor and Potential Migration Corridor, Crucial Chukar Habitat (Goodsprings), Crucial Areas for Quail (Goodsprings, Pahrump, Johnnie), and Mule Deer Winter Habitat

Although the Valley Modified corridor does not contain crucial habitat, it does cross the Desert National Wildlife Refuge (DNWR) in several places, including the Corn Creek Springs area. The DNWR was set aside primarily for desert bighorn sheep. It also provides habitat for mule deer, other desert mammals, and migratory birds. The Corn Creek area contains an environment filled with trees, pasture and spring-fed ponds which attract a large number of migrating birds not common to the desert environment. The ponds are home to the endangered Pahrump poolfish.

Each of the corridors contain many additional biological resources within the corridor or within 5 kilometers of the corridor. Although these resources are identified in the Environmental Baseline File, the DOE makes no attempt to quantify the impacts of the rail line on most of these resources.

The EIS does not contain an assessment of the impact of fencing on wildlife. This is inexcusable, since the impact of fencing was identified by the Bureau of Land Management as a major issue (TRW 1999k, p 5-1).

Response
DOE has added lists of the threatened and endangered species, sensitive species, game habitat, springs, and riparian areas that are known to occur within 5 kilometers (3 miles) of rail corridors and described those resources more fully in Section 3.2.2.1.4 of the EIS. Sections 6.3.2.1 and 6.3.2.2 have been modified to describe the impacts on game animals. This information describes the impacts to biological resources from the construction of a branch rail line in a corridor. It is, therefore, sufficient for making decisions on the basic approaches for transportation and the choice among transportation corridors. As suggested in the Foreword to the EIS, Chapter 6, and elsewhere, DOE would conduct detailed field surveys, analyses, consultations with the Bureau of Land Management and Nevada Division of Wildlife, and appropriate National Environmental Policy Act reviews if there was a proposal to select a specific rail alignment in a corridor.

All candidate rail corridors but the Valley Modified would cross several areas the Bureau of Land Management and Nevada Division of Wildlife have designated as game habitat (see Section 3.2.2.1.4 of the EIS). In addition, the candidate rail corridors are within 5 kilometers (3 miles) of other game habitat and some cross areas identified as migration routes. An approximately 60-meter (200-foot)-wide section of game habitat would be cleared of vegetation or otherwise disturbed during construction, and other game habitat would be lost in borrow areas, access roads, and other disturbances required to construct a branch rail line. Some of this land would be reclaimed after construction, but the value of that land to game and other wildlife would be diminished for many years. The value of habitat adjacent to a branch rail line would be diminished if game animals avoided those areas due to noise or presence of humans. Construction of a branch rail line could disrupt movements between those habitats and along migration routes, especially if DOE had to fence the rail line. Fence design would accommodate the movements of game animals to the extent possible. The construction of a branch rail line could decrease hunting opportunities in and adjacent to habitat along a corridor.

8.11.4 (11749)
Comment - EIS002299 / 0007
California's State Park System contains 265 park units encompassing 1.4 million acres within which the State is responsible for preserving representative samples of the State's extraordinary biological resources and diversity. Nearly half of these park units, including State Parks, State Historic Parks, State Beaches and State Recreational Areas, are located along potential spent fuel shipment routes in California. In addition, the Death Valley National Park is located adjacent to potential routes in California.

California agencies, as well as the Superintendent of Death Valley National Park, expressed concern about potential transportation impacts in the Death Valley region as well as impacts from these shipments on parks adjacent to shipment corridors. These regions have remote and very limited emergency response capability. In addition, there is concern about the potential impacts on plant and animal populations in the Death Valley region in the event of radionuclide contamination and migration in groundwater, as well as potential adverse impacts on desert bighorn sheep from any roadway or rail construction or improvements.

Response
The calculations in Chapter 5 of the EIS indicate that predicted long-term levels of radionuclide concentration in groundwater and the resulting dose levels at the predicted discharge area in Amargosa Valley, Nevada, would be low. DOE does not expect that the dose rates to plants and animals at that location would cause measurable

detrimental effects in populations of any species because the rates would be less than 100 millirad per day. The International Atomic Energy Agency concluded that chronic dose rates of less than 100 millirad per day are unlikely to cause measurable detrimental effects in populations of even the more radiosensitive species in terrestrial ecosystems (DIRS 103277-IAEA 1992). DOE acknowledged in Section 3.1.4.2.1 of the EIS that a small amount of groundwater might move beyond the primary groundwater discharge point at Alkali Flat (Franklin Lake Playa) to discharge in the Furnace Creek area of Death Valley. However, even if this were to occur, any concentrations in the Furnace Creek area of California would be even less than the concentrations presented in Chapter 5 for the discharge location, because concentrations would decline with distance from the proposed repository.

DOE does not plan to modify highways in California or elsewhere outside Nevada that it would use to transport materials, personnel, or legal-weight truck shipments of spent nuclear fuel to Yucca Mountain. Therefore, these activities would not adversely affect bighorn sheep. Transportation-related habitat fragmentation could occur if highway upgrades were necessary in Nevada for heavy-haul trucks or during construction of a branch rail line. The *Environmental Baseline File for Biological Resources* (DIRS 104593-CRWMS M&O 1999, all) describes bighorn sheep populations and migration corridors near the routes DOE is considering, and Sections 3.2.2.1.4 and 3.2.2.2.4 of the EIS highlight the sheep populations most likely to receive impacts. DOE acknowledges in Section 9.3.4.2 that construction of some transportation routes could disrupt movements of game animals. Section 9.3.4.2 states that DOE would use mitigation measures to reduce habitat fragmentation and barriers to animal movements in the design and construction of branch rail lines, routes, and fencing after seeking advice from wildlife agencies and organizations. As stated in Chapter 6 and elsewhere in the EIS, DOE would conduct a more detailed assessment of potential impacts on wildlife habitat and movements if it selected a heavy-haul truck or rail route to evaluate and mitigate impacts to bighorn sheep and other resources.

8.11.4.1 Vegetation

8.11.4.1 (5151)
Comment - EIS001444 / 0003
Threatened & Endangered Plants and State Sensitive Plants

State law requires you to survey for cacti along both routes [Caliente and Carlin].

Both routes must be surveyed for T & E and State Sensitive plant species. The following is a list of state sensitive plants which must be surveyed for.

Asclepia eastwoodiana, Eastwood Milkweed - Check all of both the Carlin and Caliente routes north of Stonewall Mountain. The plant usually grows in washes or low hills.

Astragalus funereus, Black Woolypod - Check both routes south of Scotty's Junction into the Test Site. It generally grows on hillsides.

Cymopterus ripleyi var saniculoides, Sanicle Biscuitroot - Check the Carlin route through Smoky Valley to Tonopah. The plant usually grows in sandy soils.
Penstemon arenarius, Nevada Dune Beard-tongue - Check all of both the Caliente route. The plant usually grows in sandy soils.

Sclerocactus nyensis - Check both routes from Tonopah south into the Test Site. It grows on soils derived from volcanic ash.

The Carlin route through Smoky Valley appears to go by or through Cresent Dunes T.4 N., R.41 E., plate 6. This area has recreation value along with a number of State Sensitive species. The train should be run through the far western edge of the corridor to avoid Crescent Dunes if this route is chosen. If any of the above plants are found, mitigating measures need to be implemented at that time.

Response
The *Environmental Baseline File for Biological Resources* (DIRS 104593-CRWMS M&O 1999) contains detailed maps of the known locations of sensitive plant and animal species (including Bureau of Land Management-sensitive

species) within 5 kilometers (3 miles) of rail corridors. DOE obtained this information in part from meetings held with Bureau biologists in Battle Mountain (January 27, 1997) and Tonopah (February 14, 1997) and from Resource Management Plans. The Draft EIS included lists of those species. This information will allow DOE to determine if there would be any significant impacts to biological resources from upgrades of a highway to support heavy-haul vehicles or construction of a branch rail line with in any of the rail corridors. It is, therefore, sufficient for making decisions regarding the basic approaches for transportation, as well as the choice among alternative transportation corridors. As indicated in Chapter 6 and elsewhere in the EIS, if the site was approved DOE would conduct more detailed field surveys, analyses, consultations with the Bureau, and appropriate National Environmental Policy Act reviews to evaluate further the impacts associated with a specific rail corridors or heavy-haul truck route. These would include consultations with State wildlife management agencies, the Bureau of Land Management, the Army Corps of Engineers, and other applicable government agencies. They also would include field surveys (as applicable) and more detailed assessments and analyses of wetlands and other waters; floodplains; sensitive species; effects of habitat fragmentation, interruption of movements, mortality, and harassment on wildlife, horses, and burrows; loss of hunter-generated revenue, spread of noxious weeds, and soils.

8.11.4.2 Wildlife

8.11.4.2 (43)
Comment - 3 comments summarized
The EIS should evaluate the impacts that fencing of a rail line could have on the habitat and movement of wildlife.

Response
Section 3.2.2.1.4 of the EIS lists the big game habitat that is crossed by the candidate rail corridors. These habitats and other biological resources near the corridors are further described and mapped in the *Environmental Baseline File for Biological Resources* (DIRS 104593-CRWMS M&O 1999). It is acknowledged in Section 6.3.2.1 that construction of a branch rail line could disrupt movements of game animals and that fencing would be designed to accommodate movements of wildlife. Section 9.3.4.2 lists modification of branch rail lines, routes, and fencing as a mitigation measure to minimize impacts of rail line construction on animal movements. DOE agrees with the comments that additional, site-specific information on fencing would be necessary prior to construction of a branch rail line. However, DOE believes that the EIS provides sufficient information on impacts to biological resources to make informed decisions regarding the basic approaches (for example, mostly rail or mostly truck shipments), as well as the choice among alternative transportation corridors. If the site was approved, DOE anticipates that the project plan and design would continue to evolve, creating additional opportunities for mitigation and potentially eliminating the need for some mitigation measures currently under consideration. Chapter 9 of the EIS, which provides DOE's initial list of commitments available at this time, identifies DOE-determined impact reduction features, procedures and safeguards; and mitigation measures under consideration for inclusion in the project plan and design. Chapter 9 also identifies ongoing studies that could eventually influence mitigation measures related to the project plan and design.

As noted in Chapter 6 and elsewhere in the EIS, if a repository was to be constructed at Yucca Mountain, a more detailed assessment of the potential impacts on wildlife habitat and wildlife movements would be prepared for a specific rail alignment.

8.11.4.2 (392)
Comment - EIS000039 / 0002
The Virgin River may be the home of certain endangered species of fish, other wildlife and fauna.

Response
On December 17, 1998, DOE requested a species list from the U.S. Fish and Wildlife Service and began a formal consultation to evaluate if the Proposed Action could affect endangered and threatened species, including those in the Virgin and Muddy rivers. DOE submitted its Biological Assessment of possible effects to the U.S. Fish and Wildlife Service on April 24, 2000. DOE and the U.S. Fish and Wildlife Service have completed consultation on the potential effects of repository construction, operation, and closure on threatened and endangered species. In its Biological Opinion, the Fish and Wildlife Service concluded that these actions would not jeopardize the continued existence of the Mojave population of the desert tortoise (see Appendix O of the EIS for the Final Opinion). Species in and near the Virgin River would not be affected.

8.11.4.2 (2211)
Comment - EIS000621 / 0001
My family and I own the Crescent Valley Mineral Hot Springs Trailer Park and Farms which is located one and-a-half miles from the proposed rail line outside of Crescent Valley at Hot Springs Point.

The rail line crosses between our place and town. We have a lot of concerns about the impact on our area there because it's a major riparian area and a wildlife area.

Response
DOE is aware of these springs (see DIRS 104593-CRWMS M&O 1999). The corridor is more than 2 kilometers (1.2 miles) from the springs and, therefore, should not affect the riparian areas or wildlife using them. As suggested in Chapter 6 of the EIS, if DOE chose the Carlin Corridor, it would conduct additional detailed field surveys, analyses, and appropriate National Environmental Policy Act reviews to further evaluate impacts to these springs. As stated in Section 9.3.4.2, DOE is committed to minimizing and mitigating impacts of construction and operation of a transportation route on springs and other riparian areas.

8.11.4.2 (2719)
Comment - EIS000637 / 0002
We own a hot springs, pool and house, one-half mile from the proposed rail line and a trailer one and-a-half miles on the other side. At our hot springs, there [are] a lot of different kind of birds that come there. We have a wetlands, and there's been about 50 different species of birds that land there and rest up before they go on to other places, and we have a lot of animals there, and if they build a railroad, all that noise is going to scare them away, and plus the train will scare them away when it comes through here.

Response
DOE is aware of these springs (see DIRS 104593-CRWMS M&O 1999). The corridor is more than 2 kilometers (1.2 miles) from the springs and, therefore, should not affect the riparian areas or wildlife using them. As indicated in Chapter 6 of the EIS, if DOE chose the Carlin Corridor, it would conduct additional detailed field surveys, analyses, and appropriate National Environmental Policy Act reviews to further evaluate impacts to these springs. As stated in Section 9.3.4.2, DOE is committed to minimizing and mitigating impacts of construction and operation of a transportation route on springs and other riparian areas.

8.11.4.2 (4147)
Comment - EIS001206 / 0002
The discussion of Environmental Impacts of Transportation to Biological Resources and Soils (Section 6.1.2.4) relating to the construction of a branch rail line is inadequate because it fails to properly consider and address the regional and rangewide implications of the loss of unique desert tortoise (Gopherus agassizii) populations and the genetic potential of these populations at northern extremes of this species range. It is inadequate because it fails to properly consider and address the regional and rangewide implications of increases in traffic on unique desert tortoise (Gopherus agassizii) populations at the northern extremes of this species range due to this activity. It is inadequate because it fails to properly consider and address the regional and rangewide implications of increases in raven populations and their increased levels of predation on unique desert tortoise (Gopherus agassizii) populations at the northern extremes of this species range due to this activity.

The discussion of impacts of construction of a branch rail line is inadequate because it fails to properly consider and address the regional and rangewide implications of loss of individuals and the loss of impacts on unique desert tortoise (Gopherus agassizii) populations at the northern extremes of this species range due to this activity.

The discussion of the Jean rail corridor is inadequate because it fails to consider that this corridor would pass through or near the Clark County Desert Tortoise Large-Scale Translocation Study Site (LSTS) west of Jean. Clark County has invested significant resources in establishing this site and funding studies to investigate the efficacy of translocating displaced desert tortoises. Currently more than 2,000 displaced desert tortoises have been successfully translocated to this site and many more will be translocated over the coming several years. This site is crucial to desert tortoise conservation and management in Clark County. The people of Clark County have overwhelmingly supported desert tortoise conservation actions because, in part, displaced tortoises have been humanely provided a wild home at the LSTS. Threats to the integrity of the LSTS would jeopardize public support for tortoise conservation efforts.

The discussion of impacts of construction of a branch rail line in the Valley Modified corridor is inadequate because it fails to properly consider and address the regional and rangewide implications of loss of individuals and that loss of impacts on unique desert tortoise (Gopherus agassizii) population at the northern extremes of this species range due to this activity.

Response
DOE did consider the regional and rangewide implications of the Proposed Action, the loss of genetic potential, and impacts of transportation options on desert tortoises and concluded that the Proposed Action could affect a few individual tortoises, but would not negatively affect the genetic potential or the long-term survival of regional populations of desert tortoises or jeopardize the continued existence of the species. The abundance of desert tortoises within most of the candidate rail corridors is low. In addition, DOE would implement all terms and conditions of the incidental take authorization included in the U.S. Fish and Wildlife Service's Biological Opinion, including those for minimizing impacts from ravens. Section 6.1.2.4 of the EIS has been modified to better clarify this conclusion.

DOE believes that the EIS provides the information necessary to make decisions regarding the basic approaches (for example, mostly rail or mostly truck shipments), as well as the choice among alternative transportation corridors. As stated in the Chapter 6, more detailed field surveys, analyses, and appropriate National Environmental Policy Act reviews would be conducted if a specific branch rail line alignment was chosen. If necessary, this would include more detailed analyses of the impacts on desert tortoises, including the potential effects on translocation studies being conducted near Jean.

8.11.4.2 (4148)
Comment - EIS001206 / 0003
The discussion of Impacts of Nevada Mostly Legal-Weight Truck Transportation Scenario (Section 6.3.1.1) is inadequate because it fails to properly consider and address the regional and rangewide implications of the loss of unique desert tortoise (Gopherus agassizii) populations and the genetic potential of these populations at the northern extremes of this species range in the vicinity of the Repository and throughout Southern Nevada adjacent to I-15 and U.S. 95. It is inadequate because it fails to properly consider and address the regional and rangewide implications of increases in traffic on unique desert tortoise (Gopherus agassizii) populations at the northern extremes of this species range in the vicinity of the Repository and throughout Southern Nevada adjacent to I-15 and U.S. 95 due to this activity. It is inadequate because it fails to properly consider and address the regional and rangewide implications of increases in raven populations and their increased levels of predation on unique desert tortoise (Gopherus agassizii) populations at the northern extremes of this species range in the vicinity of the Repository and throughout Southern Nevada adjacent to I-15 and U.S. 95 due to this activity. The discussion of the contribution of truck traffic related to this activity and its impact on desert tortoise populations is lacking a consideration of noise and low frequency vibrations. This issue is of concern to Clark County because it is engaged in supporting significant conservation actions in areas adjacent to and in the regional vicinity of the Repository that may be indirectly impacted.

The discussion of the impacts of the Caliente-Las Vegas heavy-haul truck route (Section 6.3.3.1) is inadequate because it fails to properly consider and address the local, regional, and rangewide implications of the loss of unique desert tortoise (Gopherus agassizzi) populations and the genetic potential of these populations at the northern extremes of this species range in the vicinity U.S. 93 in Coyote Springs Valley due to construction activities in upgrading the roads. It is inadequate because it fails to properly consider and address the local, regional and rangewide implications of increases in raven populations and their increased levels of predation on unique desert tortoise (Gopherus agassizii) populations at the northern extremes of this species range in the vicinity of U.S. 93 in Coyote Springs Valley due to construction activities and increased traffic during operation. The discussion of the contribution of truck traffic related to this activity and its impact on desert tortoise populations is lacking a consideration of noise and low frequency vibrations and their impacts on desert tortoises. This issue is of concern to Clark County because it is engaged in supporting significant conservation actions in areas adjacent to and in the regional vicinity of the Repository and along the Caliente-Las Vegas heavy-haul truck route and in the regional vicinity of the route that may be indirectly impacted.

The discussion of the impacts of the Sloan/Jean heavy-haul truck route (Section 6.3.3.2.1) is inadequate because it fails to properly consider and address the local, regional, and rangewide implications of the loss of unique desert tortoise (Gopherus agassizii) populations and the genetic potential of these populations at the northern extremes of this species range in the vicinity I-15 in upper Ivanpah Valley due to construction activities in upgrading the roads and construction of the intermodal transfer station. It is inadequate because it fails to properly consider and address the local, regional, and rangewide implications of increases in raven populations and their increased levels of predation on unique desert tortoise (Gopherus agassizii) populations at the northern extremes of this species range in the vicinity of I-15 due to construction activities and increased traffic during operation. The discussion of the contribution of truck traffic related to this activity an its impact on desert tortoise populations is lacking a consideration of noise and low frequency vibrations and their impacts on desert tortoises. The discussion of the Sloan/Jean heavy-haul truck route is inadequate because it fails to consider that this route would pass through or near the Clark County Desert Tortoise Large-Scale Translocation Study Site (LSTS) west of Jean and west of I-15. Clark County has invested significant resources in establishing this site and funding studies to investigate the efficacy of translocating displaced desert tortoises. Currently more than 2,000 displaced desert tortoises have been successfully translocated to this site and many more will be translocated over the coming several years. This site is crucial to desert tortoise conservation and management in Clark County. The people of Clark County have overwhelmingly supported desert tortoise conservation actions because, in part, displaced tortoises have been humanely provided a wild home at the LSTS, Threats to the integrity of the LSTS would jeopardize public support for tortoise conservation’s efforts. This issue is of concern to Clark County because it is engaged in supporting significant conservation actions in areas adjacent to and in the regional vicinity of the Repository and along the Caliente-Las Vegas heavy-haul truck route and in the regional vicinity of the route that may be indirectly impacted.

This discussion of the impacts of the Apex/Dry Lake heavy-haul truck route (Section 6.3.3.1) is inadequate because it fails to properly consider and address the local, regional, and rangewide implications of the loss of unique desert tortoise (Gopherus agassizii) populations and the genetic potential of these populations at the northern extremes of this species range in the vicinity I-15 and U.S. 95 due to construction activities and increased traffic during operation. The discussion of the contribution of truck traffic related to this activity and its impact on desert tortoise populations is lacking a consideration of noise and low frequency vibrations and their impacts on desert tortoises. This issue is of concern to Clark County because it is engaged in supporting significant conservation actions in areas adjacent to and in the regional vicinity of the Repository and along the Caliente-Las Vegas heavy-haul truck route and in the regional vicinity of the route that may be indirectly impacted.

Response

As stated in Section 6.3.1.2 of the EIS, legal-weight truck shipments would have little or no additional effect on desert tortoises or the abundance of ravens because they would increase truck traffic on Nevada highways by less than 0.15 percent. Upgrading of highways to support heavy-haul trucks would have minimal impact on desert tortoises because associated land disturbances would occur adjacent to those highways, where tortoises are rare or absent. Section 6.1.2.4 has been modified to clarify this conclusion. DOE is unaware of any scientific information about adverse effects of noise or low-frequency vibrations on tortoises.

DOE believes that the EIS provides the information necessary to make decisions regarding the basic approaches (for example, mostly rail or mostly truck shipments) as well as the choice among alternative transportation corridors. As indicated in Chapter 6 of the EIS, more detailed field surveys, analyses, and appropriate National Environmental Policy Act reviews would be prepared if a specific heavy-haul route was chosen. If necessary, this would include more detailed analyses of the impacts on desert tortoises, including the potential effects on translocation studies being conducted near Jean, Nevada.

8.11.4.2 (5148)

Comment - EIS001444 / 0001

Caliente Route

This route will impact the Reveille, Stone Cabin, Saulsbury, Goldfield, Stonewall, and Bullfrog Wild Horse and Burro Herd Management Areas.

Smoky Valley Route

This route will impact the Dunlap, Goldfield, Stonewall, and Bullfrog Wild Horse and Burro Herd Management Areas.

Monitor Valley Route
This route will impact the Saulsbury, Goldfield, Stonewall, and Bullfrog Wild Horse and Burro Herd Management Areas.

Impacts: The construction of a new haul road or of a rail line will result in several years (2.5 years according to the EIS) worth of disturbance to the Herd Management Areas (HMAs) which these routes will cross. Disturbance will include loss of habitat including forage and water, and may impact foaling areas and traditional winter use areas.

These animals have never seen trains before and the occurrence of such a large, noisy object may cause them to move to different areas to avoid the disturbance. Some of these areas may be outside of their current HMAs. Animals moving outside of their HMAs would have collateral damage on other programs and would likely result in the gathering and removal of these animals.

The loss of habitat is not limited to the direct ground disturbing exercises, but also includes the distance significant noise travels. This noise and activity may cause wild horses and burros to leave the area.

Direct impacts could also include being hit by the train or by the haul trucks. The EIS says “losses would be few and unlikely to affect regional populations of any species.” In areas with large numbers of animals this may be true. However, in HMAs with 30 or fewer individuals, the taking of one or two individuals a year may change the entire demographics of a herd. These additional losses coupled with existing losses raises the significance of the cumulative impacts in many areas.

The alternative of using trucks along existing routes will have the least impact on the wild horse and burro resources of this area.

Response
Section 3.2.2.1.4.1 of the EIS lists the wild horse and burro herd management areas mentioned in this comment. Sections 6.3.2.1 and 6.3.2.2 acknowledge the loss of horse and burro habitat and disruption of their movements. DOE modified Section 6.3.2.1 to describe the impacts of construction and operation to wild horses and burros and to include the comment’s concern that the potential loss of a few individuals could affect the demographics of small herds. DOE disagrees with the comment that heavy-haul trucks could hit horses and burros; these vehicles would travel at such slow speeds that collisions with horses and burros would be unlikely.

8.11.4.2 (5159)
Comment - EIS001444 / 0012
To make an accurate assessment to impacts to biological resources, a more detailed map will be needed.

The EIS and Appendix J had little information on affected environment and impacted environment to biological resources. A list of BLM [Bureau of Land Management] Sensitive Species that may be affected for the rail routes were not included and [were] referenced only as a number of SSS [state-sensitive species]. What about sensitive/non sensitive bats? These proposed routes will cross foraging habitat areas.

Carlin Rail Corridor
The proposed rail lines will cross through crucial habitat for the Western sage grouse. The routes will most likely have an affect on lekking, nesting, wintering birds, and predation of sage grouse. Studies conducted on the Modoc have shown adverse impacts to sage grouse leks and populations from overhead transmission lines. Sage grouse will be disturbed on leks (in close proximity of rail line), predation and nest loss will likely increase along the rail routes due to associated facilities (i.e. transmission lines that provide predator perches), and habitat fragmentation. Numerous other sensitive species need to be addressed.

Wetland habitats in Oasis Valley near Beatty, are currently being considered for an ACEC nomination under a Land Use Plan Amendment. A conservation agreement and strategy for the Amargosa toad is currently in draft form and will provide for management direction in/near toad habitat.

Has consultation with USFWS begun on desert tortoise?

Caliente Rail Corridor
Where is the location of Railroad Valley springfish on this route? Numerous other sensitive species need to be addressed.

Also issues addressed in the Carlin Route: tortoise, Amargosa-Oasis ACEC, and sage grouse to a lesser extent.

The discussion of special status species (raptors, sage grouse, plants, etc.) is inadequate and almost non-existent.

Response
Detailed maps of sensitive plant and animal species (including Bureau of Land Management sensitive species) within 5 kilometers (3 miles) of rail corridors are contained in the *Environmental Baseline File for Biological Resources* (DIRS 104593-CRWMS M&O 1999). Lists of those biological resources have been added to Section 3.2.2.1.4 of the EIS. This information, including a list of Bureau-sensitive species, was obtained in part from meetings held with Bureau biologists in Battle Mountain (January 27, 1997) and Tonopah (February 14, 1997) and from Bureau Resource Management Plans. The *Environmental Baseline File for Biological Resources* describes locations of sensitive species (including desert tortoise, bats, ferruginous hawk, San Antonio pocket gopher, chuckwalla, and Nevada sanddune beardtongue) and 12 areas of sage grouse habitat within 5 kilometers of the Carlin Corridor. It also describes and maps the Area of Critical Environmental Concern along the Amargosa River, which is more than 3 kilometers (2 miles) from the proposed alignment. Section 6.3.2.2.2 has been modified to better describe possible impacts to sage grouse and other biological resources along the Carlin Corridor. The information on biological resources in the EIS will allow DOE to determine whether there would be any significant impacts to those resources from construction of a branch rail line within any of the rail corridors. It is, therefore, sufficient for making decisions regarding the basic approaches for transportation as well as the choice among alternative transportation corridors. As indicated in Chapter 6 of the EIS, DOE would conduct more detailed field surveys, analyses, consultations with the Bureau, and appropriate National Environmental Policy Act reviews if a decision is made to select a specific rail alignment in a corridor.

DOE and the U.S. Fish and Wildlife Service recently completed consultation (as required by Section 7 of the Endangered Species Act) for construction, operation and monitoring and closure of a repository at Yucca Mountain (see Appendix O of the EIS). If a rail or heavy-haul truck route was selected, DOE would initiate consultation for construction activities.

The only population of the Railroad Valley springfish near a transportation corridor is the introduced population in Warm Springs. This spring is more than 3 kilometers (1.9 miles) north of the Caliente Corridor (see Section 3.2.2.1.4 of the EIS) and adjacent to U.S. 6, which is part of the proposed Caliente heavy-haul truck route (see Section 3.2.2.2.4).

8.11.4.2 (5395)
Comment - EIS001887 / 0103
Page 2-47, Section 2.1.3.3.2 - Nevada Rail Scenario

Crucial habitat for big game is frequently located in or near rugged terrain. This is especially true for crucial winter habitat. Daylight cuts required to traverse rugged terrain also pose a significant threat to big game, which tend to use these areas for movement, especially in times of heavy snow cover. When trapped in a daylight cut, big game cannot escape from an oncoming train, resulting in significant mortality rates for big game in these areas. Thus, the selection criteria that favors more rugged terrain by virtue of avoiding private land ownership greatly increases the potential impact on biological resources.

Response
DOE acknowledges that avoidance of private land in areas with gentle topography might have resulted in some alignments that would require cut slopes that could affect movements of big game. However, as stated in Section 2.3.3.1 of the EIS, "favorable topography (gently sloping, rather than rugged terrain)" was an important factor in the selection of candidate rail routes. Section 6.3.2.1 has been modified to more clearly state that some big game animals could be killed by trains during the operations phase. However, DOE disagrees with the comment that these losses would be significant because the proposed routes go through very few high-elevation mountain passes where snow would accumulate for long periods and because the frequency at which trains would be using a branch rail line

to Yucca Mountain would be low (average of five trains per week). As stated in Section 9.3.4.2, DOE is committed to reducing habitat fragmentation and barriers to animal movements in the design and construction of branch rail lines, routes, and fencing after seeking advice from wildlife agencies and organizations.

8.11.4.2 (5540)
Comment - EIS001660 / 0042
The DEIS fails to adequately address the impacts of the proposed action on wild and free-roaming horses and burros in Mineral County. Many horses and burros inhabit the public and private range lands of the county as well as many rural counties in Nevada. They are protected under the Wild and Free-roaming Horse and Burro Act and are important to the residents of Mineral County and other Nevada counties. The DEIS says (under the land use heading) that the Carlin corridor would cross five management areas (p. 6-60) or six management areas (p. 6-62), and that land would be "converted"; but, the DEIS does not discuss the impacts. The DEIS must analyze how the construction of the proposed Carlin rail corridor (and associated fences and access roads), and related alternative transportation route improvements would affect these horses and burros.

The DEIS stated the "There are no known endangered species on the Yucca Mountain site" (p. 11-15). Then stated that "the desert tortoise in the only threatened species found on the site" 11-15). The DOE maintains it will "fulfill the requirements of the Endangered Species Act, as appropriate, with regard to transportation impacts before making the recommendation determination" (p. 1- 15); yet, it does not identify any endangered species along the transportation routes. The American Buffalo (Bison) which is part of our American heritage inhabit many of the lands not only in the Nevada rural counties, but also in other counties across the country. These majestic animals are an endangered species. Would they be affected and how would they be protected? The DEIS only analyzed endangered species for the YM [Yucca Mountain] site. The DEIS must analyze endangered species along transportation routes, to include related alternative transportation route improvements and the construction of any rail corridors, and address how these animals would be affected.

The DEIS must address direct and indirect impacts on the horses, burros, bison and any endangered species along the transportation routes: (1) their movement and safety; (2) water supplies; (3) forage; and (4) harassment. Would the proposed action cause more damage to the range by restricting the forage for these animals?

Response
The herd management units, threatened and endangered species, and other biological resources most likely to be affected are highlighted in EIS Sections 3.2.2.1.4 and 3.2.2.2.4. As summarized in Chapter 6, the desert tortoise is the only threatened or endangered species that occurs within areas to be disturbed for construction or development of a branch rail line or upgrade of highways for heavy-haul trucks; therefore, DOE has concluded that the desert tortoise is the only such species that would be affected by the Proposed Action. The wood bison, which is found only in Canada, is the only bison classified by the U.S. Fish and Wildlife Service as threatened or endangered. The Proposed Action would have no impact on free-ranging populations of American buffalo.

DOE agrees with the comment that additional, site-specific information would be necessary prior to construction of a branch rail line or road upgrades to support heavy-haul truck shipping. However, DOE believes that the EIS provides sufficient information on impacts to biological resources necessary to make decisions regarding the basic approaches (for example, mostly rail or mostly truck shipments), as well as the choice among alternative transportation corridors. As indicated in Chapter 6 and elsewhere in the EIS, more detailed field surveys, analyses, and appropriate National Environmental Policy Act reviews would be performed and consultations conducted with State wildlife management agencies, the Bureau of Land Management, the Army Corps of Engineers, and other applicable government agencies if a specific branch rail line alignment was chosen. These additional surveys, reviews and consultations would include, as appropriate, more detailed analyses on impacts to endangered species and wild horse herd management units.

8.11.4.2 (5697)
Comment - EIS001887 / 0311
Page 6-10; Section 6.1.2.4 - Biological Resources and Soils

DOE has significantly understated the impact to biological resources. Loss of habitat would not be limited only to the physical loss of habitat due to the construction of the rail line. The operation of the rail line would reduce the value of habitat crossed or near to the line, resulting in significantly greater loss in habitat than just the area physically within the rail line right-of-way.

All of the rail corridors except the Valley Modified cross and are near to critical habitat for many species of wildlife. Critical habitat is absolutely necessary for wildlife. Human activity, such as the operation of a rail line, in or even near critical habitat, can seriously degrade the value of that habitat for wildlife. This is especially true of linear facilities, such as a rail line, that pass through habitat areas. Without undisturbed access to critical habitat, the wildlife using that habitat may abandon large areas of year round habitat. Critical habitat crossed by or near to rail corridors includes bighorn sheep crucial winter range, mule deer crucial winter range, pronghorn winter range, sage grouse strutting areas, sage grouse nesting areas, chukar crucial habitat, and quail crucial habitat.

The Carlin and Jean corridors also cross migration corridors for big game. Linear facilities such as rail lines can significantly impact the movement of big game. This is particularly true in areas where steep cuts or fills are required. The Jean corridor also crosses a potential migration corridor for bighorn sheep from winter range in the Devil's Hole Hills to historic but currently unoccupied habitat at the northwest end of the Spring Mountains. Although currently not used, the disruption of this migration corridor would be a significant impact. Bighorn sheep are particularly susceptible to disease. An unoccupied habitat area represents the potential to establish another herd unit that could provide greater protection for the continued recovery of the bighorn sheep.

The Environmental Baseline File for Biological Resources (TRW 1999k) lists the following crucial habitats within each of the 400 meter wide rail corridors:

Caliente: Bighorn Sheep Crucial Winter Habitat (Cedar Range), Mule Deer Crucial Winter Range (Cedar Range), Quail Crucial Habitat in Meadow Valley

Carlin: 3 Sage Grouse Strutting Areas (Grass Valley, Rye Patch Canyon, and Monitor Valley), Sage Grouse Nesting Area (Monitor Valley), Pronghorn Winter Range, Ungulate Migration Corridor Between Simpson and Tacoma Ranges, Bates Mountain Antelope Release Area, Simpson Park Habitat Management Area

Caliente B Chalk Mountain: Bighorn Sheep Crucial Winter Habitat (Cedar Range), Mule Deer Crucial Winter Range (Cedar Range), Crucial Areas for Quail (Meadow Valley)

Jean: Crucial Bighorn Sheep Winter Habitat (Wilson Pass) and Winter Habitat (west of Wilson Pass), Bighorn Sheep Migration Corridor and Potential Migration Corridor, Crucial Chukar Habitat (Goodsprings), Crucial Areas for Quail (Goodsprings, Pahrump, Johnnie), and Mule Deer Winter Habitat

Although the Valley Modified corridor does not contain crucial habitat, it does cross the Desert National Wildlife Refuge (DNWR) in several places, including the Corn Creek Springs area. The DNWR was set aside primarily for desert bighorn sheep. It also provides habitat for mule deer, other desert mammals, and migratory birds. The Corn Creek area contains an environment filled with trees, pasture, and spring-fed ponds which attract a large number of migrating birds not common to the desert environment. The ponds are home to the endangered Pahrump poolfish.

Each of the corridors contain many additional biological resources within the corridor or within 5 kilometers of the corridor. Although these resources are identified in the Environmental Baseline File, the DOE makes no attempt to quantify the impacts of the rail line on most of these resources.

The Draft EIS does not contain an assessment of the impact of fencing on wildlife. This is inexcusable, since the impact of fencing was identified by the Bureau of Land Management as a major issue (TRW 1999k, p. 5B1).

Potential transportation impacts to biological resources and soils are only curtly addressed in this section. There is insufficient information and substance for the section to be meaningful.

This section should also include a rigorous analysis of potential impacts from the spread of noxious or invasive plant species as a result of rail spur construction, heavy-haul truck highway improvement, and other activities that facilitate or promote the proliferation of noxious weeds.

<u>Response</u>
Lists of biological resources within and near rail corridors (including those listed by the commenter) have been added to Section 3.2.2.1.4 of the EIS. Sections 6.3.2.1 and 6.3.2.2 have been modified to address the commenter's concerns and more clearly describe impacts of branch rail line construction and fencing on biological resources. This information on known locations of sensitive species, game habitat, springs, riparian areas, and other biological resources within and near the rail corridors will allow DOE to determine if there would be any significant impacts to biological resources from construction of a branch rail line within any of the corridors. It is therefore sufficient for making decisions regarding the basic approaches for transportation, as well as the choice among alternative transportation corridors. As indicated in Chapter 6 of the EIS, more detailed field surveys, government consultation, analyses, and appropriate National Environmental Policy Act reviews would be conducted if a decision was made to select a specific rail alignment within a corridor or a specific location of an intermodal transfer station or the need to upgrade the associated heavy-haul truck routes. These would include consultations with State wildlife management agencies, the Bureau of Land Management, the Army Corps of Engineers, and other applicable government agencies. They also would include field surveys (as applicable) and more detailed assessments and analyses of the effects of habitat fragmentation, interruption of movements, mortality, and harassment on wildlife, horses, and burros; impacts of fencing, and spread of noxious weeds.

The Valley Modified Corridor is more than 4 kilometers (2.5 miles) from the Corn Creek Springs (see Section 3.2.2.1.4 of the EIS) and would not affect species there.

8.11.4.2 (6572)
<u>Comment</u> - EIS001632 / 0058
Page 6-38, Section 6.3.1.1: DOE recognizes that desert tortoises will be killed as a result of transportation operations. The Department reaches the conclusion that "any desert tortoises killed by trucks transporting spent nuclear fuel or high-level radioactive waste probably would be only a small fraction of all desert tortoises killed on highways." This may be true, but what is the anticipated impact of this operation relative to the desert tortoise population on the Nevada Test Site (NTS)? The higher concentration of shipments on the NTS could result in a proportionately higher impact than in the general environment. However, it may be possible that the impact on the tortoise population might be less than in the general environment since the NTS has a protection program in place.

<u>Response</u>
DOE and the U.S. Fish and Wildlife Service (see Appendix O of the EIS) have concluded that the loss of a small number of tortoises along roads and at the repository site would not affect the long-term survival of the local or regional population of desert tortoises. Tortoises are widespread throughout the region and large tracts of undisturbed tortoise habitat surround Yucca Mountain. Research at Yucca Mountain during site characterization confirms that activities similar to those proposed would have little effect on adjacent populations. The rate of tortoise mortality would remain comparable to that observed during site characterization because the amount of traffic would be similar. Under the legal-weight truck scenario, the repository would receive about 40 shipments a day of supplies, materials, and equipment (Section J.3.6.1 of the EIS), and six shipments of spent nuclear fuel or high-level radioactive waste (Section J.1.2.1). During site characterization, the daily average number of vehicles passing traffic counters in 1993 and 1994 was between 40 and 55 (DIRS 104294-CRWMS M&O 1999). The U.S. Fish and Wildlife Service has authorized an unlimited take of tortoises along roads at Yucca Mountain during repository construction and monitoring and closure in part because deaths due to vehicles are anticipated to be very infrequent (see Appendix O). Section 4.1 has been modified to better explain the conclusion that the Proposed Action would not affect the tortoise population.

8.11.4.2 (6717)
<u>Comment</u> - EIS001878 / 0075
The DEIS fails to adequately address the impacts of the proposed action on wild and free-roaming horses and burros. Many horses and burros inhabit the public and private range lands of Eureka County and neighboring counties. They are protected under the federal Wild and Free-roaming Horse and Burro Act and are of concern to the residents of Eureka County. The DEIS says (under the land use heading) that the corridor would cross five management areas (p. 6-60) or six management areas (p. 6-62), and that land would be "converted." But the DEIS does not discuss the impacts.

The DEIS must disclose the impacts upon Eureka County's wild horses and burros of: (1) conversion of range land to other uses, (2) fragmentation of herd management areas, (3) loss of forage from land disturbance, introduction of weeds, increased wildfire, or other factors, (4) restrictions on wild horse movement, (5) loss of water supplies, or restricted access to water supplies, (6) loss of horses hit by trains or other motor vehicles, and the associated public safety implications, (7) changes in the cost of wild horse management, , and (8) increases in harassment of horses. The impact analysis must address both construction and operation of fences, water wells, the railroad bed and tracks, and access roads along and perpendicular to the tracks.

The DEIS does not adequately address the impacts of the proposed action on wildlife. (pp. 6-10, -11, -37, -47, -60) Deer, antelope, sage grouse and other game and nongame species of wildlife inhabit the rangelands and uplands of Eureka County. The DEIS says that construction of the rail corridor would result in loss and fragmentation of habitat, disrupt wildlife, and kill individual animals (p. 6-47) but provides no specific information. The DEIS says under the land use heading that the corridor would cross the Bates Mountain antelope release area, three designated riparian habitats, and the Simpson Park habitat management area (p. 6-60) but does not discuss impacts on these areas. (According to the FEIS, Proposed Fallon Range Training Complex Requirements, Naval Air Station Fallon, NV [Department of the Navy and Bureau of Land Management, January 2000], the Simpson Park range is also the site of a wilderness study area. The DEIS does not disclose this fact, or discuss any impacts upon the study area.) Finally, the DEIS says on page 6-62 that the corridor would cross seven areas designated as game habitat, but does not discuss impacts on them either.

The DEIS must disclose the impacts upon Eureka County's wildlife of: (1) conversion of wildlife habitat to other uses, (2) fragmentation of habitat, (3) damage to forage from land disturbance, introduction of weeds, increased wildfire, or other factors, (4) restrictions on wildlife movement and migration, (5) loss of water supplies, or restricted access to water supplies, (6) loss of wildlife hit by trains or other motor vehicles, and the associated public safety implications, (7) changes in value of wildlife areas for hunting and fishing, (8) changes in the costs of wildlife management, and (9) increases in harassment of wildlife. The impact analysis must address both construction and operation of fences, water wells, the railroad bed and tracks, and access roads along and perpendicular to the tracks, and it must be species-specific.

The DEIS must specifically disclose the impacts of the proposed action on winter deer range in the vicinity of Beowawe, including the Horseshoe Ranch, and the impacts on deer migration between winter range in the Dry Hills northeast of Hot Springs Point and summer range to the north. Nevada's Division of Wildlife, the BLM [Bureau of Land Management], and others have spent large amounts of money restoring the winter range in this area, and the proposed action may negate those expenditures.

Response

Detailed maps of game habitat within 5 kilometers (3 miles) of rail corridors are contained in the *Environmental Baseline File for Biological Resources* (DIRS 104593-CRWMS M&O 1999). Lists of those biological resources have been added to Section 3.2.2.1.4 of the EIS. Sections 6.3.2.1 and 6.3.2.2 have been modified to address the commenter's concerns and more clearly describe impacts of branch rail line construction on biological resources, including impacts to horses, burros, and game animals and the likelihood and effects of the spread of weeds.

The information on biological resources in the EIS will allow DOE to determine if there would be any significant impacts to those resources from construction of a branch rail line within any of the rail corridors. It is therefore sufficient for making decisions regarding the basic approaches for transportation as well as the choice among alternative transportation corridors. As indicated in Chapter 6 of the EIS, more detailed field surveys, government consultation, analyses, and appropriate National Environmental Policy Act reviews would be conducted if a decision was made to select a specific rail alignment within a corridor or a specific location of an intermodal transfer station or the need to upgrade the associated heavy-haul truck routes. These would include consultations with State wildlife management agencies, the Bureau of Land Management, the Army Corps of Engineers, and other applicable government agencies. They also would include field surveys (as applicable) and more detailed assessments and analyses of the effects of habitat fragmentation, interruption of movements, mortality, and harassment on wildlife, horses, and burrows; loss of hunter-generated revenue; and spread of noxious weeds.

The text in Section 6.3.2.2.2 of the EIS was corrected to state that the route passes through six wild horse and burro management areas.

Land-use impacts of the rail corridors and alternatives were analyzed in the EIS. The primary alternative for the Carlin Corridor does not pass through the Simpson Park Wilderness Study Area. However, the Steiner Creek variation of the Carlin Corridor does pass near or within the edge of that wilderness study area east of Grass Valley Ranch. The Bureau of Land Management has recommended that this area is not suitable for wilderness designation (DIRS 103366-BLM 1984). The EIS has been modified to include information on the corridor variations and a discussion of this wilderness study area, therefore, has been added.

The rail corridor is south of mule deer winter habitat in the vicinity of Beowawe and west of habitat in the Dry Hills and therefore would not affect deer in those areas.

8.11.4.2 (7213)
Comment - EIS001337 / 0093
Page 3-107 Section 3.2.1.4. [and Page 3-127 Section 3.2.2.4] This section should include reference to the Southwest Willow Flycatcher (Empidonax trallii extimus) which was listed by the U.S. Fish and Wildlife Service as endangered in February 1995. Habitat for this species may be found proximate to the Caliente, Caliente Chalk Mountain, Carlin, Jean and Valley Modified rail routes.

Response
DOE modified Sections 3.2.2.1.4 and 6.3.2.2.1 of the EIS to state that southwestern willow flycatchers have been observed in dense stands of riparian vegetation in Lincoln County; however, there is no suitable habitat for this species in the Caliente or Caliente-Chalk Mountain Corridor. DOE also modified Sections 3.2.2.2.4 and 6.3.3.2.1 to state that this species has been detected in Meadow Valley Wash, but there is no suitable habitat at the potential site of a Caliente intermodal transfer station. Finally, DOE modified Sections 3.2.2.2.4 and 6.3.3.2.3 to state that southwestern willow flycatchers occur in dense riparian vegetation in Pahranagat Valley, and that improvements of U.S. 93 along the candidate Caliente/Las Vegas heavy-haul truck route would not affect that habitat. These conclusions are based on the Biological Assessment of potential impacts of the Proposed Action on threatened and endangered species (DIRS 152511-Brocoum 2000).

8.11.4.2 (7231)
Comment - EIS001337 / 0121
Page 9-19 Section 9.3.4.1. The 3rd and 4th bulleted actions are inconsistent with the recently adopted Clark County multispecies habitat conservation plan. Clearance surveys have come to be of marginal value since the disposition of collected tortoises is often euthanasia.

Response
The Proposed Action would be consistent with Section 7 of the Endangered Species Act, which covers Federal actions, not Section 10, which covers private actions and requires a plan such as the Clark County Multiple Species Habitat Conservation Plan. The two actions referred to in the comment are terms and conditions required by the U.S. Fish and Wildlife service to mitigate the take of tortoises during repository construction and operation (see Appendix O of the EIS), and probably would be required for transportation-related construction. Clearance surveys are an effective method for protecting desert tortoises from linear (for example, a branch rail line) or relatively small disturbances in areas where tortoises are abundant. Moving tortoises or their eggs that are found to be in harm's way into suitable habitat adjacent to the proposed project area is an effective mitigation measure compared with placing them in captivity or killing them as is done in the Clark County Multiple Species Habitat Conservation Plan.

8.11.4.2 (7532)
Comment - EIS001912 / 0056
Pg. 3-107 Biological Resources-it appears from the description that the Nevada Division of Wildlife nor the U.S.F.W.S were consulted. Big Game habitats and other important habitats within the corridor need to be described and identified in relationship to proposed corridors.

Response
DOE compiled the description of biological resources in Sections 3.2.2.1.4 and 3.2.2.2.4 of the EIS from the best available information, including data from the Nevada Division of Wildlife, Nevada Natural Heritage Program, Bureau of Land Management, U.S. Fish and Wildlife Service, Forest Service, and National Park Service. Sections 3.2.2.1.4 and 3.2.2.2.4 summarize big game habitats and other important habitats for each transportation corridor.

The *Environmental Baseline File for Biological Resources* (DIRS 104593-CRWMS M&O 1999) describes these resources in detail.

8.11.4.2 (9478)
Comment - EIS001888 / 0221
[Summary of comments noted by Clark County Nuclear Waste Division staff at various citizens' meetings.]

Indicated that if a spill went into the Virgin River it could impact the "endangered" fish in the river.

Response
For a truck accident involving spent nuclear fuel or high-level radioactive waste to have an impact on threatened and endangered species, the accident would have to involve forces greater than those for which the casks were designed. Legal-weight trucks carrying spent nuclear fuel and high-level radioactive waste would travel at speeds well within predicted cask survivability requirements. Because of the high level of performance required by regulations, it is estimated that 99.99 percent of all accidents during the transport of spent nuclear fuel and high-level radioactive waste would result in no radiological releases (Section J.1.4.2.1 of the EIS). Severe accidents that could cause extensive damage to a shipping cask have been estimated to occur less than one time in 10 million truck accidents. Given the extremely small proportion of traffic carrying spent nuclear fuel and high-level radioactive waste and the normal low rate of accident occurrence, the likelihood of one of these vehicles being involved in an accident is extremely low. The additional likelihood that an accident would result in a damaged shipping cask and the release of radioactive materials is even lower. In addition, the likelihood that such an accident would occur in one of the few areas along routes where threatened or endangered species occur is very low. Based on this information, DOE has concluded in a Biological Assessment of the effects of the Proposed Action on threatened and endangered species (DIRS 152511-Brocoum 2000) that the probability of a transportation accident involving a legal-weight truck negatively affecting listed species in the Virgin River and elsewhere along existing highways is discountable.

8.11.4.3 Soils

8.11.4.3 (5528)
Comment - EIS001660 / 0038
The DEIS fails to adequately address the impacts of the proposed actions on soils in Mineral County other affected counties (pp. 6-11, -37, -47). Given Nevada's arid climate, the desert soils are fragile and easily disturbed, and may not recover on their own. Compaction of access roads would increase, not decrease, erosion (p. 6-47). Nevada's mines are subject to some of the most stringent reclamation requirements in the country. Reclamation is technically and financially demanding, careful planning, contouring, planting, maintenance; and, in many cases, irrigation during establishment of vegetation. The DEIS must analyze the impacts on soils from constructing a raised railroad bed and access roads, including extensive cut and fill operations, to constructing additional heavy-haul roads.
Response
None of the activities proposed would occur in Mineral County. Descriptions of the potential impacts of the construction of a branch rail line or heavy-haul truck route on soils in other counties are included in Sections 6.3.2.1 and 6.3.3.1 of the EIS. DOE recognizes that soils in arid climates are often easily disturbed and slow to recover and has developed successful methods for reclaiming disturbed sites at Yucca Mountain (see Section 4.1.4.4). DOE agrees with the commenter that additional, site-specific information on soils would be necessary prior to construction of a branch rail line or road upgrades to support heavy-haul truck shipping. As indicated in Chapter 6 of the EIS, more detailed field surveys, government consultation, analyses, and appropriate National Environmental Policy Act reviews would be conducted if a decision was made to select a specific rail alignment within a corridor or a specific location of an intermodal transfer station or the need to upgrade the associated heavy-haul truck routes. These would include field surveys (as applicable) and more detailed assessments and analyses of soils and reclamation methods.

The sentence in Section 6.3.2.1 of the EIS has been modified to clarify that roads would be compacted, covered with gravel, or otherwise treated to reduce erosion and maintain their stability.

8.11.4.3 (6706)
Comment - EIS001878 / 0070
The DEIS fails to adequately address the impacts of the proposed action on soils in Eureka County and other counties. (pp. 6-11, -37, -47) Given Nevada's arid climate, the desert soils are fragile and easily disturbed, and may not recover on their own. Compaction of access roads would increase, not decrease, erosion. (p. 6-47) Nevada's mines are subject to some of the most stringent reclamation requirements in the country. Reclamation is technically and financially demanding, requiring careful planning, contouring, planting, maintenance, and--in many cases--irrigation during establishment of vegetation.

The DEIS must analyze the impacts on soils from constructing a raised railroad bed and access roads, including extensive cut and fill operations.

Response
DOE recognizes that soils in arid climates are often easily disturbed and slow to recover (see Section 4.1.4.4 of the EIS). Section 9.3.4.2 describes the mitigation measures that are being considered to minimize erosion and aid recovery of soils.

DOE agrees with the commenter that additional, site-specific information on soils would be necessary prior to construction of a branch rail line or road upgrades to support heavy-haul truck shipping. However, DOE believes that the EIS provides sufficient information on impacts to soils necessary to make decisions regarding the basic approaches (for example, mostly rail or mostly truck shipments), as well as the choice among alternative transportation corridors. As indicated in Chapter 6 of the EIS, more detailed field surveys, government consultation, analyses, and appropriate National Environmental Policy Act reviews would be conducted if a proposal was made to select a specific rail alignment within a corridor or a specific location of an intermodal transfer station or the need to upgrade the associated heavy-haul truck routes. These would include consultations with State wildlife management agencies, the Bureau of Land Management, the Army Corps of Engineers, and other applicable government agencies. They also would include field surveys (as applicable) and more detailed assessments and analyses of soils and biological resources.

DOE believes that compacting disturbances such as access roads (Section 6.3.2.1 of the EIS) would decrease erosion in comparison with uncompacted disturbed soils, but not in comparison with undisturbed soils that are probably in equilibrium with regard to wind and water erosion.

8.11.4.3 (7089)
Comment - EIS001337 / 0033
In scoping comments to the EIS, Lincoln County and the City of Caliente noted that baseline geology and soil conditions could impact upon construction and operation of repository system components, including transportation infrastructure. The County and City noted for example that fault and soil features might impair facility integrity and alteration of area soils might induce or exacerbate flooding, water quality, and air quality impacts. The County and City observed that construction of a rail spur through Lincoln County would require extensive quantities of ballast and other roadbed materials. The County and City recommended that the DEIS ,include an inventory of potentially suitable sites to borrow materials within Lincoln County and the DEIS include geologic and soils mapping for all candidate sites and corridors potentially hosting repository system components, including transportation, within Lincoln County. It was noted in the County and City scoping comments that such inventory of soils should be completed to also facilitate preparation of plans for revegetating areas disturbed by construction activities. To facilitate DOE consideration of soil conditions, the County offered to provide DOE county-wide digital soils map coverage at 1:100,000 scale, which had been developed by the County. The Affected Environment section of the DEIS provides no information on specific soil conditions within Lincoln County. This is despite analyses contained within Section 6 of the DEIS which attempt to describe impacts of transportation activities on soils.

Response
In response to this comment, DOE examined information from the Natural Resource Conservation Service to determine if any of the candidate rail corridors would cross prime farmlands and to identify serious engineering constraints that soil conditions could cause. The results of that analysis have been added to Sections 6.3.2.1 and 6.3.3.1 of the EIS to describe potential impacts of the construction of a branch rail line or heavy-haul truck route on soils. The Department agrees with this comment that more site-specific information on soils would be necessary

before the construction of a branch rail line or road upgrades to support heavy-haul trucks. As indicated in Chapter 6 of the EIS, DOE would conduct more detailed field surveys, government consultation, analyses, and appropriate National Environmental Policy Act reviews if there was a decision to select a specific rail alignment in a corridor, or a specific location of an intermodal transfer station and the need to upgrade the associated heavy-haul truck routes. These would include more detailed analyses of soils and reclamation methods.

8.11.5 CULTURAL RESOURCES

8.11.5 (5499)
Comment - EIS001660 / 0026
The DEIS fails to analyze impacts of the proposed action on archeological and ethnographic resources in Nevada and Mineral County (pp. 6-11,-37,-47). Although the DEIS says that "Table 3-36 lists the cultural resource information currently available in each corridor", it lists only the number of recorded sites, of which there are approximately 110. Rather than saying that impacts could occur during construction and not during operations (p. 6-40, 48), the DEIS must specifically disclose anticipated impacts upon archeological and ethnographic resources in Nevada and Mineral County. The analysis must consider the impacts of improved access to archeological and ethnographic sites. Additional surveys and studies are needed to identify impacts (p. 6-11) and must be completed prior to a decision on a transportation mode, route, or corridor.

Response
DOE is adopting a phased approach to the identification, evaluation, and assessment of impacts to cultural resources, including archaeological, historic, and Native American, for Nevada transportation. Under this approach, existing data sets are examined for relevant information on the known occurrence of cultural resource properties in the candidate corridors for the EIS. Once DOE identified the preferred mode of transportation and routing, it would complete specific cultural resource and ethnographic field studies for the preferred route(s).

In this context, DOE reevaluated the adequacy of the existing baseline cultural resource data in the Draft EIS. To strengthen the analysis for Nevada transportation, this Final EIS incorporates data from the evaluation of additional sources in the cultural resource site files and literature.

8.11.5 (5572)
Comment - EIS001887 / 0198
Page 3-112; Section 3.2.2.1.5 - Cultural Resources

Although archaeological inventories and testing have occurred at Yucca Mountain itself as part of site characterization activities, historic property surveys meeting the Secretary of Interior's Standards have not been conducted for the railroad corridors. As the Draft EIS acknowledges, ethnographic studies for these corridors are lacking and must be conducted to identify sites to which a tribe might attach religious or cultural significance. Were any of the rail routes used historically as transportation routes? Direct impacts would occur as a result of the construction of lines, but the Draft EIS fails to note that historic or cultural landscapes might also be impacted as a result of this construction. Again, DOE needs to consult with the State Historic Preservation Office (SHPO) regarding the definition of this Area of Potential Effect (APE).

Additionally, the Programmatic Agreement (DOE 1988b, all), referenced in this section, regards site characterization activities solely and should not be used for the entire project. The programmatic agreement states that:

Whereas, development of the repository and other facilities specified in the NWPA are not within the scope of this Programmatic Agreement, but will be dealt with through additional consultation with the Advisory Council on Historic Preservation (Council) per the Council's regulations "Protection of Historic Properties" (36 CFR Part 800 as revised on September 2, 1986) (Appendix 1);

Amendments to the National Historic Preservation Act and subsequently to 36 CFR Part 800 necessitate a new agreement that includes Native Americans as signatories where the APE (as identified within the transportation systems) crosses the Moapa Indian Reservation and Las Vegas Paiute Indian Reservation. As per the new regulations, the SHPO is identified as a consulting party and should be involved in negotiations for a new programmatic agreement.

This section on cultural resources for the rail corridors provides insufficient data to determine location and numbers of historic properties. DOE needs to consult with SHPO to identify consulting parties and define an APE. DOE needs to prepare a new programmatic agreement that details how it will identify, evaluate, and treat historic properties and how the consultation process shall occur.

Response
The existing Programmatic Agreement between DOE and Advisory Council on Historic Preservation covers cultural resource requirements for site characterization activities at Yucca Mountain. DOE recognizes that construction of the repository and a Nevada transportation corridor or route would require a new and updated Programmatic Agreement. In coordination with the Advisory Council, the Nevada State Historic Preservation Office, involved Native American tribes and organizations, and other interested parties, DOE would complete a Programmatic Agreement, following the recently amended 36 CFR Part 800, Section 106, guidelines.

Known cultural resource data presented in the Draft EIS for the candidate rail corridors were collected during a site file search for previous fieldwork and recording of archaeological and historic sites within the designated region of influence. In addition, DOE reevaluated available information on archaeological, historic, and Native American cultural resources. These reevaluations are included in the analyses of candidate rail corridors, routes for heavy-haul trucks, and sites for intermodal transfer stations presented in Chapter 6 of the EIS. The information used in the analysis is sufficient to allow DOE to assess the potential for impacts to cultural resources along each of the candidate rail corridors, routes for use by heavy-haul trucks, and sites for construction of an intermodal transfer station.

DOE recognizes that project area-specific cultural resource surveys have not been conducted for the proposed transportation implementing alternatives and related project areas. Completion of archaeological surveys for all areas subject to ground-disturbing activities during transportation-related construction would be completed prior to initiation of any ground-disturbing actions.

Federal regulations provide for phased identification and evaluation of cultural resources in projects where alternatives under construction consist of corridors or large land areas (36 CFR 800.4). Due to the overall length of the proposed rail and heavy-haul truck implementing alternatives considered in the EIS, it is not practical nor cost-effective to conduct extensive field surveys prior to selection of the mode of transportation and corridor or route. Prior to initiation of the cultural resource surveys, identification of the corridor centerline and right-of-way boundaries would be required. Moreover, until selection of the final route is completed, related engineering studies to identify potential access needs and material sites cannot be completed. If and when these decisions have been finalized, cultural resource surveys would be completed in compliance with the requirements of applicable sections of the National Historic Preservation Act and 36 CFR Part 800.

8.11.5 (7216)
Comment - EIS001337 / 0094
Page 3-113 Table 3-36. This table is misleading in that it only reflects the number of sites identified to date and does not make clear that not 100 percent of each corridor has been surveyed. The table should be revised to reflect the percent of each route surveyed to date.

Response
The second and third paragraphs of Section 3.2.2.1.5 of the EIS, which reference the table, discuss the archaeological site file search results and the approximate percentage of each corridor. The incorporation of these data in the table itself would be redundant.

8.11.5 (9665)
Comment - EIS002074 / 0009
It appears that in looking at some of these sites, and, again, finding in my previous suggestion or finding here on the systematic ethnographic studies, that it appears that only a desktop review has been conducted of the corridors with respect to cultural resources. We were talking in here and just trying to imagine that if this project had to conduct

mechanical or geological studies or maybe even a site characterization study without doing any in-field analysis -- so we believe that it's been a bit shortsighted in that respect. And that, again, reinforces the need for those further kinds of studies. Also, with that when and if site selection is decided and transportation corridors are decided, that it's believed that there should be one monitor out there for any kind of activity going on.

Secondly, there should be preliminary cultural assessments being conducted leading to those systematic interviews that were recommended previously.

Response
DOE collected the cultural resource data presented in the EIS for the candidate rail corridors during a site file search for previous fieldwork and recording of archaeological and historic sites in the region of influence. In addition, in response to public comments, DOE reevaluated available information on archaeological, historic, and Native American cultural resources. The analyses of candidate rail corridors, routes for heavy-haul trucks, and sites for intermodal transfer stations include these reevaluations. The information used in the analyses is sufficient to enable DOE to assess the potential for impacts to cultural resources for each rail corridor, route for use by heavy-haul trucks, and site for construction of an intermodal transfer station.

DOE acknowledges that there have been no project area-specific cultural resource surveys for the proposed transportation corridors, routes, intermodal transfer station sites, and related project areas. The Department would complete archaeological surveys for all areas subject to ground-disturbing activities during transportation-related construction before such activities started. Federal regulations provide for phased identification and evaluation of cultural resources in projects in which alternatives under consideration consist of corridors or large land areas (36 CFR 800.4). Due to the overall length of the proposed rail and heavy-haul truck scenarios considered in the EIS, extensive field surveys prior to selection of the final mode of transportation and route would be impractical. Before the cultural resource surveys, DOE would identify the corridor centerline and right-of-way boundaries. Moreover, until selection of the final route was complete, the Department would be unable to complete related engineering studies to identify potential access needs and material sites. After these activities, DOE would complete cultural resource surveys consistent with the requirements of the National Historic Preservation Act and 36 CFR Part 800.

DOE recognizes that it is common practice to use qualified monitors (cultural resource observers) during construction activities in areas where buried cultural resources might occur. If such places existed along a selected corridor or route or at an intermodal transfer station site, DOE would use qualified monitors to ensure there was no inadvertent disturbance or destruction of cultural resources.

8.11.5.1 Archaeological and Historic Resources

8.11.5.1 (254)
Comment - 3 comments summarized
Commenters noted that the Draft EIS did not identify any direct or indirect impacts to historic sites due to the operations of heavy-haul trucks along any of the heavy-haul truck routes. Specifically, the commenters expressed disagreement because older historic buildings in Goldfield, Nevada, are within 10 feet of the highway. Commenters indicated that there is no room available to widen the highway through Goldfield and that it would be necessary to build a roadway around the business section of the town to address this impact.

Response
In response to these comments, DOE examined available literature on potential impacts from heavy-haul trucks on historic buildings. Based on current analyses, DOE believes that ground-level vibration would be well below that which could adversely affect such structures. Section 6.3 of the EIS now includes the results of this evaluation. DOE recognizes that if it selected a heavy-haul truck route that passed through a historic downtown district, such as that in the Town of Goldfield, additional evaluation of this situation could be necessary, including evaluation of the historic structures themselves. In addition, DOE continues to consider the use of bypass routes as an option.

8.11.5.1 (4294)
Comment - EIS001160 / 0103
Page 6-11, Section 6.1.2.5: The archeological impacts on the five rail corridors are essentially unassessed and unquantified. There is no information provided that would allow assessments to be made of the option to avoid

outstanding significant sites rather than to damage, destroy or treat through data recovery. Sites should be characterized by type and the constraints provided for avoidance rather than damage or data recovery by rail construction.

Response
DOE cannot completely delineate identification and assessment of the number of significant cultural resource properties, potential impacts, and mitigation options until it could complete field inventories for the selected corridor. At this time, however, DOE can make high-level comparisons on the relative "richness" of a corridor from a cultural resources standpoint based on existing information and the potential for cultural resources to occur due to knowledge about a corridor's characteristics, proximity to known sites, and an area's relationship to known historic events. If the site was recommended and approved, the Department would conduct additional field studies after selecting a preferred transportation corridor, which would occur only after the President and Congress, if necessary, agreed with any possible forthcoming recommendation that Yucca Mountain would be suitable for a repository. Therefore, it is impossible to incorporate such data in the EIS. However, DOE would complete all required cultural resource studies before making a decision on a specific alignment within a corridor.

8.11.5.1 (5152)
Comment - EIS001444 / 0004
Cultural Heritage Impacts

Section 3.2.2.1.5 Page 1-112, Paragraph 2
The state repository for cultural files for Lander and Eureka Counties is the Nevada State Museum in Carson City; the Harry Reid Center does not have the records for these counties. Any overview for projects in Lander or Eureka Counties that fails to check the Nevada State Museum records is inadequate. In addition, since the majority of the land that will be impacted by the transportation alternatives is managed by the Bureau of Land Management, records in the various BLM field offices should have also been checked.

1. Map submitted with EIS is too generalized. It doesn't provide enough geographic information. Proposed routes could impact any number of valleys and mountain ranges. Without specific geographic references it is difficult to determine the impacts.

2. While the plan generally describes proposed actions that will impact areas outside the Yucca Mountain Repository, the effected environment section of the EIS fails to discuss the resources and the potential impacts to resources outside area of Yucca Mountain. The "potential rail corridors" (Carlin and Caliente) and the "variations of potential rail corridors" go through some of the most culturally significant areas within the Tonopah Resource Area. Big Smokey, Monitor, Reveille, Hot Creek, and Oasis Valleys, all contain high concentrations of prehistoric sites. Additionally many of those sites and geographic locations are likely to be identified as TCP's [Traditional Cultural Properties]. South Stone Cabin and Ralston Valleys contain numerous historic sites related to WWII. Many of the known sites located in previously mentioned locations do meet the criteria for significance as defined in the National Historic Preservation Act.

Response
DOE reviewed archaeological site file records at the Nevada State Museum in Carson City to acquire information on known sites along corridors in Lander and Eureka Counties. DOE has revised Section 3.2.2.1.5 of the EIS to include this information. DOE has incorporated information from additional site file searches in the EIS, including relevant Bureau of Land Management District and Resource Area office records, and literature reviews for the areas that the candidate transportation corridors cross to support the comparative analysis of cultural resource issues between corridor alternatives.

8.11.5.1 (5168)
Comment - EIS001910 / 0007
The potential adverse impacts regarding transportation include cultural integrity, health, and economic considerations. The existing transportation routes and construction of new rail and highway infrastructure could destroy significant cultural sites. Even though mention is made that preconstruction surveys may occur, modification or relocation of these routes would not necessarily happen based on the Department's assessment of whether rerouting is "reasonable." Tribal importance of cultural integrity becomes secondary to the whims of DOE

archaeologists and anthropologists. It is an important point that the archaeologists and anthropologists conducting the studies and surveys are non-Indian and, it is our understanding, not from the Yucca Mountain region.

Response
It is premature to address detailed analyses of cultural resources along a candidate transportation route in Nevada, since a decision to select a route has not been made. If the Yucca Mountain site was found suitable for a nuclear waste repository, DOE would select a rail corridor for constructing and operating a branch rail line or select a location for an intermodal transfer station and an associated route for use by heavy-haul trucks. DOE then would conduct additional National Environmental Policy Act analyses that could be required to evaluate, avoid, or mitigate potential impacts of a specific rail alignment or specific location of an intermodal transfer station. Any new construction of transportation infrastructure in Nevada would include specific cultural resource surveys and Native American interactions.

For the EIS, DOE obtained cultural resource studies from the Desert Research Institute, which has principal offices in Las Vegas and Reno, Nevada. The research professionals involved at the Institute have direct experience in southern Nevada and Yucca Mountain area anthropology and archaeology. In addition, local Western Shoshone, Southern Paiute, and Owens Valley tribal representatives have worked closely with DOE cultural scientists for resource protection since the late 1980s.

8.11.5.1 (5576)
Comment - EIS001887 / 0203
Page 3-133; Section 3.2.2.2.5 - Cultural Resources

The State Historic Preservation Office [SHPO] comments on highway corridors and intermodal transfer stations are the same for rail corridors. Insufficient data is presented to determine the location and number of historic properties. DOE needs to consult with SHPO to identify consulting parties and define an APE [Area of Potential Effect]. DOE needs to prepare a new programmatic agreement that details how it will identify, evaluate, and treat historic properties and how the consultation process shall occur. In addition, the State requests responses to the following questions:

1. Has consultation with Native Americans proceeded regarding the highway systems and intermodal transfer stations?

2. Has DOE examined whether the use of highways has the potential to affect historic properties?

Response
DOE has begun preliminary interactions with the State Historic Preservation Office, the Advisory Council on Historic Preservation, and Native American tribes and organizations to complete a Programmatic Agreement covering repository construction and related activities.

DOE examined available literature on potential impacts from heavy-haul trucks on historic buildings. Based on current analyses, DOE believes that ground-level vibration would be less than levels that could adversely affect historic structures.

8.11.5.1 (5698)
Comment - EIS001887 / 0313
Page 6-11; Section 6.1.2.5 - Cultural Resources

Historic properties should be identified before effects are determined.

Response
In response to public comments, DOE reevaluated available information on archaeological, historic, and Native American cultural resources. The analyses of candidate rail corridors, routes for heavy-haul trucks, and sites for intermodal transfer stations in Chapter 6 of the EIS include these reevaluations. The information used in the analyses is sufficient to enable DOE to assess the potential for impacts to cultural resources for each rail corridor, route for use by heavy-haul trucks, and site for construction of an intermodal transfer station.

Following requirements and guidelines outlined in relevant historic preservation laws and regulations, DOE would identify and evaluate all historic properties along a selected transportation route before starting ground-disturbing activities. The Department would assess potential impacts to important properties and develop appropriate options for mitigation.

8.11.5.1 (6671)
Comment - EIS001878 / 0053
The DEIS fails to analyze impacts of the proposed action on archeological and ethnographic resources in Nevada and Eureka County. (pp. 6-11, -37, -47) Although the DEIS says that "Table 3-36 lists the cultural resource information currently available in each corridor," it lists only the number of recorded sites, of which there are approximately 110. The DEIS says that additional information is available for the Carlin corridor (p. 3-113), but does not say what it includes. Furthermore, the DEIS does not specify whether Table 3-36 applies to the candidate rail corridors, the variation of the potential corridor, or both. (See Figure 6-12, p. 6-59.)

Rather than saying that impacts could occur during construction but not during operations, (p. 6-48, -40) the DEIS must specifically disclose anticipated impacts upon archeological and ethnographic resources in the Carlin corridor and Eureka County. The analysis must consider the impacts of improved access to archeological and ethnographic sites. The additional surveys and studies needed to identify impacts (p. 6-11) must be completed prior to a decision on a transportation mode, route, or corridor.

Response
DOE is adopting a phased approach to the identification, evaluation, and assessment of impacts to cultural resources, including archaeological, historic, and Native American, for Nevada transportation. Under this approach, existing data sets were examined for relevant information on the known occurrence of cultural resource properties in the candidate corridors for the EIS. If DOE identified its preferred mode of transportation and routing, it would complete specific cultural resource and ethnographic field studies for the preferred route(s).

In this context, DOE reevaluated the adequacy of the existing baseline cultural resource data for the EIS. To strengthen the analysis for Nevada transportation, this Final EIS incorporates data from the evaluation of additional sources in the cultural resource site files and literature.

8.11.5.1 (7142)
Comment - EIS001337 / 0039
Lincoln County and the City of Caliente recommended that the repository EIS include field surveys of alternative rail corridors, material sites, and other areas where construction may occur to determine the location and significance of any archeological resources. The DEIS does not identify potential borrow pits and therefore has not included an assessment of the archaeologic resources at such sites. Such an omission makes the document less useful as a decision-support tool, particularly in choosing among transportation corridor alternatives.

Lincoln County and the City of Caliente recommended that the DEIS include an inventory of important historic resources within Lincoln County along transportation corridors and in the vicinity of construction material sites. The DEIS does not identify potential construction material or man Camp sites and therefor no inventory of historic resources in the vicinity of such areas is included within the DEIS. The absence of this information makes the document less useful as a tool for discriminating among alternative transportation corridors.

Response
In response to public comments, DOE reevaluated available information on archaeological, historic, and Native American cultural resources in the Final EIS. The information used in the analyses is sufficient to enable DOE to assess the potential for impacts to cultural resources for each rail corridor, route for use by heavy-haul trucks, and site for construction of an intermodal transfer station.

DOE acknowledges that there have been no project area-specific cultural resource surveys for the candidate transportation corridors, routes, intermodal transfer station sites, and related project areas. The Department would complete archaeological surveys for all areas subject to ground-disturbing activities during transportation-related construction before such activities started. Federal regulations provide for phased identification and evaluation of cultural resources for projects in which alternatives under consideration consist of corridors or large land areas

(36 CFR 800.4). Due to the overall length of the rail and heavy-haul truck scenarios considered in the EIS, extensive field surveys prior to selection of the final mode of transportation and route would be impractical. Before the cultural resource surveys, DOE would identify the corridor centerline and right-of-way boundaries. Moreover, until selection of the final route was complete, the Department would be unable to complete related engineering studies to identify potential access needs and material sites. After these activities, DOE would complete cultural resource surveys in accordance with the requirements of the National Historic Preservation Act and 36 CFR Part 800.

8.11.5.1 (7214)
Comment - EIS001337 / 0099
Page 3-133 Section 3.2.2.2.5. The fourth line of the 2nd paragraph of this section should reflect that archaeological sites are “at or near” sites. The Caliente site has been developed as the City of Caliente’s wastewater treatment facility. The site has been wholly disturbed. The significance of cultural resources as an issue at this site needs to be reconsidered within the DEIS.

Response
DOE has revised Section 3.2.2.2.5 of the EIS to include the disturbance of the area that includes the two candidate intermodal transfer station sites at Caliente due to the City’s wastewater treatment plant. Section 3.2.2.1 discusses the land disturbance in more detail. DOE believes that it has dealt with the significance of the cultural resources in this area in an appropriate manner.

8.11.5.1 (8360)
Comment - EIS001873 / 0044
P. 3-133. The rock art site is fairly close to the Caliente intermodal site.

Response
If the Caliente intermodal transfer station site was selected for development as part of the Nevada transportation system, additional field studies would be completed to identify all cultural resource properties that are situated within or adjacent to the station site. Further, the potential for direct or indirect impacts would be evaluated, and mitigation strategies would be developed, as necessary.

The archaeological site file search conducted for the Draft EIS identified this site as being close to the alternative intermodal transfer station site.

8.11.5.2 NATIVE AMERICAN INTERESTS

8.11.5.2 (5153)
Comment - EIS001444 / 0006
The Native American Consultation section of the EIS fails to address the possible concerns of the various tribes and groups in regard to the proposed transportation routes. It is probable that they will have a large number of concerns, since the proposed actions will pass through culturally important areas that not only contain a large number of conventionally recognizable sites, but also less obvious, yet traditionally important, trails, geographic locations, plants, animals, and minerals.

Response
Section 4.4 of DOE’s reference document *American Indian Perspectives on the Yucca Mountain Site Characterization Project and the Repository Environmental Impact Statement* (DIRS 102043-AIWS 1998) offers Native American views on transportation issues. This report correctly notes that DOE has not completed ethnographic studies involving Native American peoples along the candidate rail corridors.

In accordance with its Indian Tribal Government Policy, DOE, through the Native American Interaction Program, is committed to involving tribes and organizations in future studies to identify, evaluate, and protect cultural resources important to Native Americans that could occur along the route selected in the final analysis for Nevada transportation.

The Final EIS transportation analysis incorporates additional information on Native American issues for lands that the transportation corridors cross. This information is available in the general literature, and environmental reviews for adjacent projects – for example, Nellis Air Force Base, Nevada Test Site, and the recent DOE evaluation of Native American issues along proposed highway routes for the intermodal transportation of low-level radioactive waste to the Nevada Test Site. Many of the routes evaluated for the low-level waste transportation routing correspond to the repository heavy-haul truck scenarios.

8.11.5.2 (8379)
Comment - EIS001873 / 0064
P. 6-48. Under Cultural Resources the necessary systematic studies of Native American sites and resources should be included in the EIS.

Response
The comment refers to impact analyses associated with transportation corridors. DOE cannot delineate the identification and assessment of the number of Native American sites, potential impacts, and mitigation options until it has completed field inventories of a specific corridor, once it was selected. The Department would conduct the required field studies after selecting a preferred transportation corridor, which would occur only after the President and Congress agreed with any possible forthcoming recommendation that Yucca Mountain would be suitable for a repository. Therefore, it is impossible to incorporate such data in the EIS. However, DOE would conduct all required cultural resource studies and Native American interactions before initiating any corridor construction activities.

8.11.5.2 (9650)
Comment - EIS002074 / 0006
On the transportation portion is that the transportation model only considered portions within -- we have conflicting views -- of either a quarter or a half mile of the proposed transportation corridors. And, as we know, that because there's been the lack of systematic ethnographic studies in those areas, that there potentially may be other cultural considerations that should be given because of potential traditional cultural properties or other cultural resources sites that would be by areas or fall within those corridors.

Response
The region of influence for the archaeological site file search for the rail corridors includes a 0.25-mile (400-meter)-wide zone.

DOE is aware of the current lack of detailed site-specific cultural resource investigations along many of the candidate transportation corridors. If a selection was made regarding mode and routing of a corridor, intensive cultural resource and ethnographic studies would be conducted to identify and evaluate all cultural resources sites that could be affected by construction and operation of the corridor.

8.11.5.2 (9747)
Comment - EIS001888 / 0331
[Clark County summary of comments it has received from the public.]

Commenters requested that the EIS evaluate cultural resources nearby Yucca Mountain and along proposed regional rail/heavy haul corridors (Carlin and Jean routes, in Lincoln and Esmeralda counties, historic Palisade- Eureka route) given the proposal to construct and operate the repository system. More specifically, commenters indicated that the EIS should consider historical and prehistoric sites, paleontologic resources, and Native American land claims and religious freedom issues. Analyses must also be based on Class III field surveys, as well as other forms of research.

Response
In response to public comments, DOE reevaluated available information on archaeological, historic, and Native American cultural resources. The analyses of candidate rail corridors, routes for heavy-haul trucks, and sites for intermodal transfer stations in Chapter 6 of the EIS include these reevaluations. The information used in the analyses is sufficient to enable DOE to assess the potential for impacts to cultural resources for each rail corridor, route for use by heavy-haul trucks, and site for construction of an intermodal transfer station.

As stated in the sections of Chapter 6 of the EIS that address potential cultural resource impacts, DOE agrees that additional analyses of archaeological, historic, and Native American cultural resources along a selected transportation corridor or route for heavy-haul trucks and the selected site of an intermodal transfer station would be necessary. DOE disagrees, however, that Class III (intensive) field surveys of each candidate rail corridor, highway route for heavy-haul trucks, and site for an intermodal transfer station would be necessary to provide information to support possible transportation route decisions in Nevada. Such decisions would be to select a particular rail corridor for construction of a branch rail line or a particular route for use by heavy-haul trucks and a particular site for construction of an intermodal transfer station. However, once a decision was made on the transportation mode and route in Nevada, DOE would complete Class III field surveys before starting ground-disturbing activities.

8.11.5.2 (9748)
Comment - EIS001888 / 0332
[Clark County summary of comments it has received from the public.]

Commenters, representing Native Americans, requested more formal involvement in the overall NEPA [National Environmental Policy Act] process to ensure that tribal rights and concerns are considered prior to decision-making or Departmental action. Many commenters cited: (1) the DOE's Indian policy regarding government-to-government relations, (2) tribal sovereign rights to regulate tribal lands and resources, and (3) cultural resource laws (National Historic Preservation Act, Native American Graves Protection and Repatriation Act, Archaeological Resources and Protection Act) as appropriate justification for greater involvement. Specific involvement issues raised included routing decisions and transportation planning, development of alternatives, impacts to ancestral artifacts, ecosystem impacts, the development of a plan to ensure Native American review of the draft EIS, and financial assistance for consultation purposes.

Response
DOE will interact with the State of Nevada Historic Preservation Office, the Advisory Council on Historic Preservation, and Native American tribes and organizations to complete a Programmatic Agreement covering repository construction and operation and related activities. Interactions are ongoing with the Consolidated Group of Tribes and Organizations through the Yucca Mountain Project Native American Interaction Program. Under this program, DOE has informed tribal representatives of transportation implementing alternatives, including candidate heavy-haul truck highway routes and intermodal transfer station sites (DIRS 102043-AIWS 1998).

8.11.6 SOCIOECONOMICS

8.11.6 (44)
Comment - 3 comments summarized
Several commenters stated that the Draft EIS indicated new jobs will be created in the Caliente/Lincoln County areas as a result of intermodal activities. Commenters said the Final EIS should include an estimate of new residents by age and make a determination of how many school children will be in the school system and how new residents will impact the existing infrastructure.

Response
Section 3.1.7 of the EIS addresses the projected baseline conditions through 2035 for Lincoln County. Sections 6.3.2 and 6.3.3 provide an estimate of the changes in population and other economic measures for each relevant implementing alternative. The transportation analysis in the EIS includes a sensitivity analysis that assigns all potential impacts to Caliente. This analysis conservatively estimates impacts of potential transportation actions on a community level for what could be the most affected community in Nevada.

8.11.6 (740)
Comment - EIS000195 / 0004
The socioeconomic section discussing the impact of heavy haul of the large rail casks totally fails to address the impacts to the quality of life, to the residents of Goldfield and other rural communities resulting from four to five of these large trucks along with the remaining convoy coming through our community every weekday for twenty-four years.

There are residents and businesses within twelve feet of US 95. Also, the trucks will be returning along this route which makes it eight to ten per day. Along these lines, the noise impacts also need to be addressed.

Response
The EIS does assess potential land-use and noise impacts associated with each transportation scenario. Subsequent environmental studies would assess transportation scenarios in more detail to support decisions on preferred transportation alignments and any necessary mitigative actions.

8.11.6 (795)
Comment - EIS000197 / 0002
In the discussion of the socioeconomic impacts associated with construction of the Caliente ... and Carlin ... rail corridors, you identify the annual average number of construction workers to be 500 to 560, and that there would be five construction camps. It would seem that one of the camps would be in the vicinity of Goldfield and could have a significant impact in this small community. We feel that this impact also needs to be addressed in the socioeconomic section and how these impacts could be mitigated should be included.

Response
The EIS presents information for the counties within the designated region of influence (Clark, Nye, and Lincoln Counties) and the Rest of Nevada. The Rest of Nevada is an aggregate of the 14 remaining Nevada counties. The socioeconomic simulation model DOE used to estimate potential impacts indicated that the Rest of Nevada would experience direct economic effects from spending by construction workers for food and lodging.

The simulation accounts for workforce expenditures through the Eating and Drinking Sector and the Construction Sector of the Standard Industrial Code. A small fraction of the spending for food and lodging was allocated to the Rest of Nevada to account for the possibility that a few workers could or purchase food in Goldfield or other counties not in the region of influence.

The simulations assumed that construction camp development and water drilling would be contracted to firms in the counties where the camps were located. It was assumed that all railroad construction workers would commute weekly from Clark County to camps outside Clark County and eat in local restaurants 5 days per week, 50 weeks per year.

Subsequent environmental studies would further assess transportation scenarios in more detail to support decisions on preferred transportation corridor alignment and any necessary mitigative actions.

8.11.6 (1000)
Comment - EIS000235 / 0007
The Final EIS should include an evaluation of existing emergency medical capabilities in Lincoln County and provide recommendations for needed enhancements.

Response
Section 3.1.7.5 of the EIS provides information on health care and hospitals within the region of influence. Lincoln County has one hospital, in Caliente. Table 3-29 lists hospital use in the region.

However, DOE will not presume to speculate on what agencies feel that they might need to do to serve their citizenry. Section 116(c) of the NWPA states that "the Secretary shall provide financial and technical assistance to [an affected unit of local government or the State of Nevada]…to mitigate the impact on such [an affected unit of local government or the State of Nevada] of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Within that broad framework, neither Section 116 nor any other provision of the NWPA limits the impacts that are subject to assistance under Section 116 to the environmental impacts considered in this EIS.

Under the NWPA, the Section 116 impact assistance review process and the EIS process are distinct from one another, and the implementation of one is not dependent on the implementation of the other. Thus, the provision of assistance under Section 116 would not necessarily be limited either by the impacts identified in this EIS or by its findings on such impacts. Any decision to provide assistance under Section 116 would be based on an evaluation of requests for assistance submitted by an affected unit of local government or the State of Nevada pursuant to Section 116 to document likely economic, social, public health and safety, and environmental impacts. If the proposed repository was to become operational, DOE would enter into discussions with the State of Nevada and affected units of local government and consider appropriate support and mitigation measures.

After a decision was made regarding the proposed repository and transportation modes and routes, local jurisdictions would be better able to identify the likely economic, social, public health and safety, and environmental impacts that would be the basis for a request for economic assistance, which could include assistance in providing additional medical and emergency response facilities, under Section 116(c) of the Act.

Further, in the Final EIS, DOE has expanded its socioeconomic discussions in Chapter 3 to provide a clarified basis for understanding the magnitude of potential impacts described in Chapters 4 and 6. This discussion includes a projection of baseline parameters through 2035 based on the most recently available information and assumptions.

8.11.6 (1241)
Comment - EIS000226 / 0004
Page 30 of the County/City EIS Scoping Report provided a range of estimates of the population and demand for housing which would be induced by a range of new jobs. While the DEIS estimates the number of jobs which might be associated with intermodal activities in Caliente, rail line construction in the County and operation of heavy-haul trucks across Lincoln County, no estimate of induced population and related demands for housing and other public services (i.e., schools) is provided.

Response
The document cited in this comment is one of many DOE reviewed before preparing the Draft EIS. DOE estimates provided in the EIS for employment and population growth (including indirect population) in Lincoln County associated with the Yucca Mountain Project align most closely with the upper-case estimates in the scoping report (DIRS 104630-YMP 1997). The Department estimated about 237 total operations jobs for the Caliente-Chalk Mountain options. Of this total, DOE assumed that half the drivers and private escorts and other indirect employees (about 133 total) would work in Lincoln County. In the Final EIS DOE estimated a population increase of about 166 in Lincoln County. DOE does not believe, however, that this represents an impact that could stress local housing or infrastructure because it does not expect the need for in-migration to fill most of the jobs. DOE estimates of incremental changes in employment include direct and indirect jobs and population increases due to Yucca Mountain activities.

DOE has revised its socioeconomic estimates for Lincoln County to reflect population estimates from the Nevada State Demographer. The Department has reviewed pertinent information and revised its analyses of demands for public services and infrastructure in light of the identified repository-induced population changes.

8.11.6 (3145)
Comment - EIS000642 / 0002
Some issues that have not been addressed in the EIS properly. And these are to deal with the fact of socioeconomics for this part of the world. We rely on mining and ranching at this point in this part of the country for survival. This project that you are proposing threatens our way of life forever.

Response
DOE developed a list of assumptions to determine the projected economic and demographic changes in Nevada by construction and operation of the proposed repository. The REMI model used in these determinations is a four-region model. Three of the regions are Clark, Nye, and Lincoln Counties. The fourth region is the Rest of Nevada, an aggregation of the other 14 counties in Nevada (including Lander County).

DOE assumed, for railroad construction, workers would be nominally assigned to base camps according to an even split by the number of camps. All railroad construction workers would commute weekly from Clark County to the trailer camps outside Clark County and would eat in local restaurants 5 days per week, 50 weeks per year. Operations workers would live in the county where the branch rail line branched off the main line, with the exception of the Carlin routes, for which they would live in Elko, Nevada.

Given the above assumptions, the total estimated incremental population increase for the aggregated 14 counties in Nevada attributed to the Carlin Corridor would be about 115 individuals in the peak year. Total employment associated with the Carlin Corridor for the aggregated 14 counties of Nevada, including Lander County, for the peak year would be about 75. The Department does not believe there would, therefore, be any discernible direct or indirect impacts to the economy (including mining and ranching) or to the infrastructure (such as public safety or recreation) for any of the counties, including Lander County.

8.11.6 (3147)
Comment - EIS000642 / 0004
There are many people here in Nevada who are into ranching and that is their way of life and their only way of life, and we are all very concerned on this. Will the grazing allotments be cut up? How will the ranchers be compensated for the lost rangeland?

I want to expand on that a little bit. I am very concerned about the issue of water rights and the loss of land in our state.

Response
At this time, definitive information is not available on specific tracts of land that could be required for a given transportation alternative. For any land that would be required or otherwise affected, the Department would fairly compensate landowners under Federal acquisition procedures. Should DOE be required to exercise its right of eminent domain, it would do so pursuant to applicable laws and regulations.

8.11.6 (4216)
Comment - EIS001160 / 0033
The DEIS does not adequately address issues raised and substantiated by White Pine County during the scoping process. For example:

DOE is encouraged to make use of the White Pine County Economic Impact Model in preparation of the repository EIS. DOE did not utilize the White Pine County Economic Impact Model despite said model having been given to the Department. The DEIS does not include an assessment of economic or fiscal impacts in White Pine County.

Response
The EIS presents information for the counties in the defined region of influence (Clark, Nye, and Lincoln Counties) and for the Rest of Nevada, which is an aggregate of the 14 remaining Nevada counties (including White Pine County). Any economic impacts on White Pine County would be an indirect impact caused by DOE employment and expenditures in neighboring Lincoln County or in the Rest of Nevada. For example, Section 6.3.3.2.2 of the EIS discusses socioeconomic impacts of the construction and operation of an intermodal transfer facility in Caliente for the Caliente/Chalk Mountain heavy-haul truck route. The socioeconomic simulation model DOE used to estimate potential impacts indicated that the Rest of Nevada would experience relatively small direct economic effects from permit fees paid to the State for the operation of a facility such as an intermodal transfer station. The estimated total employment increase due to direct and indirect jobs for the entire Rest of Nevada for the Caliente and Caliente/Las Vegas heavy-haul truck route (14 counties) could be up to 38 jobs during construction and up to 26 jobs during operations. The impacts to White Pine County, if any, would be small.

8.11.6 (4239)
Comment - EIS001160 / 0054
White Pine County is concerned that there is no review of potential state-wide impacts, how changes in regional economic trends might impact neighboring counties, or impacts that could occur in counties along proposed transportation routes. It is not possible to suggest specific positive or negative impacts to White Pine County without initial analysis on anticipated state and regional impacts. In addition, the DEIS should include a separate review and analysis of impacts to communities along transportation routes once they have been selected. The FEIS should commit to such an analysis and the related identification of mitigation measures.

All communities with the state could be impacted by changes in the economic picture for the entire state because of the repository. The DEIS provides no assessment of the impacts to counties and cities from losses in state-level economic and fiscal activity. The State of Nevada Nuclear Waste Project Office has demonstrated the potential for statewide tourism related economic and fiscal impacts as a result of nuclear waste being transported throughout the state and stored at Yucca Mountain. State sales and gaming tax revenues could be reduced, and this would impact state services and funds available to counties and cities for local services. It is also possible that the fact that high level nuclear waste is being transported on Nevada highways may influence motor freight routes. Communities like Ely receive a significant economic benefit from the increasing amount of truck traffic over US Highway 93 and State Route 318. If trucking firms elected to use Interstate 15 instead to avoid the routes used for high level nuclear waste, then our communities and the state as a whole would feel an economic impacts. Each of these key issues needs to be addressed in the FEIS.

Positive and negative impacts in neighboring counties including Lincoln, Nye, and Eureka Counties could indirectly impact White Pine County. Moderate increases or decreases in population and economic strength in Eureka, northern Nye, and northern Lincoln Counties could impact White Pine. These areas currently depend, at least in part, on Ely as a commercial and professional center. Decreases in their economies could reduce White Pine County's economic activity from its neighboring counties. Increases in population and activity could increase the economic activity in White Pine County. If the increases in the neighboring areas were significant enough to support development of new commercial and professional activity, it could decrease the activity now coming to White Pine County. These connected actions or impacts have not been considered within the DEIS.

It is possible that selection of transportation routes through White Pine County could result in socioeconomic impacts for White Pine County. If the presence of trucks hauling high-level nuclear waste in White Pine County required new state and/or federal employees in the area, their households would generate revenue in the community. New private sector ventures could be warranted to provide parking areas or shuttle services between parking and motels. However, the negative impacts of the presence of high-level nuclear waste could include reduced tourist traffic to White Pine County attractions, reduced customers for businesses located along the transportation routes or near the parking areas, reluctance of lenders to finance projects located within the corridor because of potential environmental hazards or increased risk perceived for the area; and regulations governing the use of areas along the transportation route could deter future land use decisions on mining, grazing, or tourism/recreation projects. The identification and analysis of impacts to the local economy in White Pine County and the City of Ely need to be included within the DEIS. Absent such analyses and identification of appropriate measures to mitigate impacts, potential effects will go unmitigated. Such an outcome is inconsistent with the intent of NEPA [National Environmental Policy Act]. The limited discussion regarding Clark, Lincoln, Nye, Eureka, Lander, and Esmeralda Counties does not show the true picture of impacts White Pine County could expect from the development of Yucca Mountain to store high level nuclear waste.

Response

The economic and demographic simulations that DOE performed using the REMI EDFS-53 forecasting and simulation model derived fiscal changes to the economy from interindustry relationships (including the eating and drinking places and hotel sectors of the Standard Industrial Code), labor markets, and national and worldwide economic variables. The analyses considered the entire State of Nevada. DOE structured the information presented in the EIS into four regions – Clark, Nye, and, Lincoln Counties, and the Rest of Nevada. The Rest of Nevada comprises the 14 remaining Nevada counties (including White Pine County and the Ely Shoshone Tribe). DOE estimated the potential impacts of each alternative on the same economic parameters for each region. Economic impacts on White Pine County would be indirect, caused by DOE employment and expenditures in neighboring Lincoln County or in the Rest of Nevada. For example, Section 6.3.3.2.2 of the EIS discusses the socioeconomic impacts of the construction and operation of an intermodal transfer facility in Caliente for the Caliente/Chalk Mountain route. The socioeconomic simulation model that DOE used to estimate potential impacts indicated that the Rest of Nevada would experience relatively small direct economic effects from permit fees paid to the State for operation of an intermodal transfer facility. The estimated total employment increase in total jobs (direct and indirect) for the Rest of Nevada (all 14 other counties) could be up to 37 jobs during construction and up to 18 jobs during operations. Impacts to White Pine County, if any, would be small.

Assessing the perceived impact on quality-of-life variables or the impact of "stigma" is generally problematic because it does not necessarily depend on actual physical effects or risks of the proposed action, but on the negative perception of those effects or risks by the public. While DOE agrees stigmatization could result in adverse impacts under some scenarios, it is not inevitable or measurable and stigmatization would likely be an aftereffect of unpredictable future events. As a consequence, DOE addressed but did not attempt to quantify potential impacts from risk perceptions or stigma in the EIS. This issue is discussed in Section 2.5.4 and Appendix N of the EIS.

8.11.6 (4290)
Comment - EIS001160 / 0098
Page 4-88. The analysis on Section 4.1.15.4 should have considered the economic impacts of locating one or more cask manufacturing facilities at a greenfield site in Nevada, particularly, White Pine County. Such a facility might serve to mitigate potential negative economic impacts in the area.

Response
The EIS presents information for the counties in the defined region of influence (Clark, Nye, and Lincoln Counties) and the Rest of Nevada (including White Pine County). The Rest of Nevada comprises the 14 remaining counties. Economic impacts on White Pine County would be indirect, caused by DOE employment and expenditures in neighboring Lincoln County or in the Rest of Nevada. The socioeconomic simulation model DOE used to estimate potential impacts indicated that the Rest of Nevada would experience relatively small direct economic effects from permit fees paid to the State for operation of an intermodal transport facility. The estimated total employment increase in total jobs (direct and indirect) for the Rest of Nevada could be up to 38 jobs during construction and up to 26 jobs during operations. Impacts to White Pine County, if any, would be small.

While the details of cask manufacturing facilities are not known at present, they probably would not be DOE facilities. In all probability, private firms would manufacture the casks and, therefore, DOE would not control their location.

Section 4.1.15 of the EIS provides information on potential environmental impacts from manufacturing repository components.

8.11.6 (5483)
Comment - EIS001660 / 0019
Public services information is incorrect and incomplete (p. 3-115). Counties referenced only include 6 out of 10 affected units of local government. The DEIS implies all small communities in Nevada contain community water, sewer services, wells or septic tanks. Small communities may provide these services; however, have very limited access to sufficient quantities of water.

Response
DOE has expanded the discussions of public services in Sections 3.1.7.5 and 3.2.2.1.6 of the EIS. Results of the EIS analysis indicated that not all counties initially named as affected units of local government would experience impacts from the Proposed Action.

8.11.6 (5501)
Comment - EIS001660 / 0027
The DEIS does not adequately address specific community, local government, statewide, and regional impacts. Except for a discussion of the direct and indirect impacts from construction on disposable income and the Gross Regional Product, the DEIS fails to address the impacts of the proposed action on Mineral County's economy (pp. 6-l3,-l4,-37,-64). Mineral County's economy depends on mining, construction, military, transportation, agriculture and service industries (see "Hawthorne Facts at a Glance/Winter 1999" for more information about Mineral County's economy). The DEIS must address: (1) the anticipated impacts - positive and negative - upon the mining, construction, military transportation, agriculture and service industries, and (2) the anticipated impacts on the agricultural economy. The DEIS must address the anticipated economic impacts of shared use of alternative routes by the DOE and by other users, such as mines.

Response
DOE does not expect direct impacts of repository operations to Mineral County because none of the candidate transportation corridors are in the county. The closest candidate branch rail line would be in the Carlin Corridor, approximately 32 kilometers (20 miles) to the east in Nye County.

DOE estimated the incremental impacts at the county level for Clark, Lincoln, and Nye Counties, and for the remaining 14 Nevada counties together. The Department used the REMI EDFS-53 Forecasting and Simulation Model. The model segments age, ethnicity, and gender based on 600 cohorts to predict population. In addition, it calculates births, deaths, and aging. Employment and fiscal changes to the economy are derived from interindustry relationships, labor markets, and national and worldwide economic variables. Based on the results of the model outputs, DOE does not believe incremental increases in socioeconomic parameters represent large or widespread economic impacts.

DOE would consider sharing the selected transportation corridor with others such as mine operators and private freight shippers. This could benefit communities near the transportation route. Sections 8.2.1 and 8.4.2.1 of the EIS discuss the idea of shared branch rail lines.

8.11.6 (5513)
Comment - EIS001660 / 0031
The DEIS does not adequately address specific community, local government, statewide, and regional impacts. Also, it fails to address the fiscal impacts of the proposed action on Mineral County and other local governments (p. 6-37). Mineral County has a very limited property and sales tax base, and a volatile mining economy. For these reasons it is very difficult to provide essential services and infrastructure related to fire suppression, emergency response, water and sewer, law enforcement, education, etc.; and the County would have very limited resources to defend itself against any litigation which may arise. The DEIS must evaluate the projected local revenues and expenses associated with alternative routes, considering both direct and indirect effects. Other possible impacts include: (1) fiscal impacts to local emergency response agencies, including costs of training and maintaining personnel; and (2) the fiscal effects of potential litigation related to Mineral County's emergency first response, or lack thereof, to an accident involving transportation of SNF [spent nuclear fuel] and HLW [high-level radioactive waste] along the proposed alternate routes.

Response
DOE does not expect direct impacts of repository operations to Mineral County because none of the candidate transportation corridors are in the County. The closest candidate branch rail line would be in the Carlin Corridor, approximately 32 kilometers (20 miles) to the east in Nye County.

DOE estimated the incremental impacts at the county level for Clark, Lincoln, and Nye Counties, and for the remaining 14 Nevada counties together. The Department used the REMI EDFS-53 Forecasting and Simulation Model. The model segments age, ethnicity, and gender based on 600 cohorts to predict population. In addition, it calculates births, deaths, and aging. Employment and fiscal changes to the economy are derived from interindustry relationships, labor markets, and national and worldwide economic variables. Based on the results of the model outputs, DOE does not believe incremental increases in socioeconomic parameters represent large or widespread economic impacts.

As required by Section 180(c) of the NWPA would provide technical assistance and funds to states for training public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. This training would cover procedures required for safe routine transportation of these materials and for dealing with emergency response situations. In addition, Sections 116(A) and 117(c)(5) of the NWPA establish assistance guidelines covering a number of issues including emergency response, health baseline studies, and monitoring.

8.11.6 (5524)
Comment - EIS001660 / 0036
The DEIS does not adequately address the impacts of the proposed action on public services in Mineral County and other counties. Mineral County provides public services such as education, libraries, public health administration, police, fire protection, etc. The DEIS must analyze the direct and indirect impacts of the proposed action on education and other essential public services. Specifically, the DEIS must address the demand on public services and associated costs. The discussion of impacts on public services of the Nevada transportation alternatives, both rail and road, is particularly inadequate regarding emergency response services. The type, capability, and availability of such services, and local government attitudes toward response to radiological incidents vary widely in

the affected counties. Additional risks, costs, training, and management issues regarding emergency response must be included in the DEIS.

Response
DOE estimated the potential incremental changes to a projected baseline for a number of socioeconomic and transportation parameters. The estimates were based on a range of reasonable assumptions and input variables such as where transportation workers would live and the number of waste shipments required. In the Final EIS, the projected baseline is shown through 2035. DOE expects that most of the potential impacts would occur in Nye, Clark, and Lincoln Counties. In most cases, DOE does not believe the incremental changes in population and employment would appreciably influence the level of community services. However, DOE would monitor its activities and consider reasonable mitigation actions should it be required.

Section 116(c) of the NWPA provides a non-National Environmental Policy Act process by which DOE can provide compensation to the State of Nevada and affected units of local government from impacts of developing the proposal. Section 180(c) of the NWPA establishes a process by which DOE can provide technical and funds for training to states, local governments, and tribes for training in safe transport methods and emergency response.

8.11.6 (5616)
Comment - EIS001887 / 0242
Page 4-44; Section 4.1.6.2.5 - Impacts to Public Services

The analysis of impacts to public services in the Draft EIS is inadequate and incomplete. The Draft EIS fails entirely to examine the effects of the Proposed Action on State-level public services and State agencies. A June 1998 report prepared for the State of Nevada found that costs to State agencies alone for preparing for and responding to repository-related shipments of spent fuel and HLW [high-level radioactive waste] in Nevada would be almost $498 million for the first three years of the project.(33)

The Draft EIS also fails to adequately assess costs and impacts to local governments for preparing for nuclear waste shipments, training response and other emergency preparedness personnel, obtaining necessary equipment, and related activities. Interjurisdictional impacts resulting from the nature of the emergency response systems in Nevada, the existence of and need for inter County mutual support agreements, multi County training requirements, etc. would also occur. Such costs are direct impacts associated with the Proposed Action and should have been clearly identified and assessed in the Draft EIS.

Public service impacts should be calculated on a use/revenue basis for: (1) services provided to the Yucca Mountain project by state, local, and private utilities (subject to market and service regulation, e.g., electric, water, gas, etc.); (2) services provided to employees and their households; (3) services required by the indirect and multiplier effects of the project and project employees; and (4) services by state and local governments that are mandated by federal law or represent official responses by state and local officials and agencies to the activities of the Yucca Mountain project. The public services to be assessed should include:

- All state and local government services that contribute to the Yucca Mountain project. This would include services for health and safety, emergency management and response, transportation, regulation (e.g., permitting, licensing, and oversight), legal and judicial actions, and support for the public infrastructure.

- State and local public services to the direct, indirect, and induced population and households resulting from the Yucca Mountain project, including the proportional and marginal costs for education, police and public safety, criminal justice, libraries, recreation and parks, local transportation, welfare, and publicly mandated services such as economic development. The cost estimates should include expenses for all community services, facilities, equipment, infrastructure, and staff.

The assumption in the Draft EIS that public services impacts related to the Proposed Action would be small in comparison to the overall employment and population of the region of influence does not mean that impacts cannot or will not be significant. Without a complete assessment, the significance of these impacts cannot be known.

Because the State's tax and revenue systems rely on tourism/gaming revenues to pay for growth in other sectors, public services impacts associated with additional repository-related population growth would generate negative fiscal impacts for state and local jurisdictions. Although such negative fiscal impacts would result from any non-gaming industry economic development, there is a distinction between the state's willingness to subsidize desired economic diversification and its willingness to subsidize the fiscal effects of a repository. As such, public services impacts and costs must be identified under the provisions of NEPA [National Environmental Policy Act] and the NWPA.

(33) "The Fiscal Effects of Proposed Transportation of Spent Nuclear Fuel on Nevada State Agencies," by Planning Information Corp. and Alvin Mushkatel, Arizona State University (June, 1998).

Response
DOE did not assess potential fiscal impacts at an agency level. DOE does not believe this would provide meaningful or discriminating information for the decisionmaker. DOE did, however, estimate the potential impacts at the county level for Clark, Nye, and Lincoln Counties. The remaining 14 counties in Nevada were considered aggregately.

DOE estimated the potential impact of each alternative on the same economic parameters for each of the regions. The economic and demographic simulations performed by the Department, using the REMI EDFS-53 Forecasting and Simulation Model, derived fiscal changes to the economy from interindustry relationships (including the Eating and Drinking Places and Construction Sectors of the Standard Industrial Code), labor markets, and national and worldwide economic variables. The simulations included direct and induced impacts based on changes in employment and population. One of the parameters evaluated was change in State and local spending, which captures some of the issues raised in the comment. For example, security support from the State Highway Patrol is factored into the simulations for each rail corridor.

Regarding possible agency support or response to repository activity, DOE will not presume to speculate on what agencies feel that they might need to do to serve their citizenry, nor will DOE presume to comment on the State's preferred fiscal structure. DOE will, however, enter into discussions with potentially affected units of government and consider appropriate support and mitigation measures. As required by Section 180(c) of the NWPA, DOE would provide technical assistance and funds to states for training for public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. Training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. In addition, Sections 116(A) and 117(c)(5) of the NWPA set forth assistance guidelines covering a number of issues including emergency preparedness and response, state liability arising from accidents, and necessary road upgrading.

In addition, Payments-Equal-to-Taxes (PETT) are made pursuant to Section 116(c)(3)(A) of the NWPA, which requires the Secretary of Energy to "... grant to the State of Nevada and any affected unit of government, an amount each fiscal year equal to the amount such State or affected unit of government, respectively, would receive if authorized to tax site characterization activities..." These payments, historically and for the future, are determined by estimating the amount of Yucca Mountain Project property, purchases (inside and outside the State of Nevada), and business activities (employees) within the jurisdiction of an affected unit of local government. Nye County and the State of Nevada have been eligible to receive PETT since commencement of site characterization activities in May 1986. The other affected units of government include Clark, Lincoln, Esmeralda, Eureka, White Pine, Churchill, Lander, and Mineral Counties in Nevada, and Inyo County, California. Potentially, they have been eligible to receive PETT since Congress passed the Nuclear Waste Policy Amendments Act of 1987.

For PETT relating to property taxes in Nye County, DOE and the County entered into a settlement agreement, amended in May 1999, whereby DOE would make specified payments on a fixed disbursement schedule. The current agreement runs through 2003.

8.11.6 (6053)
Comment - EIS001898 / 0014
Additional documentation or analysis should be provided in the FEIS to support the characterization of impacts and the description of environmental parameters in some areas of the FEIS.

Section 6.3.2.2.1 (Environmental Impacts of Transportation Caliente Rail Corridor Implementing Alternative-Socioeconomics) states “[t]he projected length of the corridor-513 kilometers is the most important factor for determining the number of workers (560) that would be required.” This statement is repeated for all corridors, but more specific information is needed to support this conclusion. Terrain and other factors might have significant impact, because productivity per worker (km/worker) varies considerably by route (e.g., 1.04km/worker on the Carlin route, 0.53km/worker on the Jean route).

Response
This comment takes issue with Section 6.3.2.2.1 of the EIS, which indicates “[t]he projected length of the corridor – 513 kilometers (319 miles) – is the most important factor for determining the number of workers [560] that would be required.” Because DOE based the identification of the alternative corridors on a range of factors including land ownership, engineering, and terrain or steepness of grade, the length of the corridor inherently reflects of the weighing and balancing of these other factors. As a consequence, the length of a branch rail line would influence the number of workers required and worker productivity because of the engineering requirements and possible routing constraints in the initial layout of the corridor.

With regard to the socioeconomic analyses in which the cited statement appears, the number of workers is the fundamental parameter for estimating other potential changes to the economy such as Gross Regional Product, disposable income, and State and local spending.

8.11.6 (6303)
Comment - EIS001727 / 0012
The DEIS doesn’t make any effort to assess the socioeconomic impacts of transportation other than the number of people that have to work on the trucks.

Response
The EIS assesses the socioeconomic impacts for each transportation scenario. Sections 6.3.2.2 and 6.3.3 provide socioeconomic impact estimates for each rail corridor and heavy-haul truck route, respectively.

The analysis for each alternative estimated the projected change in a number of socioeconomic parameters including employment, population, State and local spending, disposable income, and Gross Regional Product. It compared the changes associated with Yucca Mountain activities to projected baseline growth trends and economic activity for each potentially affected county (Clark, Lincoln, and Nye) and the Rest of Nevada (the 14 remaining Nevada counties).

8.11.6 (6380)
Comment - EIS001590 / 0005
It does not address properly socioeconomic impacts. For example, what would be the effect in communities along the transportation route of an accident of having the potential for an accident. This is something that my neighbors in the Rum Village Neighborhood Association along the route are very, very concerned about.

Response
DOE analyzed a range of accident scenarios related to proposed transportation activities and the accident risk would be very small. Accident scenarios analyzed in the EIS are based on probabilities with no definitive knowledge of when or where an accident could occur. As a consequence, to attempt to assess the potential impacts of an accident to a local economy would be highly speculative. The EIS does, however, address the potential socioeconomic impacts that could occur, directly or indirectly, as a result of the proposed siting, construction, operation and monitoring, and eventual closure of a geologic repository at Yucca Mountain, including transportation activities. The socioeconomic parameters considered in the EIS include quantitative estimates of changes to populations, employment, and income that could result from repository-related activities.

8.11.6 (6434)
Comment - EIS001828 / 0005
The population element in the DEIS should also include visitors to our county. More than 32 million tourists annually augment the population of the metro Las Vegas area, situated directly along the proposed truck route.

Response
Section 3.1.7.1 of the Draft EIS identified the annual number of visitors to Las Vegas. DOE has updated this number in the EIS and included it in the analysis of transportation accident health effects.

8.11.6 (6675)
Comment - EIS001878 / 0054
Except for a discussion of the direct and indirect impacts from construction on disposable income and the Gross Regional Product, the DEIS fails to address the impacts of the proposed action on the economy of Eureka County. (pp. 6-13, -14, -37, -64) The County's economy depends heavily on mining. Construction, agriculture, government, and services are the next largest sectors.

The statement (p. 3-115) that "[s]ocioeconomic effects from the construction of a rail line would be small and, for the most part, short-term," which the DEIS uses to justify the inclusion of less-detailed information for Esmeralda, Eureka, and Lander Counties, is unsupported by any evidence and does not allow an adequate analysis of the impacts of the rail alternatives.

Specifically, the DEIS must address: (1) the anticipated impacts--positive and negative--upon the mining, construction, government, and service sectors and (2) the anticipated impacts on the agricultural economy. The DEIS must address the anticipated economic impacts of shared use of the Carlin rail corridor by the DOE and by other users, such as mines.

Response
A relatively short section of the Carlin Corridor crosses Eureka County from Beowawe through Crescent Valley. DOE developed a list of assumptions to determine projected economic and demographic changes in Nevada from the construction and operation of the proposed repository. The REMI model that DOE used in these determinations is a four-region model. Three of the regions are Clark County, Nye County, and Lincoln County. The fourth region is the Rest of Nevada, which includes the other 14 counties (including Eureka County).

For railroad construction, DOE assumed that workers would be assigned to base camps according to an even split by the number of camps. Railroad construction workers would commute weekly from Clark County to the trailer camps outside Clark County and would eat in local restaurants 5 days a week, 50 weeks a year. Operations workers would live in the county where the route branched off the main line, with the exception of the Carlin routes, for which they would live in Elko County.

Given these assumptions, the total estimated population increase, as reported in the Draft EIS, for the aggregated 14 counties in Nevada attributed to the Carlin Corridor would be about 115 individuals in the peak year. DOE does not believe this would cause discernible direct or indirect impacts to the public services of any of the counties including Eureka.

In relation to possible benefits of the branch rail line, DOE would consider sharing transportation corridors with others such as mine operators and private freight shippers. This could benefit communities near the transportation routes. Sections 8.2.1 and 8.4.2.1 of the EIS discuss the idea of shared branch rail lines.

8.11.6 (6687)
Comment - EIS001878 / 0058
The DEIS fails to adequately address the impacts of the proposed action on housing in Eureka County. The housing data provided (p. 3-115) is 10 years old. Due to such factors as the high percentage of public land, the variability of the mining economy, and the high cost of raw materials, Eureka County has unique housing problems that could be aggravated by the proposed action, particularly during the construction phase. Construction would require an annual average of 500 workers (p. 6-63) in a county with only 820 housing units as of 1990 (p. 3-115). Thus, housing impacts could be quite severe.

The DEIS must disclose the anticipated impacts of the proposed action on Eureka County's housing stock. The disclosure must include direct impacts (e.g., housing of construction crews) and indirect impacts (e.g., increased demand for housing, short-term and long-term, resulting from the multiplier effect from rail corridor construction).

Response
A relatively short section of the Carlin Corridor crosses Eureka County from Beowawe through Crescent Valley. DOE developed a list of assumptions to determine projected economic and demographic changes in Nevada from the construction and operation of the proposed repository. The REMI computer model that DOE used in these determinations is a four-region model. Three of the regions are Clark County, Nye County, and Lincoln County. The fourth region is the Rest of Nevada, which includes the other 14 counties (including Eureka County).

For railroad construction, DOE assumed that workers would be assigned to base camps according to an even split by the number of camps, and that these base camps would be constructed by a local subcontractor and would include an adequate number of trailers to house the workforce. Railroad construction workers would commute weekly from Clark County to the trailer camps outside Clark County and would eat in local restaurants 5 days a week, 50 weeks a year. Operations workers would live in the county where the route branched off the main line, with the exception of the Carlin routes, for which they would live in Elko County.

Given these assumptions, the total estimated population increase, as reported in the Draft EIS, for the aggregated 14 counties in Nevada attributed to the Carlin Corridor would be about 115 individuals in the peak year. Total employment associated with the Carlin Corridor for the 14 counties, including Eureka, for the peak year would be about 75. DOE believes there would be no discernible direct or indirect impacts to housing for any of the counties including Eureka. The housing information in the EIS is based on the most current information available. The Bureau of the Census updates housing information on a county basis only every 10 years. DOE had modified this information as more timely data became available. Fifty households would represent about 4.8 percent of Eureka County's 2000 housing stock.

8.11.6 (6689)
Comment - EIS001878 / 0059
The DEIS fails to adequately address the impacts of the proposed actions on infrastructure in Eureka County. The County and its residents provide (and depend upon) roads, schools, drainage, water systems, aviation facilities, medical facilities, and public safety facilities that could be affected, directly or indirectly, by the proposed action.

The DEIS must disclose the anticipated impacts of the proposed action on Eureka County's infrastructure. The disclosure must include direct impacts (e.g., damage or displacement of infrastructure during construction) and indirect impacts (e.g., increased demand on infrastructure due to construction employment). Specifically, the DEIS must address the impact of the rail corridor on the Crescent Valley airport, which lies within the corridor.

Response
A relatively short section of the Carlin Corridor crosses Eureka County from Beowawe through Crescent Valley. DOE developed a list of assumptions to determine projected economic and demographic changes in Nevada from the construction and operation of the proposed repository. The REMI computer model that DOE used in these determinations is a four-region model. Three of the regions are Clark County, Nye County, and Lincoln County. The fourth region is the Rest of Nevada, which includes the other 14 counties (including Eureka County).

For railroad construction, DOE assumed that workers would be assigned to base camps according to an even split by the number of camps, and that these base camps would be constructed by a local subcontractor and would include an adequate number of trailers to house the workforce. Railroad construction workers would commute weekly from Clark County to the trailer camps outside Clark County and would eat in local restaurants 5 days a week, 50 weeks a year. Operations workers would live in the county where the route branched off the main line, with the exception of the Carlin routes, for which they would live in Elko County.

Given these assumptions, the total estimated population increase, as reported in the Final EIS, for the aggregated 14 counties in Nevada attributed to the Carlin Corridor would be about 115 individuals in the peak year. Total employment associated with the Carlin Corridor for the 14 counties, including Eureka, for the peak year would be about 75. DOE believes there would be no discernible direct or indirect impacts to housing for any of the counties, including Eureka.

At this time definitive information is not available on specific tracts of land that DOE could require for a particular transportation corridor. In relation to the commenter's concern about damage or displacement of infrastructure, the

Department would fairly compensate landowners under Federal acquisition procedures for land that would be required or otherwise affected. If DOE had to exercise its right of eminent domain, it would do consistent with applicable laws and regulations.

As indicated in Section 9.3.1 of the EIS, DOE would develop mitigation measures where construction and operation of transportation facilities would result in (1) impacts to publicly used lands, (2) direct and indirect land loss, and (3) displacement of capital improvements.

8.11.6 (6692)
Comment - EIS001878 / 0061
The DEIS fails to address the fiscal impacts of the proposed action on Eureka County and other local governments. (p. 6-37) With a very limited property tax base and sales tax base, and with a volatile mining economy, Eureka County and its residents must provide services and infrastructure related to fire suppression, emergency response, water and sewer, law enforcement, education, and others. The County must also defend itself in any litigation that may arise.

The DEIS must evaluate the projected local revenues and expenses associated with the Carlin corridor in Eureka County, considering both direct and indirect effects. Among other possible impacts, the DEIS must evaluate: (1) fiscal impacts to local emergency response agencies, including the costs of training and maintaining their personnel, and (2) the fiscal effects of potential litigation related to the County's emergency first response, or lack thereof, to an accident involving transportation of SNF [spent nuclear fuel] and HLW [high-level radioactive waste] along the Carlin corridor.

The estimates of local expenditures provided in the DEIS are so general that they are meaningless. They do not provide a viable basis for comparison, nor do they relate estimated expenditures to specific local government budgets. Thus, the information does not permit an examination of actual impacts on local governments and their budgets.

Response
A relatively short section of the Carlin Corridor crosses Eureka County from Beowawe through Crescent Valley. DOE developed a list of assumptions to determine projected economic and demographic changes in Nevada from construction and operation of the proposed repository.

As required by Section 180(c) of the NWPA, DOE would provide technical assistance and funds to states for training public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. Training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. In addition, Sections 116(A) and 117(c)(5) of the NWPA set forth assistance guidelines covering a number of issues including emergency response, health baseline studies, and monitoring.

8.11.6 (6694)
Comment - EIS001878 / 0062
The DEIS fails to evaluate the impacts of the proposed action on mining in Eureka County and neighboring counties. Mining is by far the largest sector of Eureka County's economy. The proposed Carlin corridor traverses an area potentially rich in mineral deposits, which may be needed to support the nation's economic development and national defense. According to testimony before the DOE at the Crescent Valley public hearing on December 9, 1999, the corridor would divide the existing Cortez mine, and cross a haul road that is in regular use.

The DEIS must evaluate the effects of the proposed action on mining, including: (1) possible restrictions on claimants' access to their mining claims, (2) division of mining claims, (3) possible physical and legal barriers to the exploitation of mineral deposits, and (4) potential benefits to mining from improved access to railroad service. The DEIS must also disclose whether restricted use of or access to mining claims and sites would be a taking of private property rights requiring compensation under the Constitution of the United States.

Response
DOE acknowledges that the Carlin Corridor passes near historic and established mining districts. In addition, the Department is aware of the Cortez Gold Mines operation in Crescent Valley. Sections 8.1.2.3 and 8.4.2 of the EIS discuss the Cortez Gold Mines and possible cumulative impacts.

As indicated in Section 9.3.1 of the EIS, DOE would develop mitigation measures where construction and operation of transportation facilities would result in (1) impacts to publicly used lands, (2) direct and indirect land loss, and (3) displacement of capital improvements. Such measures could most practically be developed after a single transportation corridor was selected and in conjunction with alignment of a route within the corridor.

In relation to possible benefits of a branch rail line, DOE would consider sharing transportation corridors with others such as mine operators and private freight shippers. This could benefit communities near the transportation routes. Sections 8.2.1 and 8.4.2.1 of the EIS discuss the idea of shared branch rail lines. In addition, DOE would evaluate the need for preserving access to land that a rail corridor could divide. The Department would try to minimize any restriction to or control over lands used for mining and would develop specific mitigation measures to alleviate impediments to the continued use of lands.

8.11.6 (6701)
Comment - EIS001878 / 0065
The DEIS does not adequately address the impacts of the proposed action on public services in Eureka County and other counties. Eureka County and the Eureka County School District provide public services including education, libraries, public health administration, police, fire protection, and others.

The DEIS must analyze the direct and indirect impacts of the proposed action on education and other essential public services. Specifically, the DEIS must address the demand on public services, and associated costs, that would be created by construction crews of 500 persons (annual average) and their families and support personnel.

Response
A relatively short section of the Carlin Corridor crosses Eureka County from Beowawe through Crescent Valley. DOE developed a list of assumptions to determine the projected economic and demographic changes in Nevada by construction and operation of the proposed repository. The REMI model used in these determinations is a four-region model. Three of the regions are Clark, Nye, and Lincoln Counties. The fourth region is the Rest of Nevada, an aggregation of the other 14 counties in Nevada.

DOE assumed, for railroad construction, each of the following: Workers would nominally be assigned to live in base camps according to an even split by the number of camps. All railroad construction workers would commute weekly from Clark County to the trailer camps outside Clark County and would eat in local restaurants 5 days per week, 50 weeks per year. Operations workers would live in the county where the route branched off the main line, with the exception of the Carlin routes in which case workers would live in Elko County.

Given the above assumptions, the total estimated population increase, as reported in the Draft EIS, for the aggregated 14 counties in Nevada attributed to the Carlin Corridor would be about 115 individuals in the peak year. The Department does not believe there would, therefore, be any discernible direct or indirect impacts to the public services of any of the counties, including Eureka.

8.11.6 (6705)
Comment - EIS001878 / 0067
The DEIS fails to consider the impacts of the proposed action on the quality of life now experienced by Eureka County's residents. The unique values of such communities as Crescent Valley include clean air, access to open space and recreation, active and passive enjoyment of fish and wildlife, quiet surroundings, enjoyment of nature, beautiful views and scenery, participation in the community life of a small town, the safety and security of a close-knit community, employment in agriculture and other outdoor occupations, and many others.

According to the written testimony of Jean Plummer, presented at the public hearing before the DOE on December 9, 1999, at Crescent Valley:

Beowawe and Crescent Valley, Nevada, might be considered townships with small populations, even if all the surrounding areas were included. Our land, though, has much natural beauty, good fishing, hunting, colorful spring flowers, canyons in the mountains, willows and cottonwood trees and streams winding through. Our children have a great school and a small community to grow up in. The Yucca Mountain project will destroy all of this within 25 years if not sooner.

The DEIS must consider the impacts of the proposed action on the quality of life in the communities in Eureka County and neighboring counties that would be affected--directly and indirectly--by the construction and operation of a rail line, access roads, fences, and supporting structures.

Response
The comment implies that actions associated with the proposed repository could negatively affect the quality of life in Eureka County. The EIS analysis in fact shows that expected impacts to Eureka County would be small.

While DOE agrees stigmatization could result in adverse impacts under some scenarios, it is not inevitable or measurable, and such stigmatization would likely be an aftereffect of unpredictable future events. As a consequence, DOE addressed but did not attempt to quantify potential impacts from risk perception or stigma in this Final EIS. See Section 2.5.4 and Appendix N of the EIS for additional information.

8.11.6 (6903)
Comment - EIS001539 / 0006
Current Data: The use of 1990 census data is inappropriate for the calculation of risks to Denver area residents. DOE should update their risk calculations with the most recent census data, as soon as they are available.

The DOE/EIS states that risks were calculated using 1990 census data. The Denver area has one of the fastest growing populations in the United States. As soon as possible, updated census data should be used in the calculation of risk estimates (e.g., population densities along each route, including railroads), and these data should be considered during the planning of waste shipment routes. The routes should be designed to minimize transport through areas of high population density.

Additionally, as the DOE/EIS states that potential risks from accidental release scenarios were calculated based on "state-specific accident rates" (pg. J-8), DEH [Denver Department of Environmental Health] encourages DOE to use the most recent data available, because the Denver area has recently experienced a large increase in automobile traffic.

Response
Based on comments received on the Draft EIS, DOE has revised the EIS to adjust transportation impacts for the Proposed Action to reflect projected changes in population from 1990 to 2035. For Modules 1 and 2, DOE adjusted the estimates for transportation impacts to incorporate projections made by the Bureau of the Census for populations in 2047.

In many instances DOE conducted special studies to collect additional data. For example, transportation accident and fatality rates were updated for the EIS in the report *State-Level Accident Rates of Surface Freight Transportation: A Reexamination* (DIRS 103455-Saricks and Tompkins 1999). These data represent the best available information for estimating transportation accident risks.

As required by the NWPA, DOE would comply with U.S. Department of Transportation regulations and requirements of the Nuclear Regulatory commission regarding routing of highway shipments of spent nuclear fuel and high-level radioactive waste. The Department of Transportation does not regulate routing of rail shipments. However, as required by the NWPA, DOE would use routes for rail shipments that are first approved for use by the Nuclear Regulatory Commission. DOE and its transportation contractors would work with railroad carriers to ensure that routes used were the safest and permitted expeditious transport of shipments of spent nuclear fuel and high-level radioactive waste.

8.11.6 (7205)
Comment - EIS001337 / 0090
Page 3-71 Section 3.1.7. The evaluation of impacts in Section 6 for transportation include impacts to real disposable income, gross regional product and government expenditures. In order to define magnitude of impact data for these parameters need to be included in the Affected Environment section of the DEIS.

Page 3-71 Section 3.1.7. The factors considered under socioeconomics is not adequate to enable a comprehensive assessment of impacts. At a minimum other factors needing to be included are age distribution of residents; other community services including water and waste water, solid waste, and emergency management and emergency medical services. Local government expenditures for these services needs to be considered. The baseline "without repository" projections of population, housing, employment, school enrollment, local government revenues and expenditures, and various community service capacities and demands should be at least through 2033 or better yet closure of the repository. Currently, the DEIS lacks sufficient information to enable a determination of the significance of impacts over projected without repository baseline to be determined.

Page 3-74 3rd paragraph. Text here indicates that Lincoln County had a 13 percent decline in employment between 1990 and 1995. The text should indicate what this was attributed to. This decline is inconsistent with the findings in Section 4, Environmental Consequences that a 1.9 to 5.8 percent increase in employment and population would be "within the range of historic changes in the county". Either the data in Section 3-74 in not accurate or the finding in Section 4 is inappropriate.

Page 3-76 Section 3.1.7.3. To enable a comparison with projected levels of PETT [Payments-Equal-to-Taxes] and to enable the reader to understand how past and future PETT levels were determined, the text here needs to explain how past PETT payment levels were derived, by County. The text should also identify any inconsistencies between derivation of PETT payments from one jurisdiction to another. Without such information any projection of PETT in Section is unsupported. (Section 4 does not provide any estimates of PETT payments and this is a deficiency in the DEIS.)

Page 3-77 Table 3-26. Because the text on Page 3-73 indicates that the population of Lincoln County will increase 2 to 4 percent per year during the next decade, an explanation is needed as to why school enrollments in Lincoln County are projected to decline between 1997 and 2001. These two trends appear inconsistent, unless there are extenuating factors (i.e. aging of the population, reduced birth rates, etc.). Because Section 3 includes school enrollment, Section 4 should include a projection of school age children resulting from population growth. In addition, Section 4 should consider the need for additional school facilities to accommodate enrollment growth.

Page 3-78 Table 3-27. The year 2000 population forecasts for Lincoln County are not consistent with those of the Nevada State Demographer (4,410).

Page 3-78 Health Care. The description of hospitals should indicate whether these facilities are currently capable of handling patients contaminated by radiation. In the case of the Grover C. Dils Medical Center in Caliente, that facility is currently not capable of effectively handling a patient contaminated with radiation.

Page 3-78 Law Enforcement. The description of law enforcement should indicate whether each police or sheriff department is currently trained and equipped to respond to emergencies involving radiation hazards. The Lincoln County Sheriff Department is not currently trained or equipped to respond to such a hazard.

Page 3-78 The description of fire protection and emergency management should indicate whether each department and/or jurisdiction is currently trained and equipped to respond to emergencies involving radiation hazards. None of the volunteer fire departments or emergency medical service providers in Lincoln are currently trained or equipped to respond to such a hazard.

Page 3-98 Section 3.2.1.1. The last sentence of this section indicates that population densities were derived to estimate health risks. The methodology used to estimate potentially impacted population as described on Page J-40 has resulted in an underestimation of population in rural areas such as Lincoln County. This results from the fact that population densities used were derived from Census Block data. In Lincoln County Census areas are very large relative to total population within the area. Most persons residing in the Census areas reside near to transportation infrastructure. As a result, it is necessary to adjust population densities prior to multiplying each by the 1.6 kilometer region of influence. Research completed by the University of Nevada, Las Vegas, Transportation Research Center has documented the need to make such an adjustment in population density.[19] [These comments also apply to Page 3-114, Section 3.2.2.1.6]

[19] Sathisan, Shasi et. al., Risk Analysis for Spent Nuclear Fuel Transportation Through Lincoln County Volume I: Rail Shipments, Volume IIA: Highway Shipments, Volume IIB: Technical Appendix, Transportation Research Center, Howard Hughes College of Engineering, University of Nevada, Las Vegas, February 1995.

Response

DOE appreciates the breadth of this comment. The Final EIS reflects some of the issues and the following response categories or groups the issues by topic to better capture some of the commenter's diverse but related concerns. DOE has expanded its socioeconomic discussions in Section 3.1.7 of the EIS to provide a clarified basis for understanding the potential impacts described in Chapter 4. This discussion includes a projection of baseline parameters through 2035 based on the most recently available information and assumptions. Information on Gross Regional Product, government spending, and real disposable income has been included. DOE incorporated State Demographer population information for Lincoln County in the Final EIS. DOE has revisited population estimates by age to determine potential impacts on specific services, particularly schools. In the Final EIS, DOE provides a quantified estimate, to the extent possible, of school changes in enrollment and the status of law enforcement and public service personnel requirements.

- Employment Decline

  Regarding Lincoln County employment, the decline between 1990 and 1995 is primarily attributed to the services sector possibly related to the Nevada Test Site employment reductions during that time period. The reference to a 1.9- to 5.8-percent increase in employment and population pertains to long-term trends going back to the 1980s and encompasses the identified employment declines of the 1990s. DOE has clarified the text in the EIS to make this distinction.

- Payments-Equal-To-Taxes

  Payments-Equal-To-Taxes (PETT) are made pursuant to Section 116(c)(3)(A) of the NWPA, which requires the Secretary of Energy to "…grant to the State of Nevada and any affected unit of government, an amount each fiscal year equal to the amount such State or affected unit of government, respectively, would receive if authorized to tax site characterization activities…." Nye County and the State of Nevada have been eligible to receive PETT since commencement of site characterization activities in May 1986. The other affected units of local government include Clark, Lincoln, Esmeralda, Eureka, White Pine, Churchill, Lander, and Mineral Counties in Nevada, and Inyo County, California. Potentially, they have been eligible to receive PETT since the enactment of the amendments to the Nuclear Waste Policy Act in 1987.

  DOE acquires data from the Yucca Mountain Site project organizations that purchase or acquire property for use in Nevada, have employees in Nevada, or use property in Nevada. These organizations include Federal agencies, national laboratories, and private firms. Not all of these organizations have Federal exemption status so they pay the appropriate taxes. The purchases (sales and use tax), employees (business tax), and property (property or possessory use taxes) of the Yucca Mountain Project organizations that exercise a Federal exemption are subject to the Payment-Equal-To-Taxes Program (DIRS 103412-NLCB 1996).

  The age group 6 to 18 estimate (school age) drops about 25 percent between 2002 to 2011 and rises again, reaching its 2002 level in about 2020. DOE believes the direct and indirect impacts of transportation activities would result in helping restore the school-age population back to its previous levels.

- Emergency Response

  Regarding possible agency support or emergency response to repository activities, DOE does not presume to speculate on what agencies feel that they might need to do to serve their citizenry. If the proposed repository was approved for development, DOE would, however, enter into discussions with potentially affected units of local government and consider appropriate support and mitigation measures. As required by Section 180(c) of the NWPA, DOE would provide technical assistance and funds to states for training for public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. Training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. In addition, Sections 116(c) and 117(c)(5) of the NWPA set forth assistance guidelines covering a number of issues including emergency response, health baseline studies, and monitoring.

- Populations and Health Risk

  The EIS used U.S. Census data to estimate the number of people in the general population who would live near the highway and rail routes that were selected for analysis. However, it was not possible or practical to identify each special population that would be in each of the thousands of Census blocks crossed by the routes and analyzed. However, the use of Census data for population along real routes selected for the analysis ensured that estimated impacts would be calculated for the health and safety of real people—not generic populations along generic routes. Because populations resident in care facilities for the elderly are included in Census data, the analysis included the impacts to these populations. Furthermore, impacts to temporary occupants of schools and hospitals that would be near routes and whose temporary occupancy is not included in Census data were included in the analysis, because the analysis assumed that adults, children, and hospital patients would be present in their homes when every shipment passed. Thus, while it is certain that the approach of using Census data to estimate the number of people who would be exposed to passing shipments leaves some uncounted, it is also certain that the analysis counted some who would not be affected. For the purpose of estimating health and safety risks to populations along routes, the approach provides reasonable estimates and does not exclude special populations.

8.11.6 (7242)
Comment - EIS001337 / 0116
Page 6-96 Socioeconomic Section discusses the impacts of heavy-haul of the large rail casks - This section fails to address potential impacts to the quality of life of residents living along highways in the rural communities resulting from 4-5 of these large trucks, along with their remaining convoy, traveling communities every day for 24 years. This area needs to be addressed by DOE. One method to mitigate this impact would be to construct heavy haul by-passes around these communities working with each community as to where by-pass should be located.

Response
If the repository was approved, subsequent environmental studies would assess route alignment in more detail to support decisions and identify possible mitigation measures.

8.11.6 (7633)
Comment - EIS001912 / 0085
Why not include other countries in the socioeconomic section? What makes Clark and Lincoln different except for the possibility of employment opportunities. How are the impacts from transportation different? The northern Nevada rail route crosses through several large urban areas. About 80 percent of Elko County's population lives within the Humboldt River corridor and adjacent to the existing rail line.

Response
All counties in Nevada were considered in the socioeconomic analysis. However, DOE defined the region of influence based on the distribution of the residences of current employees of the Department and its contractors who work on the Yucca Mountain Project or at the Nevada Test Site. The region of influence, therefore, consists of the counties where about 90 percent of the DOE workforce live (Clark, Nye, and Lincoln Counties). The Department used the residential distribution, which reflects existing commuting patterns, to estimate the future distribution of workers. The Draft EIS presented information for counties within the designated region of influence and then the Rest of Nevada. The Rest of Nevada is an aggregate of the 14 remaining Nevada counties. The socioeconomic simulation model DOE used to estimate potential impacts indicated that the Rest of Nevada (including Elko County) would experience some economic effects from spending by workers for food and lodging.

8.11.6 (8144)
Comment - EIS001653 / 0087
Pg. 6-37 needs to discuss socioeconomic impacts related to land values, recreation use, and the cost to implement and manage emergency response training at the local level.

Response
DOE did not address potential changes in property values because of the dynamic nature of real estate and the uncontrollable factors that can influence property values. Assessing perceived impacts to property values or the impacts of "stigma" is generally problematic because it does not necessarily depend on the actual physical effects or risks of the proposed action, but on the negative perception of those effects or risks by the public. While DOE agrees stigmatization could result in adverse impacts under some scenarios, it is not inevitable or measurable and such stigmatization would likely be an aftereffect of unpredictable future events. As a consequence, DOE addressed but did not attempt to quantify potential impacts from risk perceptions or stigma in this Final EIS. Dollars spent on recreation activities in Nevada are inherent in the economic forecasts and are part of the estimated incremental change in economic parameters.

Costs associated with the implementation and management of emergency response training are not part of the socioeconomic impacts identified for Yucca Mountain activities. However, Sections M.6 and M.7 of the EIS describe the implementation of Section 180(c) of the NWPA. Under these requirements, DOE would provide technical assistance and funds to states for training public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. Training would cover procedures for safe routine transportation of these materials and for dealing with emergency response situations. DOE would institute this training before beginning shipments to the repository.

8.11.6 (8300)
Comment - EIS001873 / 0040
P. 3-72. The map of the socioeconomic region does not show Pioche, the county seat of Lincoln County. Alamo, Hiko, Panaca, and Rachel should also be shown since they are on potential haul routes.

Response
DOE has added Pioche to Figure 3-23 of the EIS. Figure 6-13 and related figures depicting transportation corridors in Lincoln County show Alamo, Hiko, Panaca, and Rachel. DOE has also added Pioche to those figures.

8.11.6 (8384)
Comment - EIS001873 / 0067
P. 6-97. DOE assumes socioeconomic impacts would occur mainly in Clark County. It seems likely that the construction could cause a short boom and bust cycle in a town like Caliente.

Response
DOE estimated that Lincoln County employment associated with repository construction and operations would be very small (see Section 4.1.6.2.1 of the EIS). The greater potential increase in Yucca Mountain-related jobs and population growth would be associated with transportation activities. The estimated peak total operational employment for Lincoln County would be about 167 if DOE selected the Caliente/Chalk Mountain heavy-haul truck route.

The construction-related workforce for Lincoln County would be very small comparatively. DOE assumed operations employees would live in Lincoln County and construction employees would live in Clark County and commute to the job site. Estimated total incremental population increases over a 25-year period would be about 166 people per year, on average, from the Caliente/Chalk Mountain route. The peak year for population increases associated with heavy-haul truck operations would be about 241 individuals, approximately 2.4 percent of the estimated County population.

DOE does not believe a boom-or-bust situation would occur because increases would be marginal and would be sustained over a long period and because of the County's proximity to a large metropolitan area. In general, if population growth associated with a proposed action was less than 5 percent of the study area's total population, potential impacts would be small.

8.11.6 (9986)
Comment - EIS001888 / 0492
[Clark County summary of comments it has received from the public.]

One commenter believed that the EIS, in reaching a decision for selection of transportation routes, should consider the potential socioeconomic impacts.

Response
The potential socioeconomic impacts associated with the transportation of spent nuclear fuel and high-level radioactive waste comprise one of the factors decisionmakers would weigh and balance in determining a preferred transportation mode and route.

Sections 6.3.2.2 and 6.3.3 of the EIS provide socioeconomic impact estimates for each rail corridor and heavy-haul truck route, respectively. The analysis for each alternative estimated the projected changes in a number of socioeconomic parameters including employment, population, State and local spending, disposable income, and Gross Regional Product. It compared the changes associated with Yucca Mountain activities to projected baseline growth trends and economic activity for each potentially affected county (Clark, Lincoln, and Nye) and the Rest of Nevada (the 14 remaining Nevada counties).

8.11.6 (10037)
Comment - EIS001888 / 0524
[Clark County summary of comments it has received from the public.]

Traffic volumes and shipments of hazardous wastes have increased dramatically since 1980. If trucks are used 44 accidents are likely from transport of HLW [high-level radioactive waste] to the repository. Even if minor, this could hurt economically.

Response
DOE analyzed a range of accident scenarios related to proposed transportation activities. It based these scenarios on probabilities with no definitive knowledge of when or where an accident could occur. As a consequence, attempting to assess the potential impacts of an accident on a local economy would be highly speculative.

8.11.6 (10038)
Comment - EIS001888 / 0525
[Clark County summary of comments it has received from the public.]

A serious accident with HLW [high-level radioactive waste] combined with limited alternate routes and limited ER [emergency response] capability could shut down commerce and damage economy.

Response
DOE analyzed a range of accident scenarios related to proposed transportation activities. Accident scenarios are based on probabilities with no definitive knowledge of when or where an accident could occur. As a consequence, to attempt to assess the potential impacts of an accident to a local economy would be highly speculative. The EIS does, however, address the socioeconomic impacts that could occur, directly or indirectly, as a result of the proposed siting, construction, operation and monitoring, and eventual closure of a geologic repository at Yucca Mountain, including transportation activities. The socioeconomic parameters considered in the EIS include quantitative estimates of changes to populations, employment, and income that could result from repository-related activities.

With regard to emergency response, DOE would enter into discussions with potentially affected units of local government and consider appropriate support and mitigation measures. As required by Section 180(c) of the NWPA, DOE would provide technical assistance funds to states for training for public safety officials of appropriate units of government and Native American tribes through whose jurisdictions it would transport spent-nuclear fuel and high-level radioactive waste. Training would cover procedures required for safe, routine transportation of these materials, as well as procedures for dealing with emergency response situations. A discussion of Section 180(c) can be found in Appendix M of the EIS. In addition, Section 116(c)(2)(A) of the NWPA sets forth assistance guidelines covering a number of issues including emergency preparedness and response and Section 117(c) sets forth requirements for written assistance agreements. In the event of an incident or accident involving radioactive materials, states, tribes, and local governments can request assistance from the Federal Government under the Federal Radiological Emergency Response Plan. Assistance is available from 17 different agencies. In addition, DOE maintains eight Regional Coordinating Offices, which are ready at all times to provide assistance. Information concerning these resources can be found in Appendix M. Regional Servicing Contractors that DOE could use would be required to provide drivers and crews with specific written procedures that clearly define detailed actions to be taken in the event of an emergency or incident. The Draft Request for Proposals, *Acquisition of Waste Acceptance and Transportation Services for the Office of Civilian Radioactive Waste Management* (DIRS 153847-DOE 1998), focuses on these responsibilities, as well as on other related responsibilities. Carrier and shipper responsibilities regarding emergency situations are discussed in Appendix M.

8.11.6 (10194)
Comment - EIS001888 / 0565
[Clark County summary of comments it has received from the public.]

Commenters stated that the EIS should evaluate the economic impacts of transportation accidents.

Response
Accident scenarios are based upon probabilities with no definitive knowledge of when or where an accident could occur. As a consequence, any attempt to assess the potential impacts of an accident to a local economy would be highly speculative.

8.11.6 (10935)
Comment - EIS000463 / 0010
Nevada also believes that there would be significant adverse economic impacts (from a transportation accident), which, unfortunately, DOE chooses not to address in the draft DEIS.

Response
Risks to health and safety would be small because the risks of releases of radioactive materials in accidents would be small. Because the risks of releasing radioactive materials in transportation accidents would be small, the risk of detrimental economic consequences would also be small, although such risks would be different for each location and community along the routes used. The Federal Government would compensate for economic consequences of releases of radioactive materials in transportation accidents under provisions of the Price-Anderson Act (see Section M.8 of the EIS.) In response to public comments, Section J.1.4.2.5 contains a review of analyses of potential environmental and economic impacts from releases of radioactive materials.

8.11.6 (12069)
Comment - EIS000226 / 0023
Page 32 of the County/City EIS Scoping Report presented evidence that a transportation accident characterized by extensive media reporting might result in stigmatization of tourist destinations in Lincoln County (including five state parks). A loss of tourism during peak season could pose significant economic and fiscal consequences in Lincoln County. Mitigation of such a potential impact might include a contingent tourism marketing plan which is ready to implement the instant an accident occurs.

Response
Assessing the perceived impact of stigma is generally problematic because it does not necessarily depend on actual physical effects or risks of the proposed action, but on the negative perception of those effects or risks by the public. While DOE agrees stigmatization could result in adverse impacts under some scenarios, it is not inevitable or measurable and stigmatization would likely be an aftereffect of unpredictable future events, such as a serious accident. As a consequence, DOE addressed but did not attempt to quantify potential impacts from risk perceptions or stigma in the Final EIS. Section 2.5.4 and Appendix N of the EIS discuss this issue.

8.11.7 HUMAN HEALTH AND SAFETY

8.11.7 (801)
Comment - EIS000164 / 0004
Human error and systems errors happen. If one transports thousands of shipments over cumulative millions of miles, risks that are only one-in-a-million become virtually guaranteed. We must make our government keep waste transportation and power companies from making profits at our considerable peril. The classic textbook Public Health and Preventive Medicine states that "radiation protection has developed from using basic principles of protection against external irradiation in occupational settings: shielding, distance, time, and training." We must take those basic principles, especially that of shielding, distance, and time to heart.

Response
The commenter points out four principles—shielding, distance, time, and training—that are at the heart of radiation protection. DOE agrees with these principles and has incorporated them into the planning and design of all operations associated with the transportation of radioactive materials to the proposed repository.

The EIS addresses the radiological impacts of incident-free transportation and transportation accidents in Chapter 6 and Appendix J. The analyses take into consideration the distance and number of shipments to estimate the number of accidents that would be expected for each of the transportation alternatives. The spent nuclear fuel and high-level radioactive waste transportation casks are sufficiently robust that in more than 99.99 percent of accidents, no release of radioactive materials from the casks would be expected. Additional information on cask safety and testing is provided in Section M.4.

8.11.7 (927)
Comment - EIS000122 / 0002
What are the level of dosages allowed by the DOE on each of the radioactive elements that are known to cause cancer in the one hundred million people that these canisters will pass by in transport?

Response
The requirements listed in the U.S. Department of Transportation Hazardous Materials Packaging and Transportation Regulations (49 CFR Subchapter C – Hazardous Materials Regulations, Parts 171 through 180) specify a maximum allowable dose rate of 10 millirem per hour at 2 meters (6.6 feet) from the surface of the cask. This is total radiation from the cask and its contents, not the radiation for each individual radionuclide. The analysis in Chapter 6 of the EIS assumed the maximum allowable dose rate for all routine, incident-free transportation exposures. Estimated doses to individual members of the public would be far below those known to have reasonable probability of causing cancer. Considering national legal-weight truck transportation of spent nuclear fuel and high-level radioactive waste for 24 years, Section 6.2.3.1 of the EIS states that in a population of about 10 million people living along the roads, one would expect about 12.6 latent cancer fatalities. An individual resident would receive a dose of about 6 millirem. Background radiation for those 24 years would be about 7,200 millirem (about 300 millirem per year).

8.11.7 (2226)
Comment - EIS000622 / 0010
My questions earlier about exposure, accumulative exposure. If this panel cannot address them, then I think that's extremely important. If we have rules and regulations for transporting materials that specify they need to be moved in 48 hours, then why isn't this addressed in this book more adequately so that our questions can be answered?

We're talking about materials that are extremely deadly, and all of us are very concerned and want factual information. We want to know about cumulative effects. People who live along rail lines and have herds and growth materials, farms, who raise alfalfa and family foods, people who go out and harvest natural medicines and so forth need this kind of information.

Response
Section 8.4 of the EIS presents the past, present, and reasonably foreseeable future actions that would be additive to actions related to the transportation of spent nuclear fuel and high-level radioactive waste to a proposed repository. These actions include activities of the Nevada Test Site, Nellis Air Force Base, management of low-level radioactive

waste, Native American activities, other DOE waste management, and regional mining activities and enterprises, among others. For each action, the Department has presented the radiological impacts and vehicular accident impacts. There would be no cumulative effect of radiation on crops and farm animals grown in the vicinity of the transport routes since no radioactive material would be released from the cask during incident free transportation.

8.11.7 (3967)

Comment - EIS002239 / 0003

The EIS understates the potential health consequences of a very severe rail accident. We ran these same models, using different but credible inputs. They say 31 latent cancer fatalities, and we say the same accident could generate up to 1,380 latent cancer fatalities. A range of outputs results from a range of inputs; that's a bounding scenario that DOE uses, or they would like to in the document.

But in other areas they give you this sense of specificity; and they can tell you exactly what the impact would be. You have to define it broadly, and it could be significantly larger.

Response

The shipping casks used to transport spent nuclear fuel and high-level radioactive waste would be massive and tough with design features that comply with strict regulatory requirements that ensure the casks perform their safety functions even when damaged. Numerous tests and extensive analyses have demonstrated that casks would provide containment and shielding even under the most severe kinds of accidents. In addition, since the publication of the Draft EIS, the Nuclear Regulatory Commission published *Reexamination of Spent Fuel Shipment Risk Estimates* (DIRS 152476-Sprung et al. 2000). Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials. The consequences of rail accidents ranged from 0.7 to 130 latent cancer fatalities; even the most severe accident, which had a probability of 8×10^{-19} per year, did not yield 1,380 latent cancer fatalities.

8.11.7 (4486)

Comment - EIS001409 / 0003

"5.6 cancer deaths" is unacceptable; even saying the number sounds nutty.

Response

The EIS addresses the radiological impacts of incident-free transportation and transportation accidents in Chapter 6 and Appendix J of the EIS. The analyses take into consideration the distance and number of shipments to estimate the number of accidents that would be expected for each of the transportation alternatives.

The spent nuclear fuel and high-level radioactive waste transportation casks are sufficiently robust that in more than 99.99 percent of accidents, no release of radioactive materials from the casks would be expected. Additional information on cask safety and testing is provided in Section M.4 of the EIS.

Safety is DOE's primary concern when shipping all types of radioactive material, including spent nuclear fuel and high-level radioactive waste. U.S. Department of Transportation and Nuclear Regulatory Commission regulations strictly regulate all aspects of radioactive material transportation, including packaging, transporting, and handling radioactive materials for all modes of transportation, and include standards for labeling, shipping papers, placarding, loading and unloading, allowable radiation levels, and limits for contamination of packages and vehicles, among other requirements. In addition, the regulations specify training for personnel who perform handling and transport of hazardous materials, liability insurance requirements for carriers, and safety requirements for vehicles and transport operations. More details on transportation regulations can be found in Section M.2 of the EIS.

The estimated number of latent cancer fatalities associated with incident-free transportation has been revised. As discussed in Section 6.1.1 of the EIS, the estimated number of latent cancer fatalities among the several million people along the transportation routes would be 2.5 for mostly legal-weight truck transportation over 24 years and 1 for mostly rail. Also as discussed in Section 6.1.1, the estimated number of latent cancer fatalities for workers would be 5.6 for mostly legal-weight truck transportation over 24 years and 1.8 for mostly rail. At this time, it is not possible to know if a specific cancer would be caused by radiation; however, for perspective, there would be about 220,000 cancer fatalities in a population of 1 million along the transport routes from other causes besides the transport of spent nuclear fuel and high-level radioactive waste over the same period.

8.11.7 (6908)
Comment - EIS001539 / 0009
Acceptable Risks: Cancer risks of 1 x 10^{-3} are unacceptable to Denver residents and workers.

While DEH [Denver Department of Environmental Health] understands that the maximally exposed service station worker scenario is unlikely (service station worker exposed to 430 truck shipments per year for 24 years), DEH takes exception to a characterization of "very low" risk for the calculated probability of 1.2 x 10^{-3}, for a latent fatal cancer. Individual cancer risk estimates in the range of 1 x 10^{-3} are unacceptable for Denver residents and workers, and are recognized as unacceptable in environmental regulation.

Response
As indicated in Section J.1.3.2 of the EIS, the maximally exposed individual scenario cited by the commenter is meant to be a conservative estimate of potential exposures, not an expected exposure. A more realistic estimate of the radiation dose to people along transportation routes is about 0.2 millirem per year. This is equivalent to a latent cancer fatality risk of about 1×10^{-7}. For perspective, risks in the range of 1×10^{-4} to 1×10^{-6} are generally regarded as acceptable in environmental regulations.

8.11.7 (7620)
Comment - EIS001912 / 0079
Pg. 6-23. Needs to describe the numbers in Table 6-5 and discuss their implications.

Response
The implications of the results of the transportation analyses are discussed in Section 6.2.3.1 and Section S.4.2 in the EIS. Additional information on the basis for these calculations is provided in Appendix J.

8.11.7 (7950)
Comment - EIS001903 / 0013
Paragraph 1 on page J-45 states the baseline likelihood of fatal cancer is 23 percent. Paragraph 3 on page J-45 and paragraph 2 on page J-47 (citing the same reference) states the baseline likelihood of fatal cancer is 22 percent. This inconsistency should be corrected. Also, paragraph 3 on page J-45 incorrectly indicates that 8 percent plus 22 percent is 32 percent.

Response
Appendix J of the EIS has been revised to make these estimates consistent.

8.11.7 (8123)
Comment - EIS001653 / 0077
Pg. 6-23 Needs to describe the numbers in Table 6-5 [population doses and impacts from legal weight truck] and discuss their implications.

Response
The implications of the results of the transportation analyses are discussed in Section 6.2.3.1 and Section S.4.2 in the EIS Summary. Additional information on the basis for these calculations is provided in Appendix J.

8.11.7 (9625)
Comment - EIS001888 / 0295
A careful review of the DEIS leaves the reader unclear as to what the report is about and why the report recommends the Proposed Action. If the decision to ship waste to Yucca Mountain is made, that decision cannot be

supported on the basis of the human health risks presented in the DEIS. Based on the DEIS, the risk to human health when transporting the waste far exceeds the risk of leaving the waste in place.

This aspect of the report highlights the uncertain role risk assessment plays in the decision making process. In a 1995 report, a DOE contractor described a process for choosing a route through Nevada to Yucca Mountain. Nowhere in that report did the contractor mention human health risk as a criterion. Part of the uncertainty about the role of probabilistic risk assessment in the decision-making process is due to the inconsistent way in which PRA is performed. The differences between the DEIS produced by the DOE and the Generic EIS (GEIS) produced by the Nuclear Regulatory Commission for the relicensing of nuclear power plants are inconsistent. The differences in methodologies used to prepare transportation risk analysis are substantial and effect the results of the analysis.

Response
As discussed in the EIS Summary, the impacts from the Proposed Action would range from 22 to 50 fatalities. For the No-Action alternative, the impacts would range from 33 fatalities for Scenario 1 to 3,300 fatalities for Scenario 2. The impacts of the Proposed Action would be about the same as the impacts of Scenario 1 and less than the impacts of Scenario 2. Therefore, the risk to human health when transporting the waste would not far exceed the risk of leaving the waste in place.

Human health risk does play a role in transportation routing. For example, in the U.S. Department of Transportation guidelines for selecting preferred highway routes for spent nuclear fuel shipments, two of the primary criteria are normal radiation exposure and public health risks from accidents. These criteria are directly related to human health risks.

The Nuclear Regulatory Commission *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (DIRS 101899-NRC 1996) estimated about 3 fatalities for transport of spent nuclear fuel in Nevada. The EIS analysis estimated that as many as 1.5 fatalities could occur in Nevada, which is about half the number of fatalities for transport of spent nuclear fuel estimated by the Nuclear Regulatory Commission. The difference between the two analysis results is not substantial.

8.11.7 (9871)
Comment - EIS002150 / 0001
I heard in the evening news that the Department of Energy has the public safety for most in mind when considering trucking nuclear waste. However, I read in the Draft EIS that [the] Department of Energy estimates that 29 people will die from cancer as a result of using legal weight trucks. Eleven workers will die and 178 of the general public.

In signing 29 Americans to death through the horrors and pain of cancer does not indicate to me the Department of Energy really is concerned about public safety. Who decides which 29 will die as the Department of Energy estimated how many Americans will suffer the ravages of cancer and not die?

Response
Safety is DOE's primary concern when shipping all types of radioactive material, including spent nuclear fuel and high-level radioactive waste. U.S. Department of Transportation and Nuclear Regulatory Commission regulations strictly regulate all aspects of radioactive material transportation, including packaging, transporting, and handling radioactive materials for all modes of transportation, and include standards for labeling, shipping papers, placarding, loading and unloading, allowable radiation levels, and limits for contamination of packages and vehicles, among other requirements. In addition, the regulations specify training for personnel who perform handling and transport of hazardous materials, liability insurance requirements for carriers, and safety requirements for vehicles and transport operations. More details on transportation regulations can be found in Section M.2 of the EIS.

The estimated number of latent cancer fatalities associated with incident-free transportation has been revised. As discussed in Section 6.1.1 of the EIS, the estimated number of latent cancer fatalities among the several million people along the transportation routes would be 2.5 for mostly legal-weight truck transportation over 24 years and 1 for mostly rail. Also as discussed in Section 6.1.1, the estimated number of latent cancer fatalities for workers would be 5.6 for mostly legal-weight truck transportation over 24 years and 1.8 for mostly rail. At this time, it is not possible to know if a specific cancer is caused by radiation; however, for perspective, there would be about 220,000 cancer fatalities in a population of 1 million along the transport routes from other causes besides the transport of spent nuclear fuel and high-level radioactive waste over the same period.

8.11.7 (11679)
Comment - EIS002293 / 0001
The radiation allowed to reach the surface from the underground Yucca Mountain Nuclear Waste repository is less than a tenth of that which we receive from nature; and data now indicates that such extra low-level radiation, like that in Denver, may be healthy. But, what about the transportation of wastes to Yucca Mountain? Considering the real transportation dangers we face from such common carriers as gasoline trucks, and the 50,000 deaths each year from automobile accidents, why has there been such concern over nuclear waste transportation. Nuclear waste shipments are required to have such strong packaging and containment requirements that even in an accident the probability of significant radiation leakage is negligibly small. For the past 45 years, there have been some 3,000 shipments of nuclear fuel wastes without any effects on the public from nuclear radiation. The normal public radiation exposures from the transportation of wastes are orders of magnitude less than our radiation exposures from nature.

Response
The analyses in the EIS of transporting spent nuclear fuel and high-level radioactive waste indicate that the impacts would be negligible.

8.11.8 NOISE

8.11.8 (10)
Comment - 6 comments summarized
Commenters expressed concern about the proximity of public buildings and residences to proposed heavy-haul truck routes and rail lines in the State of Nevada. Some expressed concern about impacts to the quality of life due to noise during construction and operation of transportation facilities. Others expressed concern about impacts to structures from ground vibration associated with intermodal transfer stations and operation of heavy-haul trucks. Specific concern was expressed regarding the 640-meter (2,100-foot) region of influence established at the 45-decibel (dBA) level as it applies to Goldfield in Esmeralda County. Similar concerns were expressed regarding the assessment of noise associated with a railroad, an intermodal transfer station, and heavy-haul truck traffic in Caliente.

Response
Because of the need to differentiate among implementing alternatives (for example, among corridors), the noise analysis applied to the alternative rail corridors and heavy-haul truck routes was a reconnaissance-level screening analysis, rather than an examination of individual noise receptors or baseline levels of noise and traffic. As discussed in the introduction to Chapter 6 of the EIS, follow-on implementing decisions, such as the selection of a specific rail alignment within a rail corridor, would require additional field surveys, State. Local, and tribal government consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews. Buildings of historic significance, as well as public exposure to noise and vibration for example, would be addressed at that time.

Nevada does not have noise regulations. DOE used 45 dBA for the EIS analyses to establish conservatively a region of influence that would include most receptors. For comparison, residential noise standards in many other states generally use a level of 60 dBA for residential zones and 65 dBA for commercial zones. Residences located near highways along heavy-haul truck routes would be exposed to instantaneous levels of noise exceeding 60 dBA, which could elicit complaints that the noise was annoying. Annoyance levels are below levels that would be unsafe or could cause hearing damage. DOE has modified Section 3.1.9.2 of the EIS to include a discussion of noise levels that are potentially unsafe or that could cause hearing damage compared to levels that merely result in annoyance.

8.11.8 (7217)
Comment - EIS001337 / 0100
Page 3-134 Section 3.2.2.2.7. 3rd paragraph. The Caliente Route is located several miles from the community of Hiko. Reference to Hiko in this paragraph should be deleted.

Response
DOE has deleted the reference to Hiko.

8.11.9 AESTHETICS

8.11.9 (47)
Comment - 3 comments summarized
Commenters stated that the beauty and serenity of Crescent Valley, Nevada, would be destroyed if the valley were to become a rail or truck route for nuclear waste. A commenter indicated that the project would destroy everything in the valley within 25 years because of radioactivity in the air and water.

Response
The Carlin Corridor, part of which passes through Crescent Valley, is but one of five alternative rail corridors DOE considered in Section 6.3 of the EIS. Similarly, the Carlin heavy-haul truck route is only one of five alternative heavy-haul truck routes under consideration (see Section 6.3). See Sections 6.3.2.1 and 6.3.3.1 for discussions of the impacts from noise and to aesthetics in rail and heavy-haul truck corridors, respectively.

Crescent Valley has already been altered by man. There are houses, ranches, roads, and businesses in the valley, most of which are along State Route 306 between the Cortez area and Beowawe. There are historic and present-day mining operations in the vicinity of Cortez, and the effects of these operations are evident in the valley. Tailing piles, access roads, and mining facilities are evident. South of the Cortez area, there are fewer disturbances to the valley, consisting primarily of farming operations.

DOE recognizes that additional, site-specific information would be needed before it constructed either a branch rail line or upgraded roads to support heavy-haul truck shipping. DOE believes, however, that sufficient information on impacts to visual resources is provided in Chapter 6 of the EIS to help make a decision about the transportation mode (rail or truck) and the specific corridor or heavy-haul truck route (see Section 1.1 of the EIS). More detailed field surveys, government consultations, and appropriate National Environmental Policy Act reviews would be conducted if DOE made a decision to select either a specific rail alignment within a corridor or an intermodal transfer station and associated heavy-haul truck route. These additional reviews could include more detailed analyses of impacts to visual resources, as well as the identification of possible mitigation measures to minimize any impacts identified.

Sections 6.2.3 and 6.2.4 of the EIS summarize the radiological impacts of transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain. Appendix J describes these impacts in more detail. The radiation dose from routine transportation would not be likely to harm plant or animal life within the area. Sections 4.1.4 and 5.9 discuss radiation impacts to biological resources.

8.11.9 (5699)
Comment - EIS001887 / 0314
Page 6-14; Section 6.1.2.9 - Aesthetics

This transportation impacts overview section admits that the Caliente intermodal transfer station site “could cause impacts on the Class II lands of Kershaw-Ryan State Park” in terms of aesthetics. However, it goes on to imply that, because the character of the Meadow Valley Wash has already been modified by the existence of a rail line, the City of Caliente’s water treatment facility and agricultural uses, the impact would be slight, if not negligible. No other potential impacts were even acknowledged in the overview. We find this cursory analysis inadequate.

Response
As discussed in Section 6.1.2.9 of the EIS, routes originating in Caliente could adversely affect the Class-II visual designation of lands in and around Kershaw-Ryan State Park, the entrance of which is on the east site of Meadow Valley Wash across from the potential location of an intermodal transfer station. Section 6.3.3.1 of the Draft EIS stated that more stringent management requirements would be necessary to retain the existing visual character of Class-II lands. Nevertheless, DOE has included additional discussion in Sections 6.3.2.2 and 6.3.3.2 of potential impacts to selected views from outside and inside each alternative rail corridor, and the visual impacts associated with the alternative sites for an intermodal transfer station.

8.11.9 (5700)
Comment - EIS001887 / 0315
Page 6-14; Section 6.1.2.9 - Aesthetics

No mention is made of the fact that the Apex/Dry Lake intermodal transfer station sites are in close proximity to the Valley of Fire State Park exit off I-15. Furthermore, no attempt is made to quantify any impacts that may occur as a result of this proximity.

Response
The entrance to Valley of Fire State Park is approximately 19 kilometers (12 miles) east of Interstate-15. The site of the Apex/Dry Lake intermodal transfer station would be another 18 kilometers (11 miles) south on Interstate-15 near its interchange with U.S. 93. Because of the distances between these locations, construction or operation of an intermodal transfer station at Apex/Dry Lake would not have any impacts on Valley of Fire State Park.

8.11.9 (7139)
Comment - EIS001337 / 0036
Lincoln County and the City of Caliente recommended that the DEIS, to facilitate an assessment of impacts upon viewshed, include an analysis of existing visual quality within basins potentially impacted by rail construction and operation. The County and City noted that such information can be used in developing measures for mitigation of impacts to viewshed within Lincoln County. The DEIS does assess existing visual quality along rail corridors in Lincoln County. There is however, no description of measures to mitigate visual impacts of rail corridors within Section 9.3 of the EIS.

Response
Section 9.3.8 of the EIS has been modified to include several possible measures to mitigate visual impacts from a branch rail line. Potential mitigation measures could include (1) removing or contouring spoil piles from construction activities to mimic the existing landscape; (2) minimizing the height of spoil piles if they could not be removed or recontoured; (3) planting native seedlings and other vegetation in specific locations to screen or reduce texture and color contrasts from key observation points; and (4) implementing a water spraying program during construction to minimize emissions of fugitive dust.

8.11.9 (7221)
Comment - EIS001337 / 0096
Page 3-116 Section 3.2.2.1.8. This section needs to describe BLM [Bureau of Land Management] designated wilderness study areas (WSA) proximate to transportation corridors. Section 4, environmental consequence needs to consider visual impacts to and from designated WSA's.

Response
Section 4.1.10 of the EIS describes potential aesthetic impacts of the proposed repository. There are no Wilderness Study Areas near Yucca Mountain. Therefore, construction and operation of a repository at Yucca Mountain would not affect existing Wilderness Study Areas.

The Caliente Corridor passes near Weepah Springs Wilderness Study Area in the Kawich and Reveille Mountains, and the Valley Modified Corridor passes near two Wilderness Study Areas near the Sheep Range Mountains, the Desert National Wildlife Refuge, and the Nellis Air Force Range. The Steiner Creek Alternate of the Carlin Corridor potentially encroaches on the Simpson Park Wilderness Study Area. DOE has modified Section 6.3.2.1 of EIS to include additional discussion of the visual impacts to these Wilderness Study Areas from construction and operation of a branch rail line.

8.11.9 (8141)
Comment - EIS001653 / 0085
Pg. 6-14 There is no discussion of aesthetic or visual impacts along the proposed rail corridors. Simply showing the VRM [Visual Resource Management] classifications for public lands is not acceptable. More importantly it is the views from surrounding mountains and inhabited areas of the proposed rail line, which are impacted. There are numerous high quality well used recreation areas along the proposed route. DOE needs to consider visual impacts from surrounding lands and prepare a full visual resource analysis.

Response
DOE described the potential aesthetic impacts of constructing and operating a branch rail line in Section 6.3.2.1 of the Draft EIS. Because these corridors cross mostly public land administered by the Bureau of Land Management, DOE used the Visual Resource Management classifications developed by the Bureau to assess each corridor's scenic sensitivity. DOE incorporated this approach into the EIS for consistency with the Bureau's approach and to facilitate comparison with previous assessments conducted by the Bureau.

DOE agrees that factors other than the Visual Resource Management classifications are pertinent to assessing visual impacts. Therefore, DOE has included additional discussion in Sections 6.3.2.2 and 6.3.3.2 of the Final EIS of potential impacts to selected views from outside and inside each alternative rail corridor, and the visual impacts associated with the alternative sites for an intermodal transfer station.

8.11.9 (8361)
Comment - EIS001873 / 0045
P. 3-135. The Kershaw Ryan State Park should be mentioned here as a resource. On the following page BLM [Bureau of Land Management] Visual Resource classes are displayed as if they included all the aesthetic resources of the area. Important areas not shown as resources, because they are not BLM lands apparently, should include the Pahranagat Lakes and Groom Mountain.

Response
Section 6.1.2.9 of the EIS notes that routes originating in Caliente could adversely affect the Class-II visual designation of lands in and around Kershaw-Ryan State Park, the entrance of which is on the east side of Meadow Valley Wash across from the potential location of an intermodal transfer station.

Pahranagat Lakes, located west of U.S. 93 along a section of road, is a natural area. However, since the lakes are along a highway that is being considered as a heavy-haul truck route (Caliente/Las Vegas Route) and a legal-weight truck route and not as a possible rail route, impacts to the area would not be likely.

Groom Mountain, located in the northeast portion of the Nellis Air Force Range, has already been removed from public use with the exception of several mining claims. The mountain previously was managed by the Nevada Test Site and used by the Air Force. Management of the mountain was transferred to the Air Force by the Test Site during the same time Pahute Mesa management was transferred from the Air Force to the Test Site.

DOE used the Visual Resource Management classifications developed by the Bureau of Land Management to assess each corridor's scenic sensitivity because the rail corridors cross mostly public land administered by the Bureau. The Bureau has prepared many environmental documents that use this visual-assessment classification. DOE incorporated this approach into the EIS for consistency with the Bureau's approach and to facilitate comparison with previous assessments conducted by the Bureau.

DOE agrees that factors other than the Visual Resource Management classifications are pertinent to assessing visual impacts. Therefore, DOE has included additional discussion in Sections 6.3.2.2 and 6.3.3.2 of the EIS of potential impacts to selected views from outside and inside each alternative rail corridor, and the visual impacts associated with the alternative sites for an intermodal transfer station.

8.11.9 (8387)
Comment - EIS001873 / 0068
P. 6-98. Even the BLM [Bureau of Land Management] Visual Resource map shows the Caliente intermodal site as being in a Class II area. Meeting Class III objectives is not satisfactory.

Response
As discussed in Section 6.1.2.9 of the EIS, routes originating in Caliente could adversely affect the Class-II visual designation of lands in and around Kershaw-Ryan State Park, the entrance of which is on the east side of Meadow Valley Wash across from the potential location of an intermodal transfer station. Section 6.3.3.1 of the EIS states that more stringent management requirements would be necessary to retain the existing visual character of Class-II lands.

8.11.9 (8388)
Comment - EIS001873 / 0069
P. 6-98. The impacts to aesthetics and cultural resources would be greater at Caliente than at the other sites.

Response
Only the Caliente intermodal transfer station and immediately adjacent routes would adversely affect the Class-II visual designation. Section 6.1.2.9 of the EIS states that routes originating in Caliente could adversely affect the Class-II visual designation of lands in and around Kershaw-Ryan State Park, the entrance of which is on the east side of Meadow Valley Wash across from the potential location of an intermodal transfer station. Section 6.3.3.1 describes the aesthetic impacts associated with this intermodal transfer station.

Section 6.3.3.1 of the EIS indicates that limited cultural resources surveys have been performed along the candidate heavy-haul truck routes. For this reason, specific impacts to culturally important sites, areas, or resources cannot be determined. If, however, DOE selected heavy-haul truck for the transportation of spent nuclear fuel and high-level radioactive waste, along with a site for an intermodal transfer station in Meadow Valley Wash, the Department would conduct additional field studies to identify cultural resource properties in or adjacent to the intermodal transfer station site (see Section 6.3.3.1).

8.11.9 (9807)
Comment - EIS001888 / 0394
[Clark County summary of comments it has received from the public.]

Commenters requested that the EIS include an analysis of existing visual quality within basins in Lincoln County and in the Elko region, and a description of the visual impact from rail construction and operation.

Response
DOE has included additional discussion in Sections 6.3.2.2 and 6.3.3.2 of the EIS of potential impacts to selected views from outside and inside each alternative rail corridor, and the visual impacts associated with the alternative sites for an intermodal transfer station.

8.11.9 (9868)
Comment - EIS002158 / 0013
Ryan Park is not sufficiently identified as a resource. It's within a half a mile of the proposed intermodal facility. This is one of our state parks in Lincoln County where people go for the scenery. Of course the facility's known, Rainbow Canyon and the name speaks for itself. It's a scenic area. The EIS simply says that it's a BLM [Bureau of Land Management] Class 3 area or something and leave it at that. Well, BLM visual impact categories are absolutely meaningless to the people that live in this area, where it's an aesthetic resource and a recreation resource that has deep significance for the community.

Response
Figure 3-29 of the EIS shows selected features along the alternative rail corridors, including Kershaw-Ryan State Park near Caliente. As discussed in Section 6.1.2.9 of the EIS, routes originating in Caliente could adversely affect the Class-II visual designation of lands in and around Kershaw-Ryan State Park, the entrance of which is on the east side of Meadow Valley Wash across from the potential location of an intermodal transfer station. Section 6.3.3.1 of the Draft EIS stated that more stringent management requirements would be necessary to retain the existing visual character of these Class-II lands.

DOE agrees that factors other than the Bureau of Land Management Visual Resource Management classifications are pertinent in assessing visual impacts. Therefore, DOE has included additional discussion in Sections 6.3.2.2 and 6.3.3.2 of the EIS of potential impacts to selected views from outside and inside each alternative rail corridor, and the visual impacts associated with the alternative sites for an intermodal transfer station.

8.11.9 (11937)
Comment - EIS001878 / 0069
The DEIS fails to adequately address the impacts of the proposed action on the scenic resources of Eureka County and Nevada's other rural counties. Nevada's rural areas provide increasingly rare unspoiled views of the basin and

range region, and include numerous scenic resources, none of which are identified in the DEIS. Scenic resources that could be affected by the proposed Carlin corridor include such areas as Monitor Valley and Grass Valley, and such features as stage stops, hot springs, graveyards, historic mines, historic ranches, historic railroads, the Humboldt River, and unique geological formations. The statement on p. 6-50, "The greatest impact on visual resources from the construction of a rail line would be the presence of workers, camps, vehicles, large earth-moving equipment, lay down yards, and dust generation" is self-serving and unsupported by any evidence. The statement completely ignores the long-term scenic impacts of new permanent linear facilities (i.e., rail lines and access roads) and the associated land disturbance.

The DEIS must analyze the anticipated impacts of the proposed action on views and scenery, particularly in areas now in a natural or nearly-natural condition. The DEIS must consider, at a minimum, the long-term scenic impacts of the railroad bed, access roads, excavations and pits, fences, and supporting infrastructure.

Response
DOE agrees with this comment and has included additional discussion in Sections 6.3.2.2 and 6.3.3.2 of the EIS of potential impacts to selected views from outside and inside each alternative rail corridor, and the visual impacts associated with the alternative sites for an intermodal transfer station.

8.11.10 WASTE MANAGEMENT

8.11.10 (112)
Comment - 2 comments summarized
Commenters stated that the Draft EIS provided insufficient information regarding the expected wastes that would be generated during the construction and operation of a rail line in Nevada (or intermodal transfer station and heavy-haul truck routes) and where such wastes would be disposed of. Commenters noted the remoteness of the proposed activities and the limited capacity of existing disposal facilities in those areas.

Response
Waste generated from the construction of a branch rail line or intermodal transfer station would fall into several categories: waste soil and rock material; general construction waste, such as wood, excess rebar, rail ties, and track material; solid waste generated by workers indirect to construction, such as trash; hazardous wastes, such as certain used paints, resins and lubricants; and sanitary waste. For all waste types, DOE likely would use the nearest available authorized disposal facilities having sufficient capacity. In some instances, DOE recognizes that wastes might need to be transported either by use of a partially completed branch rail line or by truck. DOE would identify disposal facilities during final design and construction of a branch rail line or intermodal transfer facility.

8.11.11 ENVIRONMENTAL JUSTICE/NATIVE AMERICAN ISSUES

8.11.11 (3084)
Comment - EIS000735 / 0012
The area of environmental justice addresses primarily Native-American issues. Other minority groups in urban areas may be effected just as much and should be considered.

Response
As discussed in Section 3.1.13 of the EIS, DOE defined minority as "Hispanic, Black, Asian/Pacific Islander, American Indian/Eskimo, Aleut, and other non-white person." To identify minority and low-income communities in the region of influence, DOE analyzed Bureau of the Census block groups. Those block groups where the percentage of minority or low-income residents was meaningfully greater than average were identified as minority or low-income communities for purposes of the environmental justice analysis. This EIS considers whether activities at Yucca Mountain could cause disproportionately high and adverse human health or environmental effects to those communities. The results of the analysis are throughout the EIS (for example, Section 6.2.5 for national transportation and Section 6.1.2.12 for Nevada transportation). The analysis determined that the potential impacts to public health and safety would be small on all populations during all phases of the repository program, and that no subsection of the population, including minority or low-income populations, would receive disproportionately high and adverse impacts.

8.11.11 (5147)
Comment - EIS001911 / 0006
We know that nuclear waste from Northern States Power will be transported through and adjacent to our reservation to a federal storage facility. Other jurisdictions may not be aware that they might be impacted by shipments. The DOE must begin conducting field workshops in these areas to begin educating people about these shipments and to answer the many questions people have regarding safety and emergency preparedness arrangements.

Response
Section 180(c) of the NWPA requires DOE to provide technical and financial assistance to states for training for public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions the Department planned to transport spent nuclear fuel or high-level radioactive waste. The training of public safety officials would cover procedures required for safe routine transportation of these materials and for dealing with emergency response situations.

DOE plans to fully implement these requirements, but implementation would not begin until closer to the time that actual shipments would occur. Section M.6 of the EIS describes how Section 180(c) of the NWPA would be implemented. DOE anticipates knowing at least 4 years before shipments occurred the states or tribal jurisdictions through which the shipments would travel, even if exact routes had not been selected. Using this information, DOE would notify those jurisdictions about their potential eligibility for the Section 180(c) program. DOE published a Notice of Revised Proposed Policy and Procedures in the *Federal Register* (63 *FR* 23753 to 23766, April 30, 1998) that sets forth its plan for implementing a program of technical and financial assistance for training public safety officials of appropriate units of local government and tribes through whose jurisdictions the Department would transport spent nuclear fuel or high-level radioactive waste.

8.11.11 (5502)
Comment - EIS001660 / 0028
The DEIS inadequately analyzes the project impacts in relation to environmental justice. Rural communities are dispersed, rather than concentrated. Given the limited political power of rural communities, they are often targeted for unwanted projects. The Yucca Mountain repository is an excellent example of this type of “justice”. The DOE’s risk models are based on avoiding urban areas, and presume that risks from the project should be borne by individuals in rural communities. The DEIS should consider the effects of past programs and policies on communities, as well as additional impacts of the Yucca Mountain Project.

Response
An environmental justice analysis considers the potential for disproportionately high and adverse impacts to minority and low-income populations. Executive Order 12898, issued by the President, gives the environmental justice analysis this exclusive focus. An environmental justice analysis does not consider the potential for impacts on the general population. The EIS as a whole, however, does.

The EIS brings together the results of analyses from different technical disciplines that focus on consequences to certain resources that could affect human health or the environment. The EIS analyzes the demographic characteristics of the population in the immediate vicinity of the Yucca Mountain site and along transportation routes. Chapter 8 of the EIS addresses cumulative impacts, which consider the effects of past programs and policies on communities. The discussion focuses on past, present, and reasonably foreseeable future projects together with the potential impact from implementing the Yucca Mountain proposal. Section 8.1.2.2 discusses the other Federal actions in the vicinity of Yucca Mountain (including those conducted at the Nellis Air Force Range and the Nevada Test Site). Section 8.2 discusses cumulative impacts on human health and environmental resources. Section 8.2.5 discusses cumulative impacts to cultural resources. Section 8.2.6 discusses socioeconomic indicators associated with construction, operation, and closure of the repository.

8.11.11 (6382)
Comment - EIS001590 / 0006
There are questions about environmental justice. There’s been no analysis along the specific routes regarding the impact on minority communities. Half of Rum Village is minority, not to mention Native American communities, black and Hispanic communities. Note that the waste would end up in land, which, by the treaty of Ruby Valley, is the property of Western Shoshone nation.

Response
Section 6.2.5 of the EIS discusses environmental justice aspects of national transportation of spent nuclear fuel and high-level radioactive waste. DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties, offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

Section 3.1.13 of the EIS describes the minority or low-income populations in Nevada in relation to Yucca Mountain and the alternative rail and heavy-haul truck corridors. Section 6.3.4 addresses environmental justice impacts in Nevada as a result of the shipment of spent nuclear fuel and high-level radioactive waste to the proposed repository. These sections contain maps that show the locations of minority or low-income populations in relation to the site and the transportation corridors.

This comment raises the question of whether disproportionately high and adverse health and safety impacts (as the term is used in Executive Order 12898) exist whenever minorities and low-income individuals reside along transportation routes for radioactive materials. The EIS considers air emissions and doses from exposure to radioactive materials during routine transport and shows that the impact from air emissions to be 1 emissions-related fatality. The EIS estimates that the 24-year national transportation campaign would cause fewer than about 3 latent cancer fatalities among the general public, and fewer under the preferred, mostly rail scenario. Although many people would be exposed nationwide over a long campaign, the radiation dose to any exposed individual would be very low. In this context, DOE does not consider such impacts to be high. DOE does not know of a plausible mechanism under these circumstances whereby low-income or minority populations could incur high and adverse impacts when the general public would not.

Section 3.1.1.4 of the EIS acknowledges the issue over the Ruby Valley Treaty of 1863. At this time, the Federal Government owns the land encompassing the Yucca Mountain site. A 1985 U.S. Supreme Court decision held that the Western Shoshone claim to land associated with the Ruby Valley Treaty has been extinguished. Although DOE recognizes the sensitivity of this issue, it believes that the Supreme Court case settles these issues [United States v. Dann, 470 U. S. 39 (1985)].

DOE believes that the EIS adequately analyzes the level of potential transportation-related disproportionate impacts to minority and low-income populations, including Native American tribes.

8.11.11 (8799)
Comment - EIS001907 / 0026
The DOE states in the DEIS that it believed there would be no disproportionately high and adverse impacts to minority or low-income populations as a result of the Proposed Action, including national transportation. This claim is obviously false, since already heavy-weight truck and rail routes throughout this country are placed in low-income, people of color communities. That this environmental racism would change with this proposed action, is as likely flying toads (although with continued accidents throughout the country, I'm sure that flying toads caused by radioactive mutation are getting closer and closer).

Response
Thank you for your comment.

8.11.11 (8853)
Comment - EIS002087 / 0003
On page J-110, under environmental justice, section J.3.6.4, it says, "In addition to the nearly random nature of accidents that would involve the transportation of materials and people, the probability of such an accident would be small in any location, minimizing the risk at a specific location. Furthermore, because the potential accidents would be nearly random, impacts to minorities in low income populations and to Native Americans along the routes in Nevada, it would be unlikely to be disproportionately high and adverse."

And with that particular statement, we would then disagree with that, because if there was an accident near a reservation, clearly being an Indian population there, we believe that would be higher and more disproportionate. I would also – with that close proximity due to the subsistence patterns of Native Americans that that, again, would be a disproportionately high something to the Indian people, whatever the word is.

Response
The likelihood of a transportation accident that resulted in a considerable release of radioactivity affecting Native Americans along the shipping routes is extremely remote. The shipping casks used to transport spent nuclear fuel and high-level radioactive waste would be massive and robust, with design features that complied with strict regulatory requirements that ensure they were fault-tolerant. That is, the casks would perform their safety functions if damaged. Tests and analyses using the most advanced methods have demonstrated that the casks would provide containment and shielding even under the most severe accidents that could occur. A study by Sandia National Laboratories for the Nuclear Regulatory Commission concluded that the casks would continue to contain spent nuclear fuel completely in more than 99.99 percent of all accidents (DIRS 152476-Sprung et al. 2000). This means that there would be much less than a 1-percent chance of an accident that could result in a release of radioactive material from a cask over 24 years of spent nuclear fuel and high-level radioactive waste shipments to Yucca Mountain by truck. The chance of a rail accident that would cause release from a cask is even lower. The chance that an accident would occur in a specific locale would be much less than 1 percent.

8.11.11 (9342)
Comment - EIS001888 / 0058
In the DEIS minority and low-income populations are identified along possible transportation routes and in the vicinity of the proposed disposal site for the high-level nuclear wastes. This is accomplished by identifying census tracts and determining whether the proportion of these groups within those census tracts is higher than in other tracts. Because in the Yucca Mountain DEIS it is concluded that there is very little or no risk of adverse impacts from the government actions in question, it is also concluded that these groups will not be significantly affected.

There are several inadequacies in the methods that lead to these conclusions. These are listed below along with corresponding recommendations.

The DEIS treats minority and low-income populations as the vulnerable populations of interest (DEIS, pg. 3-94). These groups are specifically mentioned in all government documents considering environmental justice, because they have historically been politically vulnerable to government actions with adverse effects. But these are not the only groups that are disproportionately vulnerable to such actions. Guidance documents for interpreting Executive Order 12898 emphasize that fair treatment means that no group of people should bear a disproportionate share of negative environmental consequences of government actions. Other groups, for example, would be disproportionately vulnerable to such consequences because of impaired health or immature immunological systems.(1)

In view of this, we recommend that other vulnerable populations, including the aged, the infirm, pregnant women, and children, be included in the DEIS and other environmental justice analyses.

The DEIS sections on environmental justice use census and demographic information from 1990 (pp. 3-94, 3-96). The population of Clark County has changed dramatically in the ten years since the 1990 census. The Council on Environmental Quality (CEQ) Final Guidance Document notes the limitations of census data and proposes using multiple sources of information on potentially affected populations.(2) Clark County recommends that data on current populations and projections of population changes into the foreseeable future should be used to correct, supplement or replace 1990 Census data.

(1)Section 2. 1, *CEQ Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses*, April 1998.

(2)Section 5. 1, *CEQ Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses*, April 1998.

Response
DOE implements its responsibilities to environmental justice through the DOE Environmental Justice Strategy [of] Executive Order 12898, April 1995. This strategy lists four goals: (1) identify and address DOE programs, policies,

and activities that might have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations; (2) enhance the credibility and public trust of DOE by making public participation a fundamental component of all program operations, planning activities, and decisionmaking; (3) improve research and data collection methods related to human health and the environment of minority and low-income populations by incorporating full characterizations of risks, including the identification of differential patterns of subsistence consumption of natural resources among such populations; and (4) further Departmental leadership by integrating environmental justice criteria, as appropriate, with activities and processes related to human health and the environment. The DOE environmental justice methodology brings together results of analyses from technical disciplines that focus on consequences to certain resources that could affect human health or the environment to determine disproportionately high and adverse effects on minority and low-income populations.

The DOE implementation of environmental justice in identifying minority and low-income populations for closer analysis is consistent with Executive Order 12898. Health effects modeling includes all persons, including vulnerable populations identified by the comment.

The Final EIS uses Nevada population data that are consistent across technical areas and that directly reflect data developed by and received from county and State officials.

The Regional Economic Models, Inc. (REMI), Economic and Demographic Forecasting System (EDFS) 53-sector model incorporates population estimates from recent years (1998 to 1999) provided by Nye and Clark Counties for the socioeconomic baseline. For Lincoln County and the rest of Nevada, the REMI model used State Demographer estimates for the same period. DOE compared these locally derived estimates to the 2000 data provided by the Bureau of the Census.

The Final EIS baseline used REMI model projections of population totals for each county until 2035. The DOE Clark County projections correspond to those used by the University of Nevada, Las Vegas (DIRS 136698-Riddel and Schwer 1999), which also used the REMI model. Inputs to the Nye County projections for the Final EIS are based on data identified in Nye County documents (DIRS 150996-Williams 2000; DIRS 148140-PIC 1998). The Nye County projections are based in part on a REMI 14-sector model. Lincoln County and Rest of Nevada projections through 2018 from the Nevada State Demographer's Office (DIRS 107195-NSD 1999) were inputs to population projections for these areas. DOE used the county projections and Nye County source documents to project population distribution within the 80-kilometer (50-mile) radiological monitoring grid. California Department of Finance projections (DIRS 150294-California State Department of Finance 1998) for Inyo County were the basis for projecting population distributions for Inyo County sections of the radiological monitoring grid.

For analysis of accidents near transportation corridors and for health effects modeling in Nye, Clark, and Lincoln Counties, DOE used county population estimates as the basis for extrapolating estimated impacts. Thus, for example, if the estimated county population would double from 1990 to the year of analysis, the analysis generally assumed that the population in the block groups along transportation routes would also double. As appropriate, DOE based estimates of population changes in some areas (for example, the vicinity of the Las Vegas Beltway) on assumptions or information other than a simple percentage change.

For other Nevada counties, DOE used Nevada State Demographer projections (DIRS 107195-NSD 1999) as the basis for population projections in analyses of accidents near transportation corridors and for health effects modeling. The Department obtained estimates of historic populations of towns and cities in Nevada from the State Demographer's Office or from county documents.

Finally, as discussed in Section 5.2.4.1 of the EIS, DOE accepts the position of the National Academy of Sciences that it is not possible to predict future human behavior accurately. As stated in that section, the Draft EIS used a default position of today's conditions. For the Final EIS, DOE projected baseline population and other economic measures to 2035. Projections for periods further in the future would be substantially less credible.

However, while totals of populations would be forecast for block group levels, the 1990 Census remains the best readily available, consistent identification of the percentage of minority and low-income populations for small geographic areas such as block groups.

8.11.11 (9475)
Comment - EIS001888 / 0144
DEIS Statement (pg. 6-8) 6.1 - Nationwide, during the 24 years of the Proposed Action transportation activities, about four fatalities could result from traffic accidents under the mostly legal-weight truck scenario. For the same time period, about four fatalities could also result from traffic accidents under the mostly rail scenario. These fatalities would all be related to physical injuries associated with traffic accidents, not radiological impacts.

Clark County Comment - Under the transportation accident scenario for either rail or truck, four fatalities are forecast over 24 years. Without route identification, it is impossible to ascertain whether low-income or minority communities may be unduly burdened at the local scale. NEPA [National Environmental Policy Act] Regulation: Sec. 1502.22.

Response
Chapters 2, 3, and 6 and Appendix J of the EIS identify potential national and Nevada transportation routes for rail and heavy-haul-truck shipments. Further, Section 3.1.13 describes the minority and low-income populations in Nevada in relation to Yucca Mountain and the alternative rail and heavy-haul truck corridors. At this time, many years before shipments could begin, it is impossible to predict accurately which highway routes or rail lines DOE could use. Before such shipments began, states or tribes could designate alternate preferred highway shipping routes, and highways and rail lines could be built or modified. Therefore, for the analysis in this EIS, DOE selected potential highway routes in accordance with U. S. Department of Transportation regulations, which require the use of preferred routes (typically highways and bypasses that are part of the Interstate Highway System). The Department based its selection of potential rail routes on current rail practices, because there are no comparable Federal regulations applicable to the selection of rail lines for the shipment of radioactive materials. In response to public comments, DOE included maps of highway routes and rail lines it used for analysis in the EIS. It also included potential health and safety impacts associated with shipments for each state through which shipments could pass.

In the EIS, DOE used the census block data to identify minority populations that the selection of a particular rail corridor or route for heavy-haul trucks could affect. Census block data are not available to identify low-income populations. DOE has updated and refined information germane to its environmental justice analysis. The EIS now includes, for example, additional and more detailed mapping of minority populations, and additional mapping and information that describes the proximity of tribal lands and cultural and ceremonial areas to candidate rail corridors in Nevada. DOE conducted a statistical analysis for Nevada and the Nation to determine potential accident fatalities using accident statistics for states and applying these to large numbers of shipments across multiple routes and over long distances. Thus, the analysis cannot specify the location of a specific accident or the identification of the specific people involved.

In response to comments received on the Draft EIS, DOE considered locations at which individuals could reside nearer to the candidate rail corridors and heavy-haul truck routes in Nevada as a way of representing conditions that could exist anywhere in potentially affected communities. For example, DOE assumed that a maximally exposed individual could reside or work as close as 4.9 meters (16 feet) to a candidate heavy-haul truck route. During the 24-year period of repository operations, a maximally exposed individual would receive an estimated dose about 29 millirem, resulting in an increased fatal cancer probability of 2 in 100,000.

These exposures would be well below those received from natural background radiation, would not be discernible, even if corresponding doses could be measured, and would not add measurably to other impacts that an individual could incur. For comparison, the lifetime likelihood of an individual incurring a fatal cancer from all other causes is about 1 in 4.

If DOE made a decision on a specific mode and route of transportation through Nevada to the repository site, it would perform additional engineering and environmental studies to support detailed designs and appropriate National Environmental Policy Act reviews that included potential impacts to minority and low-income populations. Along with these studies, the Department would initiate consultations with responsible Federal, State, tribal, and local agencies to gather information and address potential mitigation of impacts.

DOE believes that the EIS adequately analyzes the potential environmental impacts of transportation accidents and the potential for disproportionate impacts to minority and low-income populations.

8.11.11 (9652)
Comment - EIS001888 / 0315
The environmental justice section of the DEIS clearly demonstrates the failings in the DOE's approach to impact assessment. The DEIS indicates that because there are no impacts on the population at large, therefore, there can be no impact on minority populations. This violates the DOE's own directives for implementing environmental Justice programs and is at variance with the best practice in the field. The DOE failed to make a serious effort in this area. In order for the DOE to have credibly analyzed environmental justice along pertinent transportation routes, the DOE must produce a new DEIS that contains documentary evidence of the DOE's outreach efforts and their effectiveness in engaging minority communities along the transportation corridors. It is vital that these communities be part of a meaningful dialogue about the risks of the program.

Response
DOE recognizes its obligation to identify potential impacts to minority or low-income populations. Section 1.5.1 of the EIS describes the outreach activities that DOE has undertaken to involve all members of affected communities. Section 3.1.13 describes the minority and low-income populations in Nevada in relation to Yucca Mountain and the candidate rail and heavy-haul truck corridors. Section 6.3.4 addresses environmental justice impacts in Nevada as a result of the shipment of spent nuclear fuel and high-level radioactive waste to the proposed repository. These sections contain maps that show the locations of minority or low-income populations in relation to the site and the transportation corridors. DOE generated these maps using census block group data. Only block group data are available for low-income populations, although a more detailed data set (blocks) is available for minority populations. In response to comments, DOE has updated its population estimates in the regions of influence to reflect the most recent State and local information, as well as the U.S. Census Bureau 2000 population summary data for Nevada. For the repository- and transportation-related regions of influence, DOE performed REMI simulations to establish an updated population baseline by accounting for population estimates and projections provided by county governments.

In the EIS, DOE used the census block data to identify minority populations that the selection of a particular rail corridor or route for heavy-haul trucks could affect. As noted above, block data are not available to help identify low-income populations. Based on these data, the EIS contains maps for each candidate corridor, route and intermodal transfer station location that identify more precisely the extent to which transportation activities could affect. However, for Nevada and the Nation, DOE conducted a statistical analysis to determine potential fatalities using accident statistics for states and applying these to large numbers of shipments across multiple routes and over long distances. Thus, the analysis cannot specify the location of a specific accident or the identification of the specific people involved.

If DOE made a decision on a specific mode and route of transportation through Nevada to the repository site, it would perform additional engineering and environmental studies to support detailed designs and appropriate National Environmental Policy Act reviews that included potential impacts to minority and low-income populations. Along with these studies, the Department would initiate consultations with responsible Federal, State, tribal, and local agencies to gather information and address potential mitigation of impacts.

DOE believes that its outreach activities and its efforts to identify potential impacts of the proposed repository, including transportation, are consistent with the objectives of Executive Order 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*), relevant agency guidance, and National Environmental Policy Act best practices. DOE also believes that the EIS adequately analyzes the potential environmental impacts of transportation accidents and the potential for disproportionate impacts to minority and low-income populations.

8.11.11 (10236)
Comment - EIS001888 / 0585
The Department of Energy was one of the first federal agencies to develop an Environmental Justice policy. It is unfortunate, then, that the evaluation of effects on minority, low-income and Native-American groups is totally ignored in the DEIS. For example, U.S. 95, a major or proposed routing option bisects the Las Vegas Paiute

reservation. No statement is made of potential impacts. Other routes through the Las Vegas metropolitan area are adjacent to minority and low-income populations. However, there is no recognition of potential impacts to these populations in the DEIS.

Response
Section 6.3.4 of the EIS addresses environmental justice impacts in Nevada from shipping spent nuclear fuel and high-level radioactive waste to the proposed repository. These sections include maps that show the locations of minority or low-income populations with respect to the site and potential transportation routes. The EIS acknowledges that a 1.6-kilometer (1-mile) section of U.S. 95 would cross the southwest corner of the Las Vegas Paiute Indian Reservation that could be used by legal-weight trucks as well as either the Caliente-Las Vegas or Apex/Dry Lake heavy-haul truck route. In addition, the EIS notes a branch rail line in the Valley Modified Corridor would pass near the Las Vegas Paiute Reservation. As noted in Section 6.3.4, public health and safety impacts to all populations in Nevada would be small (less than 0 to 2 latent fatalities from cancer and other causes for incident-free transportation and 0.0005 latent cancer fatality for accidents over 24 years). The public health and safety impacts to minority and low-income populations along the routes of travel would also be small. Because the probability would be small at any single location, the risk of an accident at a specific location would also be small. Thus, impacts to minority or low-income populations or to Native Americans in small communities along the routes would also be small and, therefore, unlikely to be disproportionately high and adverse.

8.11.11 (10404)
Comment - EIS001927 / 0022
Using a groundless piece of circular logic, this DEIS holds that because the Proposed Action poses no impact anyway, it thus cannot impact low income communities or people of color. As shown above, this finding of no impact is flawed, as is this weak attempt to claim that principles of environmental justice are not being violated.

Who is most likely to live along the railroad tracks and the highway? In a place like Chicago, it would be people of color and the poor. Sometimes train cars sit on the tracks for up to 48 hours before moving on. If that car happens to hold an irradiated nuclear fuel cask, then the family sleeping in the house right next to the switch yard could receive a significant dose of gamma radiation. In certain sections of south Chicago, where thousands of high-level waste transport are targeted to go through, many residents are exclusively Spanish speaking. The same is probably true along transportation routes in Colorado, New Mexico, Arizona, and southern California. Has the DEIS been translated into Spanish? Why not? Why are these significantly impacted communities being excluded from the public comment process just because they don't speak English?

Response
The approach to environmental justice in the Draft EIS and Final EIS is consistent with Council on Environmental Quality guidance. The goal of this approach is to identify whether any high and adverse impacts would fall disproportionately on minority and low-income populations. The approach first analyzes the potential impacts on the general population as a basis for comparison. Second, based on available information, the approach assesses whether there are unique exposure pathways, sensitivities, or cultural practices that would result in high and adverse impacts on minority and low-income populations. If such potential impacts would be high and adverse, the approach then compares the impacts on minority and low-income populations to those on the general population to determine whether any high and adverse impacts fall disproportionately on minority and low-income populations. In other words, if high and adverse impacts on minority or low-income population would not appreciably exceed the same type of impacts on the general population, no disproportionately high and adverse impacts would be expected.

The Nuclear Regulatory Commission and U.S. Department of Transportation regulate the transportation of spent nuclear fuel. Although spent nuclear fuel emits gamma radiation and neutrons, these would be largely absorbed by the massive cask in which the fuel was transported. The regulations require that at 2 meters (6.6 feet) from the edge of the transport vehicle, the dose rate from the cask can be no higher than 10 millirem per hour. The EIS evaluated the dose to a "maximally exposed individual" resident who was assumed to live within 200 meters (660 feet) of a railroad switchyard at an exposure of 20 hours for each occurrence. The EIS also evaluated a resident living 30 meters (100 feet) from a point where all truck shipments would pass. The analysis of exposure for this maximally exposed individual conservatively assumed that the same resident would be exposed to all rail shipments to the repository over 24 years. Table 6-12 of the EIS indicates that a resident near a rail stop would receive a dose of 0.3 rem over 24 years of operation. The probability of a latent fatal cancer from this exposure would be 0.0001.

The maximally exposed individual would receive a dose of about 6 millirem from exposure to all truck shipments (6 millirem represents an increased probability of contracting a fatal cancer of 3 in 1 million).

During the public comment period for the Draft EIS, DOE encouraged stakeholders to offer comments on the document during the public hearings and by mail, facsimile, and the Internet. Before each hearing, DOE placed advertisements in local newspapers, including Spanish-language newspapers, and distributed public service announcements and press releases to more than 175 local and national stakeholders and media outlets to publicize information that would be accessible to the general public and to minority and low-income communities. In addition, in concert with the publication of the Draft EIS, DOE made available Spanish-language fact sheets about Yucca Mountain and the proposed repository.

8.11.11 (10635)
Comment - EIS001906 / 0016
The DEIS also fails to analyze nuclear waste transportation impacts for the proposed Timbisha Shoshone Trust Land Parcel at Scotty's Junction along U.S. 95 in Nevada. The DEIS does state that the Carlin and Caliente rail corridors implementing alternatives as well as the Caliente heavy-haul truck implementing alternative would pass through, overlap, or be located along the edge of the proposed Scotty's Junction Parcel (DEIS, p. 8-13). A high-level nuclear waste transportation route located on a proposed trust land parcel is an extremely negative impact for the Timbisha Shoshone Tribe. However, there is absolutely no mention of any impact to the Timbisha Shoshone by the above proposed routes in the DEIS. The DOE needs to fully analyze the impacts to the Timbisha Shoshone Tribe, including its Environmental Justice implications.

Response
DOE has updated and refined information germane to its environmental justice analysis and is aware of the potential conflict between the Carlin and Caliente Corridors, the Caliente heavy-haul truck route, and the Timbisha Shoshone Trust Lands. The Final EIS acknowledges that the Bonnie Claire variation of the Caliente and Carlin Corridors would pass through 4.5 kilometers (2.8 miles) covering 1.8 square kilometers (450 acres) of the Scottys Junction portion of the newly designated Timbisha Shoshone Trust Lands planned for residential and tourist uses.

8.11.11.1 Environmental Justice Issues

8.11.11.1 (2390)
Comment - EIS000713 / 0002
It is possible that the decision to haul the nation's nuclear waste across the country may affect more neighborhoods than any other decision by the Department of Energy indeed it will affect over 100 communities with populations of more than 100,000 people. Yet, the DOE refuses to name the mode of transportation (rail or truck) or the routes that it will use to transport 77,000 metric tons of nuclear waste across the country. Further, it has failed to hold hearings in key areas such as Chicago, Cleveland, Hartford, Indianapolis, Los Angeles, and other major cities that are likely to lie along those transportation routes, thereby ignoring the goals set forth in the Environmental Justice Strategy.

Response
The Final EIS identifies rail as the preferred mode of transportation. DOE assessed the health and safety impacts to people living near transportation routes along which spent nuclear fuel and high-level radioactive waste could be transported. This analysis examined the impacts using actual routes that DOE could select. DOE evaluated the impacts to an individual, the maximally exposed individual, who resided 200 meters (660 feet) from a point where all rail shipments, would pass. Under these circumstances, the maximally exposed individual would receive a dose of about 2 millirem from exposure to all rail shipments (6 millirem represents an increased probability of contracting a fatal cancer of 3 in 1 million). DOE estimated the average lifetime impact for an individual who lived along a route for 24 years of the Proposed Action. Although it can be argued that individuals could live closer to these shipments, it is highly unlikely that an individual would be exposed to all shipments over the 24-year period of shipments to the repository, even though DOE incorporated this highly conservative assumption into the analysis. These impacts are so low that they would not be discernible and would not add measurably to or compound other impacts that individuals or communities might incur.

DOE believes that its public involvement process during the development of the EIS is consistent with the Council on Environmental Quality and DOE regulations on implementing the National Environmental Policy Act, and DOE guidance on public participation during the preparation of EISs. In 1995, DOE held 15 public scoping meetings across the country during a 120-day public scoping period (August 13, 1999, through February 28, 2000). After publishing the Draft EIS, DOE held public hearings at 21 locations in Nevada and across the country during a 199-day comment period to receive comments from interested parties. Given the impracticality of holding hearings at every location potentially affected by the transportation of spent nuclear fuel and high-level radioactive waste, DOE selected national hearing locations in the major metropolitan areas most likely to experience large numbers of shipments or locations close to nuclear powerplants.

8.11.11.1 (2612)
Comment - EIS000692 / 0001
I think most basically a definition of minority is numbers. In terms of numbers, votes, representation in the government process, Nevada residents should be viewed as a minority.

I don't think people in the East realize what it means to have ninety-eight percent of your county under public domain, or eighty-seven percent of your state publicly owned. Growth, both in population and economic growth, is curtailed.

In terms of low income populations, taken as an entity, Lincoln County is about as low income as it's possible to get.

It seems like taking advantage of the economically disadvantaged to have three of the five possible sites for intermodal transfer facilities located in Caliente, Nevada.

Response
DOE implements its responsibilities to environmental justice through its Environmental Justice Strategy [of] Executive Order 12898, April 1995. The first goal of this strategy is to identify and address DOE programs, policies, and activities that might have disproportionately high and adverse human health or environmental effects on minority and low-income populations. The procedure for implementing this goal and Executive Order 12898, *Environmental Justice*, is to identify minority and low-income communities by analyzing the Bureau of the Census population designation called "block groups." DOE pinpoints block groups where the percentages of minority or low-income residents are meaningfully greater than average. For environmental justice purposes, the pinpointed block groups are minority and low-income communities. DOE identifies low-income communities based on a determination of percentages of persons in poverty.

8.11.11.1 (4367)
Comment - EIS001157 / 0013
The DEIS is not clear as to what census blocks with high minority populations or high levels of poverty would be affected by the proposed routings. The DEIS refers to "City of Las Vegas" and "Las Vegas area" interchangeably. The area of concern needs to be clarified to make the environmental justice findings understandable.

Response
Figures 3-27 and 3-28 identify minority and low-income census block groups in Nevada, with potential transportation corridors (rail and heavy-haul truck) shown in relation to these block groups..

8.11.11.1 (6677)
Comment - EIS001878 / 0055
As discussed in the general comments, the DEIS inadequately analyzes the project impacts in relation to environmental justice. Because of the nature of rural life, communities are dispersed, rather than concentrated. Given the limited political power of rural communities, they are often targeted for unwanted projects. The Yucca Mountain repository is an excellent example of this type of "justice." The DOE's risk models are based on avoiding urban areas, and presume that risks from the project should be borne by rural people.

The DOE should consider the effects of past programs and policies on communities, as well as the additional impacts of the Yucca Mountain project. Rural low income populations received damaging doses of radiation in the 1950s and 1960s from above-ground and underground nuclear weapons tests conducted by the Atomic Energy

Commission. The DOE must take these disproportionately high adverse health and environmental impacts of its programs, policies, and activities into consideration.

Response
DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties, offers the most appropriate means to arrive at conservative estimates of transportation-related impacts. However, in response to comments, DOE has considered locations at which individuals could reside nearer to the candidate rail corridors and heavy-haul truck routes in Nevada as a way of representing conditions that could exist anywhere in potentially affected communities. For example, DOE assumed that a maximally exposed individual could reside as close as 4.9 meters (16 feet) to a candidate heavy-haul truck route. During the 24-year period of repository operations, the maximally exposed individual would receive an estimated dose of about 29 millirem, resulting in an increased fatal cancer probability of 2 in 100,000.

These exposures would be well below those received from natural background radiation, would not be discernible even if corresponding doses could be measured, and would not add measurably to other impacts that an individual could incur. For comparison, the lifetime likelihood of an individual incurring a fatal cancer from all other causes is about 1 in 4.

The analysis of cumulative impacts in Chapter 8 of the EIS did consider the impacts of past programs and policies in addition to those of the Yucca Mountain Project. The analysis evaluated impacts of repository activities coupled with those of other Federal, non-Federal, and private actions. The evaluation included past DOE activities at the Nevada Test Site (such as nuclear weapons testing) and past disposal of low-level radioactive waste at the Beatty Disposal Area.

8.11.11.1 (9136)
Comment - EIS001860 / 0005
Environmental justice/transportation considerations - The project proposes to transport waste by rail, road or both from 77 sites all over the U.S. to Yucca Mountain yet fails to provide any information about proposed routes outside the state of Nevada. Note that the bulk of the waste is proposed to be transported from reactors on the east coast to Yucca Mountain nearest the west coast of the country.

I live in the First District of San Bernardino County in southeastern California through which a portion or all of the waste produced at the five Southwestern commercial reactor sites might be transported to Yucca Mountain. The people in my community and neighboring communities rely upon State Route 247 as one of only three access roads to our Morongo Basin. Our community groups and cities are in constant communication with the state and the county transportation departments regarding the poor condition and inadequate maintenance on SR 247 and our major thoroughfare, SR 62. We have even considered formation of assessment districts to tax ourselves to improve our roads in this area for our use.

We are a moderate to low income area dependent upon Joshua Tree National Park tourism for our economic future. Most residents have to commute at least an hour a day to work in other places. Six dumps have been proposed for within 200 miles of Joshua Tree National Park. This is an environmental injustice which sacrifices our area to the profits of the waste industry and we have organized to oppose it, including changing our political representation and encouraging our elected representatives in their now-well-known efforts to stamp out corruption in our county and prevent our desert from being used as the nation’s waste repository.

If the people who will be affected by the transportation of these wastes were to be allowed to vote on the issue, they would vote no as they have voted on other proposed projects in this area.

Implementing Yucca Mountain means transporting 800,000 cubic feet of high-level radioactive waste through our desert, 80 times more waste than would have been scheduled for the Low Level Radioactive Waste site proposed for Ward Valley near Needles. Why would we put up with this if we won’t put up with Ward Valley?

It would be an environmental injustice to expect the citizens of San Bernardino County's First District to bear the brunt of DOE traffic on our already inadequate roads and we should be able to expect the DOE to advise us which of our roads are being considered for alternate waste transportation routes.

Response
DOE has not determined the specific routes it would use to ship spent nuclear fuel and high-level radioactive waste to the proposed repository. Nonetheless, the EIS analysis used current regulations governing highway shipments and historic rail industry practices to select existing highway and rail routes to estimate potential environmental impacts of national transportation. Routing for shipments of spent nuclear fuel and high-level radioactive waste to the proposed repository would comply with applicable regulations of the U.S. Department of Transportation and the Nuclear Regulatory Commission in effect at the time the shipments occurred.

These regulations, which were developed to promote public safety and reduce radiological risk for transport of Highway Route Controlled Quantities of Radioactive Materials, require shipments of radioactive material to be on state or tribal designated preferred routes to reduce the time in transit. The State of California would have the opportunity to designate alternative preferred routes in accordance with U.S. Department of Transportation regulations. Consultation with local jurisdictions and tribes would be necessary.

8.11.11.1 (9826)
Comment - EIS001888 / 0403
[Clark County summary of comments it has received from the public.]

County feels EIS must seriously consider federal directives regarding environmental justice. 24% of county is minority (11% Hispanic/ 9% Black) and 38% along UP rail line. Native Americans live in areas adjacent to I-15 and US 95.

Response
The analysis of environmental justice impacts in Nevada considered existing highways and railroads that DOE would use in Nevada - Interstate-15, the proposed Las Vegas Beltway; U.S. 95; five possible highway routes for heavy-haul trucks; the Union Pacific Railroad's mainlines in northern and southern Nevada; and five corridor alignments with variations for a possible branch rail line in five rail corridors in the State. Section 6.3.4 of the EIS discusses the environmental justice impacts from transportation options being considered in Nevada. The EIS acknowledges that the Union Pacific Railroad's mainline tracks pass through the center of the Moapa Reservation and through the center of Las Vegas, crossing census block groups with high fractions of minority and low-income populations.

8.11.11.1 (10012)
Comment - EIS001444 / 0005
Section 3.1.13, Page 3-94 - 3-96
Esmeralda County needs to be included in the discussion on Environmental Justice.

Response
Esmeralda County is included in the environmental justice discussions on the transportation options in Section 3.2.2.1.10 of the EIS, which addresses candidate rail corridors and in Section 3.2.2.2.10, which addresses candidate heavy-haul truck routes.

8.11.11.1 (10655)
Comment - EIS001888 / 0402
[Clark County summary of comments it has received from the public.]

Populations at risk include: residents; peak and average daily visitors; workplace employment population; institutional populations. Are some populations, for example, African Americans at greater risk than the general resident population?

Response
The DOE analysis showed that the Proposed Action would not result in significant environmental or health and safety impacts to any segment of the population. Using available information, DOE evaluated the likelihood that circumstances unique to minority and low-income populations could create a potential for these populations to be exposed to disproportionately high and adverse impacts. For example, DOE assessed the health and safety impacts to people living near actual transportation routes along which spent nuclear fuel and high-level radioactive waste could be transported. The analysis showed that even if an individual lived along the same route for 24 years, this would increase the likelihood of a latent fatal cancer for this individual by about 1 in 1 million for rail shipments to about 29 millirem (increased fatal cancer probability of 2 in 100,000). These exposures would be well below those received from natural background radiation, would not be discernible even if corresponding doses could be measured, and would not add measurably to other impacts that an individual could incur. For comparison, the lifetime likelihood for an individual fatal cancer from all other causes is about 1 in 4.

8.11.11.2 Native American Issues

8.11.11.2 (5377)
Comment - EIS001887 / 0093
Pages 2-41 and 2-42; Figures 2-26 and 2-27 - Highway and Rail System Maps

The maps do not show the locations of potentially affected Native American tribes in relation to the Interstate Highway and rail systems. Even in the absence of identified shipping routes (a major shortcoming of the Draft EIS that is discussed in detail elsewhere in these comments), the document should have provided some indication of Native American lands that are traversed by, or are located in proximity to, highway and rail routes. Numerous Native American lands/communities outside Nevada will be impacted by spent fuel and HLW [high-level radioactive waste] shipments including: Gila Bend, Navajo, San Xavier, and Salt River in Arizona; Umatilla and Cow Creek in Oregon; Miccosukee in Florida; Fort Hall in Idaho; Winnebago in Nebraska; Cattaraugus in New York; Quapau, Ottawa, Modoc, Sac Fox, in Oklahoma; and others. The failure to identify Native lands and communities along transportation routes and to assess impacts of the Proposed Action on those entities is another indication of the inadequate and superficial treatment of transportation impacts in the Draft EIS.

Response
In response to public comments, Figures 2-25 and 2-26 of the EIS have been revised to show Federally recognized tribal lands located along highway and rail routes that could be used for national transportation.

8.11.11.2 (5573)
Comment - EIS001887 / 0199
Page 3-113; Section 3.2.2.1.5 - Cultural Resources

Native American Interests: The Draft EIS states that, "...while transportation issues are of extreme importance to [Native Americans], at present they cannot provide specific comments on any of the Nevada transportation alternatives... due to the absence of systematic ethnographic studies for any of the proposed project areas." Since the Draft EIS acknowledges at least the potential for significant impacts to Native American cultural resources, it is incumbent upon DOE to carry out the needed ethnographic studies as part of its work in preparation of the Draft EIS. DOE has had almost 17 years to do this work, and failure to do it should not exempt DOE from its obligations under NEPA [National Environmental Policy Act]. In addition, a considerable body of information exists as a result of research carried out by the State of Nevada between 1986 and 1998. This research was available to DOE at the time it was preparing the Draft EIS. Summaries of the State's Native American studies reports are found in Appendix II of these comments.

Response
DOE had not conducted comprehensive and systematic ethnographic studies of lands along candidate transportation corridors at the time it published the Draft EIS. The Department reviewed Appendix II to the above-referenced comments with respect to ethnographic information. Since the publication of the Draft EIS, DOE has gathered ethnographic information along the transportation corridors and included it in Section 3.2.2.1.5 of the EIS. The cultural resources sections of Chapter 6 include analyses of this information. Ethnographic information gathering is

not yet complete. DOE would conduct additional surveys in the course of evaluating any final corridor selection and before route construction began to identify cultural resources and to design avoidance or other mitigation measures to minimize the potential for harm to such resources.

Section 9.3.5 of the EIS acknowledges that land clearing, excavation, and construction activities have the potential to disturb or cause the relocation of cultural artifacts, and identifies actions that DOE would take to mitigate adverse impacts to cultural resources along transportation routes. These actions include those required by law or regulation and those built into the project to reduce such impacts.

8.11.11.2 (5606)
Comment - EIS001887 / 0232
Page 4-38; Section 4.1.5.2 - Impacts to Cultural Resources from Construction, Operation and Monitoring, and Closure

Native American Viewpoints: The 1986 Environmental Assessment (EA) for Yucca Mountain stipulated that, "[i]f the Yucca Mountain site is approved for site characterization, [Native American impacts] will receive appropriately detailed treatment in research to be performed during the Environmental Impact Statement process."(26) The EA also made special note of the "potential for impacts on Native American cultures from [SNF (spent nuclear fuel) and HLW (high-level radioactive waste)] transportation activities" and stated that "[t]his aspect will receive appropriately detailed treatment ... if Yucca Mountain is approved for site characterization."(27) The Draft EIS, however, fails to specifically address potential impacts to Native American communities in Nevada (and in states through which SNF and HLW will be shipped to a Yucca Mountain repository). Such impacts include effects on Native culture, economics, infrastructures, emergency response/preparedness requirements, state-tribe relationship effects that may be caused by state routing or risk management decisions, implications for tribal sovereignty, Native land claim issues and impacts, and other areas potentially impacting Native peoples and communities. The Draft EIS should have contained a detailed description of the activities undertaken, the data collected, and the analyses done to adequately evaluate potential effects of the Yucca Mountain program on Native peoples and communities across the country. The Draft EIS should also have included an analysis of the impacts of the transportation of spent fuel and high-level waste.

(26) U.S. Department of Energy. Environmental Assessment Yucca Mountain Site, Nevada Research and Development Area, Nevada, May, 1986, pp. C.4-30.

(27) Ibid, pp. C.7-42.

Response
DOE determined that it is not necessary to examine the composition of the general population residing along existing spent nuclear fuel and high-level radioactive waste transportation corridors before DOE can reasonably conclude that there would be no disproportionately high and adverse impacts to minority and low-income populations from the transportation of radioactive materials. In addition, as described in Chapter 6 of the EIS, incident-free transportation and the risks from transportation accidents (the maximum reasonably foreseeable accident scenario would have 2.3 chances in 10 million of occurring per year) would not present a large health and safety risk to the population as a whole, or to workers or individuals along national transportation routes. The low effect on the population as a whole would be likely for any segment of the population, including minorities, low-income groups, and members of Native American tribes.

However, the Final EIS examines the composition of the population along newly proposed transportation rail corridors in Nevada. Selecting among alternative new routes could offer opportunities to avoid high and adverse impacts that would fall disproportionately on low-income or minority populations in relation to the general population that would not be present when considering existing transportation corridors. Therefore, even though the health effects from exposure to radioactive materials from transportation activities would not implicate environmental justice concerns in selecting new routes, other factors such as the impacts of the construction and use of a newly created route on land use, socioeconomics, noise, air quality, and esthetics could vary by location. Section 6.3.4 of the EIS presents the analysis of environmental justice impacts in Nevada.

8.11.11.2 (5717)
Comment - EIS001887 / 0328
Page 6-34; Section 6.2.5 - Environmental Justice

The Draft EIS refers only to Native Americans affected by national transportation in Idaho. Proper identification of the national highway and rail routes used in the Section 6 analysis would have revealed additional impacts on Native American populations in other states. Analyses prepared for the State of Nevada by Planning Information Corporation identified the following potentially affected Indian Reservations:

Arizona: Hualapai and Navajo (I-10, I-40; BNSF/UPRR);

California: Agua Calientes, Cabazon, Chemehuevi Valley, Ft. Mojave, Ft. Yuma, Morongo, Torres Martinez, and Hoopa Valley (I-10, I-40/I-15; BNSF/UPRR);

Florida: Hollywood (I-95, FECR);

Iowa: Mesquakie (Sac & Fox) (UPRR);

Kansas: Potawotamie (UPRR);

Minnesota Prairie Island (CP/Soo);

Nebraska: Omaha and Winnebago (UPRR);

New Mexico: Acoma, Canoncito, Isleta, Laguna, Navajo, and Zuni (I-10, I-40; BNSF/UPRR);

New York: Cataraugas and Tonawanda (I-90, Conrail)

North Carolina: Cherokee (I-40)

Oklahoma: Choctaw, E. Shawnee, Kialegee Creek, Kickapoo, Miami, Modoc, Osage, Ottawa, Peoria, Quapaw, Sac & Fox, and Thlopthlocco Creek (I-35, I-40; BNSF/UPRR);

Oregon: Umatilla (I-84; UPRR);

Utah: Goshute, Ouray, Skull Valley, and Unitah (I-84/I-15/I-80/US93A; UPRR)

Washington: Yakima (I-84; UPRR)

Wisconsin: Oneida (WCRR)

The Draft EIS does not attempt to define transportation-affected and potentially-affected Indian lands and resources. Nevada defines affected lands and resources to include the following: (1) reservations crossed by potential shipping routes; (2) off-reservation ceded lands, where Tribes retain treaty rights or other legally recognized user rights crossed by potential shipping routes; (3) reservation lands and off-reservation lands within transportation emergency evacuation zones along potential shipping routes; (4) reservation and off-reservation lands which could be contaminated by air or water transport of radioactive materials released in a severe transportation accident or terrorist incident (generally within 50 miles down-wind, down-stream, or down-gradient of a potential shipping route); (5) reservations whose highway access would be disrupted by a nuclear waste transportation emergency; and (6) off-reservation lands along potential shipping routes where Tribal personnel would likely be involved in transportation emergency response.

The Draft EIS gives insufficient consideration to the major concerns identified by potentially affected Indian Tribes and by the National Congress of American Indians. These concerns include: (1) Tribal authority to regulate shipments across reservations; (2) emergency response planning and training for Tribal personnel; (3) advance notification of shipments and shipment monitoring; (4) protection of Native American religious and cultural sites, plants, and animals, both on and off reservations; (5) cultural implications of potential radiological contamination of Indian lands and the cultural implications of cleanup activities involving non-tribal personnel; and (6) adverse economic impacts of public perception of risk, especially adverse impacts on tribal tourism and recreation businesses. Moreover, except for tribes in Idaho, DOE failed to identify potential Indian reservations and communities in the Draft EIS and in the public hearing notices, and failed to provide financial assistance to facilitate independent technical review of the Draft EIS by potentially affected Indian Tribes.

Response

In response to public comments, DOE has revised the EIS to show the locations of Federally recognized tribal lands along highway and rail routes the Department could use for transportation. DOE recognizes that tribal governments have a unique legal and political relationship with the Government of the United States. For this reason, DOE will continue to interact with tribal governments and work with representatives of the Consolidated Group of Tribes and Organizations to ensure that it considers tribal rights and concerns before making decisions or implementing programs that could affect tribes.

With regard to emergency response planning and training, DOE would provide technical and financial assistance to states to assess the need for and training of public safety officials of units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste, as required by Section 180(c) of the NWPA. Section M.6 of the EIS discusses these requirements in detail. In addition, the Federal Radiological Program includes plans that outline the policies, procedures, roles, and responsibilities of Federal, tribal, state, and local agencies in planning for and responding to emergencies involving releases or suspected releases of radiological materials from Government facilities or operations. Training would cover procedures for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. In the event of an incident involving spent nuclear fuel or high-level radioactive waste, the transportation vehicle crew would notify local authorities and the central communications station monitoring the shipment. DOE would make resources available to local authorities, if requested, to mitigate such an incident.

DOE would comply with applicable Federal regulations for notification of spent nuclear fuel shipments and would follow the same procedures for shipments of high-level radioactive waste and for unclassified shipments of DOE-owned material. Nuclear Regulatory Commission regulations require notification of the governor of the affected state or the governor’s designee of pending shipments. In addition, DOE would notify potentially affected tribes of pending shipments. The governor would notify state and local safety officials, as appropriate.

With respect to the Proposed Action, DOE has implemented worker education programs on the protection of cultural resources to limit direct impacts to such resources, especially inadvertent damage and illicit artifact collecting. If significant data recovery (artifact collection) was required during construction and operation, DOE would initiate additional involvement of Native American tribes to determine appropriate costs. If DOE made a decision about the transportation of spent nuclear fuel and high-level radioactive waste in Nevada, it would conduct additional engineering and environmental studies for the selected mode and route to provide the basis for detailed design. In addition, DOE would initiate consultations and interactions with responsible Federal, state, tribal, and local agencies to gather additional location- and community-specific information, assess potential impacts, consider mitigation measures, and conduct appropriate National Environmental Policy Act reviews.

A system of financial protection established by the Price-Anderson Act covers the costs of state and tribal actions associated with a nuclear accident, such as a transportation accident in which there was a suspected release of radioactive material. In response to public comments, Appendix M of the EIS discusses Federal radiological emergency response programs.

The EIS addresses potential risks to human health and the environment from the proposed siting, construction, operation and monitoring, and closure of a repository at Yucca Mountain. The socioeconomic impacts discussed in the EIS include quantitative effects on populations, employment, and income that would result from a decision on whether to proceed with development of the repository. However, the manner in which particular individuals might perceive risks and modify their behavior is speculative and subject to debate.

8.11.11.2 (6621)
Comment - EIS001632 / 0068
The draft EIS (Figures 2-26 and 2-27) depicts U.S. interstate and rail routes which are potential corridors for waste proposed for disposal at Yucca Mountain. We recommend that the final EIS provide a modified overlay of these two figures to depict Tribal lands through which waste bound for disposal at Yucca Mountain may pass via road or rail. The Bureau of Indian Affairs (BIA) has a 1993 map for Indian Land Areas in the lower 48 states. This map depicts the location of tribal lands in relationship to the Federal highway network, and may be useful for this effort.

Response
In response to public comments, DOE has revised Figures 2-25 and 2-26 of the EIS to show Federally recognized tribal lands located along highway and rail routes that could be used for national transportation.

8.11.11.2 (10764)
Comment - EIS002144 / 0001
I'm a member of the tribe the Paiutes, been here since forever. Our people, we're not going anywhere. We can't, because this is our land. This is where we come from. That's a real short, quick history. We are located fifty-five miles from here with the rail line and the interstate running across our lands.

Response
DOE has been interacting with representatives of the Moapa Paiute Tribe as part of the Native American Interaction Program since the late 1980s. The Department appreciates the tribe's involvement to help better understand Native American issues associated with the repository program.

8.11.11.2 (10768)
Comment - EIS002144 / 0005
There have been no studies of our lands and our people and we are the ones that are to lose the most. The studies that they have, transportation studies that they have is for big places like Las Vegas. Well, to some of you guys in Las Vegas, that's not even a drop in the bucket, but if somebody dies on a reservation where we only have approximately 290 enrolled members, that's a big drop. If a truck was going down the road and our tribal council a lot of time travel together in a van, if they were to knock that van off the road and kill everyone, that's six people. That's a whole government that is gone and can't be revived. There is no way you could pay us any amount of money to get those people back because they are no longer here. They no longer exist. The only way they exist is to us, our -- the people of Moapa because they come back and they tell us how we should be doing things, how -- what we should say.

Response
The transportation analyses in the EIS evaluated impacts to all people along the transportation routes, including Native Americans. DOE does not believe it necessary to consider population characteristics on a community-by-community basis to determine potential public health and safety impacts from the transportation of spent nuclear fuel and high-level radioactive waste. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions if there are uncertainties, offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

For example, DOE assumed that an individual, the "maximally exposed individual," would be a resident living 30 meters (100 feet) from a point where all truck shipments, or 200 meters (660 feet) from a point where all rail shipments, would pass. Under these circumstances, the maximally exposed individual would receive a dose of about 6 millirem from exposure to all truck shipments, and a dose of about 2 millirem from exposure to all rail shipments (6 millirem represents an increased probability of contracting a fatal cancer of 3 in 1 million).

Although it can be argued that individuals could live closer to these shipments, it is highly unlikely that an individual would be exposed to all shipments over the 24-year period of shipments to the repository, even though DOE incorporated this highly conservative assumption into the analysis.

8.11.11.2 (11352)
Comment - EIS002271 / 0002
For example, the DOE's lack of proactive procedures put communities at a high level of risk by failing to establish MOU's [Memorandums of Understanding] in a timely manner with Affected Units of Tribal Governments along the nuclear waste transportation routes for the New Mexico, WIPP [Waste Isolation Pilot Project] site.

The DOE's refusal to act in such a proactive manner demonstrated the department's willingness to allow a back-up of nuclear waste on major highways and rail thoroughfares putting citizens at an unnecessary level of risk along those routes. This would not have occurred had MOU's been established with the Affected Units of Tribal Government.

In this scenario, affected tribes may shut down a rail transportation route and file lawsuits against the DOE, severely limiting safe transportation of nuclear waste. When the MOU's were finally established, the language within the MOU's recognized and addressed the concerns and rights of the affected tribes. Similar tribal actions and lawsuits could impede the effective and safe transportation of nuclear wastes.

Response
The Final EIS identifies rail as the preferred mode of transportation. If the Yucca Mountain site received approval, DOE would implement the requirements of Section 180(c) of the NWPA, which requires it to provide technical and financial assistance to states to train public safety officials of appropriate units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel or high-level radioactive waste. Training would cover procedures for safe transportation and for dealing with emergency response situations.

DOE has not yet acted to implement Section 180(c) of the NWPA because such action could only occur after the Yucca Mountain site was been determined to be suitable as a nuclear waste repository. As stated in Appendix M of the EIS, about 4 years prior to the beginning of shipments, DOE would notify affected states and tribes of preliminary routes that shipments could use. Because shipments are not expected to occur prior to 2010, DOE anticipates that the notifications would occur after 2005. At that time, affected states and tribes that had been notified could present proposals to DOE for grants to determine their respective needs for training of safety officials.

Backups on rail lines due to additional rail transport would be unlikely. Spent nuclear fuel and high-level radioactive waste transportation would represent a very small fraction of the total railroad traffic (0.007 percent of railcar kilometers).

8.11.11.2 (11353)
Comment - EIS002271 / 0003
My concern is that within close proximity to the Yucca Mountain site, the Timbisha-Shoshone people are in the process of acquiring surplus federal lands both outside and within the boundaries of the Death Valley National Park. The tribe will be directly affected by the transportation of nuclear wastes within Inyo County and the additional transportation routes to the proposed Yucca Mountain repository. Such transportation routes will affect their pursuit of economic development and physical well-being.

To reiterate, tribal governments need assistance now. Now, not at the time the Yucca Mountain site may be approved or disapproved, or when an alternative site is considered. Such assistance would include funds to establish nuclear waste spill and contamination response teams to address accidents within proximity to tribal ancestral homelands, developed lands, watershed, affected aquifers, and affected atmospheric use areas.

Response
The Timbisha Shoshone Trust Lands are discussed in Section 8.1.2.2 of the EIS. The EIS acknowledges that, because of the proximity of some of the proposed transportation corridors, there would be potential cumulative impacts between their use and the proposed repository with regard to land use, regional water use, and transportation impacts. The analysis found that construction and operation of a branch rail line in the Bonnie Claire variation of the Caliente or Carlin Corridor would restrict access across the Scottys Junction parcel of the Timbisha Shoshone Trust Lands. If the Yucca Mountain site received approval, DOE would implement the requirements of Section 180(c) of the NWPA, which requires it to provide technical and financial assistance to states to train public safety officials of appropriate units of government and Native American tribes through whose jurisdictions it would

transport spent nuclear fuel or high-level radioactive waste. The training would cover procedures for safe transportation and for dealing with emergency response situations.

DOE has not implemented Section 180(c) of the NWPA because such action could occur only after a determination that the Yucca Mountain site is suitable as a nuclear waste repository. As stated in Appendix M of the EIS, about 5 years before shipments began DOE would notify affected states and tribes of preliminary routes the shipments could use. Because shipments would not start before 2010, DOE anticipates that such notifications would occur after 2005.

8.11.11.2 (12509)
Comment - EIS001887 / 0342
Page 6-137; Section 6.3.4 - Environmental Justice Impacts in Nevada

The Draft EIS fails to acknowledge the full range of nuclear waste transportation impacts on Native American communities, lands, and cultural resources in Nevada.

The State of Nevada considers the following Indian Reservations and Colonies in Nevada to be potentially affected by rail and truck routes identified in the Draft EIS:

-Moapa Reservation (UPRR, I-15)

-Las Vegas Reservation (Valley Rail Spur, US95)

-Ely Colony (US93)

-Duckwater Reservation (US6)

-Walker River Reservation (UPRR)

-Pyramid Lake Reservation (UPRR)

-Reno-Sparks Colony (UPRR)

-Lovelock Colony (UPRR)

-Winnemucca Colony (UPRR)

-Te-Moak Reservations [Battle Mountain, Elko, South Fork, Te-Moak, Wells] (Carlin Rail Spur, UPRR)

The Draft EIS does not define transportation-affected and potentially-affected Indian lands and resources. Nevada defines affected lands and resources to include the following: (1) reservations crossed by potential shipping routes; (2) off-reservation ceded lands, where Tribes retain treaty rights or other legally-recognized user rights, crossed by potential shipping routes; (3) reservation lands and off-reservation lands within transportation emergency evacuation zones along potential shipping routes; (4) reservation and off-reservation lands which could be contaminated by air or water transport of radioactive materials released in a severe transportation accident or terrorist incident (generally within 50 miles down-wind, down-stream, or down-gradient of a potential shipping route); (5) reservations whose highway access would be disrupted by a nuclear waste transportation emergency; and (6) off-reservation lands along potential shipping routes where Tribal personnel would likely be involved in transportation emergency response.

The Draft EIS gives insufficient consideration to the major concerns identified by potentially affected Indian Tribes in Nevada, the Western Shoshone National Council, and organizations such as the Nevada Indian Environmental Coalition and the Inter-Tribal Council of Nevada. These concerns include: (1) Tribal authority to regulate shipments across reservations; (2) emergency response planning and training for Tribal personnel; (3) advance notification of shipments and shipment monitoring; (4) protection of Native American religious and cultural sites, plants, and animals, both on and off reservations; (5) cultural implications of potential radiological contamination of Indian lands, and the cultural implications of cleanup activities involving non-tribal personnel; and (6) adverse economic impacts of public perception of risk, especially adverse impacts on tribal tourism and recreation businesses. DOE's proposal to construct a rail spur to Yucca Mountain creates special concerns about right-of-way acquisition implications for Western Shoshone land claims (Ruby Valley Treaty) and about protection of graves, religious sites, and other cultural resources within the candidate rail corridors identified in the Draft EIS. Moreover, DOE failed to provide financial assistance to facilitate independent technical review of the Draft EIS by potentially affected Indian Tribes in Nevada.

Response

In response to public comments, DOE has revised the EIS to show the locations of Native American reservations that could be affected by transportation routes. The Department recognizes that Native American tribal governments have a unique legal and political relationship with the Government of the United States. For this reason, DOE will continue to consult and interact with tribal governments and work with representatives of the Consolidated Group of Tribes and Organizations to ensure that it considers tribal rights and concerns before making decisions or implementing programs that could affect tribes.

With regard to emergency response planning and training, DOE would provide technical and financial assistance to states to assess the need for and training of public safety officials of units of local government and tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste, as required by Section 180(c) of the NWPA. Section M.6 of the EIS discusses these requirements in detail. In addition, the Federal Radiological Program includes plans that outline the policies, procedures, roles, and responsibilities of Federal, tribal, state, and local agencies in planning for and responding to emergencies involving releases or suspected releases of radiological materials from Government facilities or operations. Training would cover procedures for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. In the event of an incident involving spent nuclear fuel or high-level radioactive waste, the transportation vehicle crew would notify local authorities and the central communications station monitoring the shipment. DOE would make resources available to local authorities, if requested, to mitigate such an incident.

DOE would comply with applicable Federal regulations for notification of spent nuclear fuel shipments and would follow the same procedures for shipments of high-level radioactive waste and for unclassified shipments of DOE-owned material. Nuclear Regulatory Commission regulations require notification of the governor of the affected state or the governor's designee of pending shipments. In addition, DOE would notify potentially affected tribes of pending shipments. The governor would notify state and local safety officials, as appropriate.

With respect to the Proposed Action, DOE has implemented worker education programs on the protection of cultural resources to limit direct impacts to such resources, especially inadvertent damage and illicit artifact collecting. If significant data recovery (artifact collection) was required during construction and operation, DOE would initiate additional involvement of Native American tribes to determine appropriate costs. If DOE made a decision about the transportation of spent nuclear fuel and high-level radioactive waste in Nevada, it would conduct additional engineering and environmental studies for the selected mode and route to provide the basis for detailed design. In addition, DOE would initiate consultations and interactions with responsible Federal, state, tribal, and local agencies to gather additional location- and community-specific information, assess potential impacts, consider mitigation measures, and conduct appropriate National Environmental Policy Act reviews.

A system of financial protection established by the Price-Anderson Act covers the costs of state and tribal actions associated with a nuclear accident, such as a transportation accident in which there was a suspected release of radioactive material. In response to public comments, Appendix M of the EIS discusses Federal radiological emergency response programs.

The EIS addresses potential risks to human health and the environment from the proposed siting, construction, operation and monitoring, and closure of a repository at Yucca Mountain. The socioeconomic impacts discussed in the EIS include quantitative effects on populations, employment, and income that would result from a decision on whether to proceed with development of the repository. However, the manner in which particular individuals might perceive risks and modify their behavior is speculative and subject to debate.

8.12 Transportation-Related Comments on the Supplement to the Draft EIS

8.12 (224)
Comment - 11 comments summarized
Commenters stated that the flexible design includes the capability for handling younger, hotter fuel, and questioned whether the transportation impacts of fuel blending were adequately addressed in the Supplement to the Draft EIS. They believe shipping hotter fuel would cause increased radiation exposure to those along transportation routes, to workers, and to those exposed to an accident. Commenters stated that shipping younger fuel would invalidate accident analyses in the Draft EIS and that the Supplement should have contained a risk assessment for this fuel.

Commenters stated that the Supplement should have contained a description of the shipping campaign, including the specific timing, number, and composition of the shipments, and a description of the national routes DOE would use to transport the material. Commenters expressed concern that fuel blending and shipping younger fuel could eliminate the advantages of using rail transportation.

Response
If DOE shipped younger (and therefore hotter) spent nuclear fuel than that assumed for the analysis in the Draft EIS, estimates of public and occupational health and safety impacts would be greater than those reported in the Draft. However, DOE developed the flexible design for the repository to allow flexibility in the emplacement of spent nuclear fuel and high-level radioactive waste that DOE projects it would receive, not to promote or accommodate receipt of younger, hotter spent nuclear fuel. The estimated quantities and characteristics (for example, years following discharge from a reactor) of receipts were based on DOE projections of actions that would be taken by utilities to deliver spent nuclear fuel for disposal. The projections are independent of the repository design. Rather, they are based on the terms of DOE's Standard Contract for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste contained in 10 CFR Part 961 and the generation and storage characteristics of each generator site (see discussion of CALVIN computer code in Section J.1.1.1 of the EIS). DOE does not anticipate that the flexible design would have any effect on the characteristics of spent nuclear fuel that would be shipped to a Yucca Mountain Repository or, consequently, on the casks and modes of transport that would be used for shipment. Therefore, DOE does not expect that the health and safety risks of transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain, or the consequences of maximum reasonably foreseeable transportation accidents would be different for the flexible design from those associated with the design presented in the Draft EIS.

Nevertheless, in response to public comments on the Draft EIS concerning the age and burnup assumed for spent nuclear fuel used in accident analyses, DOE reevaluated the characteristics of spent nuclear fuel that it would receive. As a result of this reevaluation, DOE determined that the accident hazard for spent nuclear fuel with a cooling time of 15 years for pressurized-water reactor fuel assemblies and 14 years for boiling-water reactor fuel assemblies represents the midpoint of the cumulative hazard of all spent nuclear fuel that would be shipped. As a consequence, analyses of accidents presented in the EIS use the characteristics of "representative" spent nuclear fuel described in Appendix A of the EIS. The projected average age of spent nuclear fuel delivered to a repository would be that described for "typical" spent nuclear fuel in Appendix A.

The Draft EIS discussed ongoing site characterization activities and design evaluations, and the potential for resulting changes to the design. Since the publication of that document, DOE acquired an improved understanding of the interactions of repository features with the natural environment, and the advantages of a number of design features (such as titanium drip shields) to enhance containment and isolation. DOE published the Supplement to the Draft EIS to provide the updated information to the public. While aspects of the design evolved from those in the Draft EIS, the basic elements of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository at Yucca Mountain (such as transportation of spent nuclear fuel and high-level radioactive waste) remain unchanged. For this reason, the Supplement focused on the most recent design enhancements, including various repository operating modes to manage heat generated by emplaced spent nuclear fuel and high-level radioactive waste.

If there was a decision to proceed with the development of a repository at Yucca Mountain, shipping routes would be identified at least 4 years before shipments began and NWPA Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. At this time, many years before shipments could begin, it is impossible to predict with a reasonable degree of accuracy which highway routes or rail lines could be used. In the interim, states or tribes could designate alternative preferred highway routes, and highways and rail lines could be constructed or modified. Therefore, for purposes of analysis in this EIS, DOE identified representative highway routes in accordance with U.S. Department of Transportation regulations, which require the use of preferred routes (Interstate System highways, beltways, or bypasses, and state or tribal designated alternate routes) that reduce time in transit. Rail lines were identified based on current rail practices, as there are no comparable Federal regulations applicable to the selection of rail lines for the shipment of radioactive materials.

Because the Yucca Mountain site has not been approved for construction and operation of a geologic repository, DOE has not developed operations plans for transportation. However, a Draft Request for Proposals for *Acquisition of Waste Acceptance and Transportation Services for the Office of Civilian Radioactive Waste Management* (DIRS 153487-DOE 1999) describes the Department's schedules and plans for acquiring services to transport spent nuclear fuel and high-level radioactive waste to a Yucca Mountain Repository (see Appendix M of the EIS).

In response to public comments, DOE has included in the EIS maps of representative highway routes and rail lines that were used for analysis. In addition, potential health and safety impacts associated with shipments are provided for each state through which shipments would pass.

8.12 (251)
Comment - 10 comments summarized
Commenters recognized that, because of the flexible design, the Supplement to the Draft EIS indicates an increased number of worker- and material-related transportation fatalities. Some commenters questioned the validity of the analytical results, and others asked that the analyses be incorporated into the Final EIS along with mitigation strategies. Several commenters expressed concern that the short-duration campaign to ship drip shields to the repository, currently planned for the time near repository closure, is not adequately addressed.

Response
To estimate the number of traffic-related fatalities that would occur in the course of worker commuting and transportation of materials, supplies, and wastes to and from a Yucca Mountain Repository, DOE used the latest reasonably available information compiled from U.S. Department of Transportation statistics. For example, the Bureau of Transportation Statistics reports that about 1 traffic fatality occurs for each 100 million kilometers (62 million miles) of travel on U.S. highways. A fatality rate of 1.4 fatalities per 100 million kilometers is the average of state-specific values used in the EIS for heavy-haul trucks. This value was compiled from data from the Department of Transportation.

The impacts of transporting drip shields to Yucca Mountain are included in analyses of impacts of transporting other materials and personnel in Section J.3.6 of the EIS. Estimated transportation impacts would be the same whether the drip shields were transported for emplacement over the full duration of the emplacement phase or over a period of 1 or 2 years near the end of emplacement, because:

1. The number of railcar and truck shipments and the distance shipped would be the same.

2. The analysis of transportation impacts is based on rate data (per kilometer of travel) for accidents and fatalities. These data were derived from national transportation statistics. Shipments of drip shields, even if compressed into 1 or 2 years, would not be discernible from the total transportation of all commodities on U.S. highways and railroads and, therefore, would not be expected to affect accident or fatality rates.

In addition, because shipments of drip shields from manufacturers to Yucca Mountain would use commercial transportation carriers operating under U.S. Department of Transportation and applicable state safety regulations, the expected rate for involvement in accidents would be the same as for other commodities.

8.12 (10971)
Comment - EIS010158 / 0007
As other people have said, the SDEIS doesn't present qualitative or quantitative studies of the various accident scenarios. Studies must be conducted and presented to the public. How would a crack in the fuel column, accidents

along transportation routes, mislabeling, as people have said of packages, of the waste packages, how the Alloy 22, which is my age, how are all these things going to play out in the long run?

Response
The Draft EIS discussed ongoing site characterization activities and design evaluations, and the potential for resulting changes to the design. Since DOE issued the Draft EIS, it has acquired an improved understanding of the interactions of repository features with the natural environment, and the advantages of a number of design features (such as titanium drip shields) to enhance waste containment and isolation. DOE published the Supplement to the Draft EIS to provide the updated information to the public. While aspects of the design have evolved from those in the Draft EIS, the basic elements of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository at Yucca Mountain (such as transportation of spent nuclear fuel and high-level radioactive waste) remain unchanged. For this reason, the Supplement focused on the most recent design enhancements, including various operating modes to manage heat generated by emplaced spent nuclear fuel and high-level radioactive waste.

In the Draft EIS DOE considered six categories of increasingly severe and increasingly unlikely accident scenarios. The analyses hypothesized one accident scenario to represent each category, along with a corresponding projection of the amount of radioactive material that could be released from a transportation cask. The analyses estimated impacts of postulated releases in three population zones – urban, suburban, and rural – and under two weather conditions – slowly dispersing conditions and moving-air conditions. The analyses also estimated the impacts from an unlikely but severe accident scenario called a maximum reasonably foreseeable accident. In response to public comments and to clarify this discussion for the reader, DOE has revised the EIS to describe the maximum reasonably foreseeable accident in terms of cask failure mechanisms, range of impact velocities, and temperature range for the accident.

Based on the revised analyses, DOE has concluded in the EIS that casks would continue to contain spent nuclear fuel fully in more than 99.99 percent of all accidents (of the thousands of shipments over the last 30 years, none has resulted in an injury due to release of radioactive materials). This means that of the approximately 53,000 truck shipments, there would be an estimated 66 accidents, each having less than a 0.01-percent chance that radioactive materials would be released. The chance of a rail accident that would cause a release from a cask would be even less. The corresponding chance that such an accident would occur in any particular locale would be extremely low. Section J.1.4.2.1 of the EIS presents consequences for accidents that could release radioactive materials.

Section 2.3.4.1 of the Supplement to the Draft EIS discusses the construction of the flexible design waste package, which includes an Alloy-22 shell. This package would contain the waste for emplacement within the proposed repository and is not the cask that would be used for transportation to the Yucca Mountain site. The NWPA requires DOE to use transportation casks certified by the Nuclear Regulatory Commission when transporting spent nuclear fuel and high-level radioactive waste to a repository.

8.12 (12708)
Comment - EIS010485 / 0007
While, according to the Supplement, "Transportation of spent nuclear fuel and high-level radioactive waste to the repository would not be affected by the repository design evolution and is not evaluated in this Supplement," the DOE should disclose the growing resistance to shipping nuclear waste throughout the country in the Supplement.

Response
DOE published the *Supplement to the Draft Environmental Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* to provide the updated design information to the public. While aspects of the design evolved from those in the Draft EIS, the basic elements of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository at Yucca Mountain (including transportation of spent nuclear fuel and high-level radioactive waste) remain unchanged. For this reason, the Supplement focused on the most recent design enhancements, including various operating modes to manage heat generated by emplaced spent nuclear fuel and high-level radioactive waste.

Chapter 6 and Appendix J of the EIS contain information on transportation-related impacts that could result from the Proposed Action. These analyses used widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions that offer the most appropriate means to arrive at conservative estimates of transportation-related impacts. In addition, because of the public's interest in transportation in general and in the related information and analyses, the Department has included in the EIS descriptive information such as a new Appendix M and maps and tables that show the analyzed routes and estimated health and safety impacts for each state through which the shipments would pass. Appendix M provides general background information about transportation-related topics, such as transportation operations, cask testing requirements, and emergency response.

DOE has considered all comments received on the Draft EIS, as well as all comments received on the Supplement to the Draft EIS, and responded to them in this Comment-Response Document, including those that address concerns with shipping spent nuclear fuel and high-level radioactive waste. The Secretary of Energy will make a determination on whether to recommend the site to the President on the basis of a number of different types of information, including that contained in the Final EIS. Any recommendation of the site to the President by the Secretary of Energy would be accompanied by the Final EIS.

8.12 (13080)
Comment - EIS010230 / 0006
The low-temperature scenario is intended to improve the long-term performance of the repository and reduce geologic uncertainties, but would result in greater transportation risks, including a higher traffic fatality rate, due to an increased distance/number of shipments to the repository. The SDEIS should offer mitigation measures to help minimize the increased transportation risk.

Response
DOE believes that the risks of transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain would be very small for the Proposed Action, regardless of the eventual repository design. The transportation activities under the lower-temperature repository operating mode would be similar to the other repository scenarios. The distances and number of shipments to the repository would not change. Therefore transportation risks would not be greatly different. If the Yucca Mountain site was selected, DOE would enter into discussions with potentially affected units of local government and consider appropriate support and mitigation measures.

8.12 (13082)
Comment - EIS010230 / 0008
In Section 3.1.14, "Transportation," the SDEIS states that "transportation of spent nuclear fuel and high-level radioactive waste to the repository would not be affected by the repository design evolution." It is impossible to predict whether transportation would be affected because the design has not been finalized. Therefore, the relationship of design evolution to transportation parameters is unknown.

Response
The Draft EIS discussed ongoing site characterization activities and design evaluations, and the potential for resulting changes to repository design. Since DOE issued the Draft EIS, it has acquired an improved understanding of the interactions of repository features with the natural environment, and the advantages of a number of design features (such as titanium drip shields) to enhance waste containment and isolation. DOE issued the Supplement to the Draft EIS to provide the updated information to the public. While aspects of the design have evolved, the basic elements of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository at Yucca Mountain (such as transportation of spent nuclear fuel and high-level radioactive waste) remain unchanged. For this reason, the Supplement focused on the most recent design enhancements, including various operating modes to manage heat generated by emplaced spent nuclear fuel and high-level radioactive waste.

DOE believes, however, that the EIS adequately analyzes the potential environmental impacts that could result from the Proposed Action. This belief is based on the level of information and analysis, the analytical methods and approaches used to represent conservatively the reasonably foreseeable impacts, and the use of bounding assumptions where information is incomplete or unavailable, or where uncertainties exist. The use of widely accepted analytical tools, latest reasonably available information, and cautious but reasonable assumptions offer the most appropriate means to arrive at conservative estimates of transportation-related impacts.

8.12 (13225)
Comment - EIS010244 / 0024
Figure 2-4 of the SDEIS refers only to direct rail access and heavy-haul access to the site. The text on page 2-12 refers to legal weight trucks. It is not clear if DOE anticipates legal-weight trucks being used to transport waste directly to the Yucca Mountain site.

Response
DOE has incorporated Figure 2-4 of the Supplement to the Draft EIS into the Final EIS and modified it to clarify that legal-weight trucks and either railcars or heavy-haul trucks would have access to the site.

8.12 (13277)
Comment - EIS10231 / 0011
Page 3-17, Section 3.1.14. Transportation. We note that the transportation impacts are increased for the flexible design over the draft EIS design. These increased impacts, as well as those noted in other areas, should be incorporated into the final EIS analysis.

Response
The flexible design presented in the Supplement to the Draft EIS was carried forward to the Final EIS analyses.

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9

No-Action Alternative

9. NO-ACTION ALTERNATIVE

9.1 Technical Issues

9.1 (138)
Comment - 13 comments summarized
Commenters said that the No-Action analysis is inadequate and does not provide a basis for comparison with the Proposed Action. Some of the reasons stated include: the existence of large uncertainties, lack of information, and failure of DOE to quantify how uncertainties could affect the outcome of the analysis; the use of a regional approach instead of a site-by-site approach, without providing data that shows it is truly representative; the use of different assumptions related to conservatism between the analysis of the Proposed Action and the No-Action Alternative; the need to look at a scenario that includes some redistribution or centralizing of the waste as a possible outcome of no action on the repository; and failure to consider the potential value of the waste.

Several commenters stated that a more comprehensive analysis on a site-by-site basis would demonstrate that a geologic repository would be favorable.

Response
DOE analyzed the No-Action Alternative to serve as a basis for comparing the magnitude of potential environmental impacts of the Proposed Action. Under the No-Action Alternative, and consistent with the NWPA, DOE would terminate activities at Yucca Mountain and undertake site reclamation to mitigate any significant adverse environmental impacts. In addition, DOE would prepare a report to Congress, with the Department's recommendations for further action to ensure the safe, permanent disposal of spent nuclear fuel and high-level radioactive waste, including the need for new legislative authority. Under any future course that would include continued storage at the generator sites, commercial utilities and DOE would have to continue managing spent nuclear fuel and high-level radioactive waste in a manner that protected public health and safety and the environment. However, the future course that Congress, DOE, and the commercial utilities would take if Yucca Mountain was not approved is uncertain.

DOE recognizes that a number of possibilities could be pursued, including continued storage of spent nuclear fuel and high-level radioactive waste at existing sites and/or one or more centralized locations, study and selection of another location for a deep geologic repository (Chapter 1 identifies the process and alternative sites previously selected by DOE for technical study as potential repository locations), the development of new technologies (for example, transmutation), or reconsideration of alternatives to geologic disposal. The environmental considerations of these possibilities have been analyzed in other contexts in other documents to varying degrees.

The No-Action Alternative did not consider redistribution or centralizing of spent nuclear fuel. However, the introduction to Chapter 7 of the EIS lists several references to documents that have evaluated potential environmental impacts of away-from-reactor spent nuclear fuel consolidation facilities. In addition, because the Department believes that it is a reasonably foreseeable future action although still uncertain, the Final EIS includes an evaluation of potential cumulative transportation impacts associated with the shipment of 40,000 metric tons of heavy metal (MTHM) of commercial spent nuclear fuel to a proposed privately owned centralized storage facility at Skull Valley in Utah (see Chapter 7 and Section 8.4 for details).

In light of these uncertainties, DOE decided to illustrate the possibilities by focusing the analysis of the No-Action Alternative on the potential impacts of two scenarios—long-term storage of spent nuclear fuel and high-level radioactive waste at the current sites with effective institutional control for at least 10,000 years (Scenario 1), and long-term storage with no effective institutional control after about 100 years (Scenario 2). Although the Department agrees that neither of these scenarios is likely, it selected them for analysis because they provide a basis for comparison to the impacts of the Proposed Action and because they reflect a range of the impacts that could occur.

In addition, because the purpose of the No-Action Alternative is to provide a basis for comparison with the Proposed Action, DOE has tried to be consistent with the analyses of the Proposed Action, as appropriate. Regarding long-term analyses, for example, Section K.1 of the EIS notes that DOE did not want to influence the results to favor the

Proposed Action, and thus used assumptions for the No-Action Alternative that minimized predicted impacts. The Department believes that the avoidance of overstatement of impacts is the conservative approach for evaluation of potential impacts from the No-Action Alternative. Section K.4 discusses examples of these assumptions and their effects on the outcome of the impact analyses. Based on the above, DOE believes that the environmental impacts of the No-Action Alternative discussed in Chapter 7 and Appendix K are not overstated.

In Section K.4.4 of the EIS, DOE acknowledges that the No-Action Alternative impacts presented in Chapter 7 and Appendix K could be much larger or smaller than those estimated for the EIS. DOE believes that these estimates (with their uncertainties) adequately describe the potential environmental impacts that could occur from continued storage of high-level radioactive waste and spent nuclear fuel at or near existing facilities, and are valuable to the decisionmaking process.

Chapter 7 and Appendix K of the EIS provide information related to the No-Action Alternative. In addition, the 16 references cited in the No-Action impact analysis provide additional detailed information.

DOE analyzed five “regionalized” sites based on regional environmental parameters. DOE selected and weighted these parameters based on each site’s potential for human health impacts (that is, inventory, facility failure rates, canister corrosion rates, surface-water pathways to humans, and downstream populations). DOE evaluated site-specific environmental conditions, such as freeze-thaw cycles, precipitation frequency and quantities, precipitation chemistry, and relative humidity, at the 77 storage locations to determine failure times for the primary weather protection barriers (see Section K.2.1.1 of the EIS). For above-ground concrete storage facilities, these failure times ranged from fewer than 75 years for areas with many freeze-thaw cycles and abundant precipitation, such as the Northeast, to more than 600 years in dry, warm areas, such as the desert Southwest. For the below-grade storage facilities (such as those at the Savannah River Site and Hanford), the Department assumed that the primary weather protection would fail at 50 years after maintenance ended because, unlike the reinforced concrete structures used in above-ground facilities, the below-grade facilities use sheet-metal buildings. Release of radioactive materials would not begin with the loss of weather protection but only after the weather protection was lost and the storage canister and or cladding failed (see Section K.2.1). In addition, DOE gathered operational data obtained from facilities currently in operation or planned for the near future (see Appendix K of the EIS). The analysis constructed and evaluated the five hypothetical sites in a manner such that the total collective impacts estimated for a given region would be essentially equal to those that would have been estimated using individual, site-specific analyses.

Because the potential value of spent nuclear fuel and high-level radioactive waste would be the same under the Proposed Action and the No-Action Alternative, DOE does not consider it to be an important discriminator in the decisionmaking process and, therefore, did not include the value in either analysis.

9.1 (162)
Comment - 2 comments summarized
Commenters stated that a reliance on the Nuclear Regulatory Commission’s prior analysis conducted for independent spent fuel storage installations as a basis for characterizing long-term at-reactor storage is not appropriate.

Response
The Nuclear Regulatory Commission (DIRS 101899-NRC 1996) has stated, “The overall conclusion for on-site storage of spent fuel during the term of a renewed license is that the environmental impacts will be small for each plant.” Although this finding is applicable only to the continued storage of existing spent nuclear fuel and spent nuclear fuel generated during the 20-year license renewal period for a nuclear powerplant, for purposes of analysis, DOE assumed that potential environmental and radiological impacts for the storage facility would remain small for much longer periods assuming effective institutional controls are maintained. Environmental impacts would remain small because no additional fuel would be generated beyond the operation of the nuclear powerplant (plants are assumed to be closed after the first 20-year license renewal period), and radiological impacts would remain within regulatory limits specified in the storage facility license (10 CFR Part 72).

9.1 (250)
Comment - 20 comments summarized
Commenters suggested that the Supplement to the Draft EIS should have considered aging spent nuclear fuel and high-level radioactive at the generator sites rather than at the repository site. The commenters suggested several benefits of generator-site aging which included reduced transportation risks (incident-free and accidents), reduced health and safety risks (for both routine operations as well as accident consequences) and expenses related to the proposed repository spent nuclear fuel aging facility, and providing additional time for development of new management technologies as well as scientific research and review of currently proposed disposal technologies. Other commenters suggested that storage of fuel at existing sites for up to 100 years for the purpose of cooling would be a more realistic No-Action Alternative than abandoning the spent nuclear fuel at the reactor sites for 10,000 years. Commenters suggested that the interim storage facilities could be used to age the spent nuclear waste.

Response
The commenters are correct in saying that, as spent nuclear fuel and high-level radioactive waste age, their radioactivity decreases. DOE recognizes that delaying the shipment of these materials for 50 years could reduce radiation exposures to transportation workers (truck drivers and handlers) and the public living along the transportation routes. However, because of the generally higher population densities near the generator sites, delaying shipment to the proposed repository and allowing the material to accumulate at generator sites or nearby interim storage facilities could increase potential overall impacts to current and future generations of individuals living and working in and around the storage facilities. Section 7.2.1.7.3 of the EIS contains information on the effects of delayed shipment indicating that most short-term impacts from the continued storage of spent nuclear fuel and high-level radioactive waste (about 15 latent cancer fatalities) would result from exposure to noninvolved workers working near the storage facilities during the first 50 years of storage. Implementation of the Proposed Action would avoid much of this exposure. Under a delayed shipping scenario, such exposures would be additive to the somewhat reduced exposures to workers and the public resulting from the later transportation of spent nuclear fuel and high-level radioactive waste to the repository. Thus, a significant reduction in collective impacts, including those resulting from a smaller repository surface aging facility, under a delayed shipping scenario or near-site interim storage would be unlikely.

Similarly, reductions in potential impacts resulting from transportation (both accidents and incident-free transport) of "representative" fuel (see Appendix A) evaluated in Chapter 6 of the EIS or for routine operations or accidents at the repository evaluated in Chapter 4 would not be offset by the potential impacts of 50 to 100 years of additional storage at the generator sites of more than 16 latent cancer fatalities (see Section 7.2.1.7.3).

Socioeconomic impacts related to extended emplacement periods are discussed in Section 3.1.6 of the Supplement to the Draft EIS and 4.1.6 of the Final EIS. However, as discussed in Section 5.2.4.1 of the Draft EIS, DOE accepts the position of the National Academy of Sciences that it is not possible to make accurate predictions of future human behavior. As stated in Section 5.2.4.1 of the Draft EIS, DOE used a default position of today's conditions. For the Final EIS, DOE has projected baseline population and other economic measures to 2035. Because much of the aging process occurs outside of the timeframe for which socioeconomic impacts can reasonably be predicted (2035), the estimated impacts are generalized and confined to direct employment estimates. In addition, projections for periods further in the future would be substantially less credible and for this reason, have not been included in the analysis.

With regard to comments suggesting that onsite aging would be a more realistic No-Action Alternative, although not specifically evaluated, DOE believes that potential impacts related to onsite aging would be similar to the short-term impacts estimated for the No-Action Alternative, which assumes that the spent nuclear fuel would remain on the site for 100 years (see Section 7.2.1.7.3). DOE believes that licensed onsite dry storage facilities demonstrate the practicality and feasibility, and thus the reasonableness, of the No-Action scenarios. In addition, DOE believes the two No-Action Alternative scenarios evaluated in this EIS reflect a range of impacts that could occur and, therefore, provide an adequate basis for comparison of impacts resulting from the Proposed Action.

The Proposed Action includes a lengthy program of monitoring and testing that would continue for perhaps more than 300 years after waste emplacement ended (through closure of the repository, as described in Section 2.1.2 of the EIS). It would give future decisionmakers the ability to take advantage of technological advances, implement corrective actions, if required, and make societal choices on closing the repository or retrieving the wastes.

However, even if new technologies become feasible sometime in the future, the Department believes that a repository would continue to be an essential element of the nuclear fuel cycle because significant quantities of highly radioactive, long-lived materials would remain unsuitable for treatment. Therefore, the Department does not recommend abandoning the Nation's current waste management strategies.

9.1 (292)
Comment - EIS000026 / 0003
Under the No-Action Alternative, if the Department of Energy decides not to proceed with the development of a repository at Yucca Mountain, one alternative will be the continued storage of the materials at their present locations. The EIS considered two scenarios in this event: long-term storage of spent nuclear fuel and high-level radioactive waste at the current sites with effective institutional control for at least 10,000 years and long-term storage with no institutional controls after approximately 100 years. A number of considerations were taken into account under these scenarios. However, from Florida's standpoint, the risks from possible hurricanes on stored spent nuclear fuel and high-level radioactive waste were not considered appropriately in either scenario.

Response
The Nuclear Regulatory Commission licenses spent nuclear fuel storage facilities at commercial nuclear generating sites (such as those in Florida) under 10 CFR Part 72. License requirements include extensive safety analyses that consider the impacts of plausible accident-initiating events (including natural phenomenon such as earthquakes, tornadoes, lightning, hurricanes, floods, tsunami, and seiches). These analyses must demonstrate that the facilities can withstand the most severe wind loading (tornado winds and tornado-generated missiles) and flooding from the Probable Maximum Hurricane with minimal release of radioactive material. DOE has revised Section 7.2.1.8 of the EIS to reflect these requirements.

Chapter 7 of the EIS describes an analysis DOE performed to identify types of events (natural and manmade) that could lead to the release of radioactive material to the environment. The analysis found no such events. However, it did determine that two events would be the most challenging to the integrity of a licensed and maintained storage facility -- the crash of an aircraft and a severe seismic event (see Section 7.2.2.7).

The analysis assumed that the facilities would be licensed and maintained during the period of active institutional control (the first 100 years of Scenarios 1 and 2 and the remaining 9,900 years of Scenario 1) and, therefore, that they would be able to withstand maximum postulated hurricanes. Under Scenario 2, during the period without institutional control (100 to 10,000 years), there would be no maintenance so the facilities would eventually degrade to a point where protection from hurricanes would not be effective. If a hurricane struck a degraded facility, a release of radioactive materials could occur earlier than predicted (see Section K.2 of the EIS) because of damage to the engineered barriers (concrete storage modules, dry storage canisters, material cladding, etc.). Section K.4 describes the potential effect of early loss of these barriers, which could result in significantly greater collective impacts than those discussed in Sections 7.2.1.7.3 and 7.2.2.5.3. However, because of the large uncertainties involved with trying to predict the outcome, and because DOE did not want to overestimate the impacts of the No-Action Alternative, the analysis made no attempt to quantify potential impacts from future severe weather phenomena.

9.1 (2043)
Comment - EIS001660 / 0006
The DEIS is confusing and misleading with regards to future generation of SNF [spent nuclear fuel] and HLW [high-level radioactive waste]. When discussing the no-action alternative, the DEIS says that all nuclear power plants will be closed by 2116 (p. 7-28), that decommissioning will occur in 2052 (p. 7-29), and that nuclear power plants would be closed after the first 20-year licensing renewal period (pp. 7-43 and -44). The cumulative impact analysis considers SNF generated until the year 2046, and says that Modules 1 and 2 represent "all" projected SNF and HLW (p. 8-5). No such statements are made regarding the proposed action.

If the DOE proposes to close all commercial nuclear power plants by a certain year, this must be explicitly stated as part of the proposed action. If not, both the proposed action and the no-[action] alternative must consider SNF and HLW generated after that year. Presently, the analysis of the proposed action does not account for 35,000 tons of SNF and HLW generated through 2046, over and above 70,000 tons that would be placed at Yucca Mountain. Nor does the DEIS account for SNF and HLW generated after 2046. Because of these errors, the DEIS greatly underestimates the costs of the proposed action. (See Table 2-5.)

Response
DOE recognizes that some existing nuclear facilities could be shut down prematurely and that others could be relicensed more than once. However, for purposes of analysis, the Department used certain simplifying assumptions to evaluate potential impacts of the No-Action Alternative. Important among these are the assumption that the No-Action Alternative would begin in 2002 (Sections 2.2.2 and 7.2 of the EIS), that some commercial nuclear powerplants would continue to operate through the first 20-year licensing renewal period (Section 7.3), and that noninvolved workers (powerplant workers) would remain at the generating facilities until 2052 (Section 7.2.1.7.3). These assumptions established a basis for analysis of the No-Action Alternative and are not predictions of actual events or proposals for future action.

The NWPA specifically restricts the capacity of the Nation's first repository to no more than 70,000 metric tons of heavy metal of spent nuclear fuel and high-level radioactive waste. Therefore, DOE limited the impact evaluation of the Proposed Action to those that could result from the emplacement of 70,000 metric tons of heavy metal. However, disposing of all commercial and DOE spent nuclear fuel and all high-level radioactive waste projected through 2046 (Module 1) as well as Greater-Than-Class-C low-level radioactive waste and Special-Performance-Assessment-Required waste (Module 2) in the repository represents a reasonably foreseeable future action. For this reason, DOE analyzed the potential impacts for these actions as potential cumulative impacts (Chapter 8).

For consistency, the No-Action Alternative analysis also evaluated the potential environmental impacts from continued onsite storage of all commercial and DOE spent nuclear fuel and all high-level radioactive waste projected through 2046. Section 7.3 of the EIS discusses the results of these analyses.

Regarding evaluation of commercial spent nuclear fuel generated after 2046, DOE believes that generation rates after the first licensing renewal period are too speculative to predict. Therefore, the analyses did not evaluate these potential impacts for either the Proposed Action or the No-Action Alternative.

9.1 (3637)
Comment - EIS001105 / 0001
While it is recognized that the no-action alternative be addressed, it is acknowledged that the judged consequences are highly speculative and that the actual impact of no action could well be many times greater than that presented in the draft. A particular example is the "sealed source" waste described in Appendix A Section A.2.5.3. The assumption that this material will always be placed in standard waste packages is unrealistic. Thus, the no-action case underestimates the potential for its deterioration, with resultant releases of actinides. Such releases would seriously multiply the consequences of the no-action case to both human mortality and environmental contamination throughout the DOE/commercial sites and their environments across the entire country.

Response
The assumption that DOE would place sealed-source waste in standard waste packages applies only to disposal of these wastes at the proposed Yucca Mountain Repository, as discussed in Chapter 8 of the EIS.

As stated in Section 7.3 of the EIS, DOE did not include a quantitative evaluation of Module 2 inventory potential impacts under the No-Action Alternative because not enough information is available about the long-term storage configuration of the sealed sources under that alternative.

9.1 (3959)
Comment - EIS001486 / 0001
Missing under the No-Action Alternative is No-Generation. This would cut loses due to the predicted increment in waste as well as to an accidental increment as aging generators become short-timers.

Response
DOE has no authority over the operation of the Nation's commercial nuclear powerplants. As mandated by the Atomic Energy Act, the Nuclear Regulatory Commission has jurisdictional authority for commercial uses of nuclear

materials, including the operation of reactors to produce electricity; this includes the production of electricity from nuclear energy and the interim storage of spent nuclear fuel at the reactor sites.

9.1 (4101)
Comment - EIS001375 / 0005
The "No Action" alternative leaves the waste in storage facilities at reactor sites that were never intended to become permanent storage sites. Although on-site dry cask storage has been determined by the NRC to be safe for a limited amount of time, waste should not be stored on-site indefinitely. There are 11 active commercial nuclear reactors in Illinois and 3 retired commercial reactors. These sites are all near major population centers and/or Illinois waterways.

Response
By including long-term onsite storage as part of the No-Action Alternative, DOE is not predicting conditions that would actually occur. In fact, the Department recognizes that both No-Action Alternative scenarios are unlikely (see Section 2.2 and the introduction to Chapter 7 of the EIS). However, the Department selected these scenarios to provide a basis for comparison to the Proposed Action and because they reflect a range of potential impacts that could occur from the continued storage of material at these sites.

If the Yucca Mountain site was not approved, DOE would discontinue the development of a repository at Yucca Mountain and, as directed by Section 113(c)(3) of the NWPA, would prepare a report to Congress with its recommendations for further action to ensure the safe, permanent disposal of spent nuclear fuel and high-level radioactive waste, including the need for new legislative authority. Based on Nuclear Regulatory Commission regulations and DOE directives that govern the safe and secure storage of spent nuclear fuel and high-level radioactive waste, commercial and DOE sites have an obligation to continue to manage these materials in a manner that protects public health and safety and the environment.

9.1 (4260)
Comment - EIS001160 / 0075
Page 1-20. Failure to provide institutional control over this sensitive and potentially dangerous material (provided governmental agencies concerned with this still exist) is poor logic. Perhaps the DOE could consider alternatives in the range between 100 and 10,000 years. Other parts of the document discuss permanent closure after 300 years. This appears inconsistent with other statements in the document.

Response
DOE recognizes that maintaining effective institutional control for 10,000 years is unlikely, as is losing effective institutional control after 100 years (see Section 2.2 and Chapter 7 of the EIS). The Department selected these scenarios because it did not want to speculate on actions that Congress, DOE, and the utilities could take if Yucca Mountain was not approved as a repository site and because predicting a date for a loss of institutional control would be speculative. The Nuclear Regulatory Commission and the Environmental Protection Agency have recognized this and, although they encourage the maintenance of monitoring and physical oversight for as long as possible, they recognize that projecting society's willingness and ability to provide such a function for more than 100 years into the future is not reasonable. DOE selected these scenarios to provide a basis for comparison of impacts from the Proposed Action and to reflect a range of impacts that could occur if spent nuclear fuel and high-level radioactive waste were left where they are currently stored.

DOE believes that efforts to perform additional analyses, such as institutional control for 300 years, probably would yield results that contained some combination of the environmental and human health effects postulated for the two scenarios evaluated in the EIS and, therefore, would not provide substantive additional information for the decisionmakers.

9.1 (4272)
Comment - EIS001160 / 0080
Page 2-1: The second paragraph notes that the No Action Alternative is intended to serve as a baseline against which the Proposed Action can be evaluated. Because waste managed on-site at generator locations has institutional controls, the No Action assumption of loss of institutional controls is not a true reflection of baseline conditions.

Response
Because the future course that Congress, DOE, and the commercial utilities would take if Yucca Mountain did not receive a recommendation as a repository site is uncertain (see the introduction to Chapter 7 of the EIS), DOE decided to illustrate one set of possibilities by focusing the analysis of the No-Action Alternative on the potential impacts of two scenarios: long-term storage of spent nuclear fuel and high-level radioactive waste at the current sites with effective institutional control for at least 10,000 years (Scenario 1), and long-term storage with no institutional control after approximately 100 years (Scenario 2). DOE recognizes that neither of these scenarios would be likely to occur but selected them for analysis because they reflect a range of potential impacts that could occur. The Department evaluated Scenario 1 to estimate potential impacts under the status quo: continuing to store spent nuclear fuel and high-level radioactive waste with institutional control. Scenario 2 provides another set of potential impacts if the responsible organizations became unable or unwilling to continue to fund surveillance and maintenance of the storage facilities. DOE selected Scenario 2 to parallel that part of the Proposed Action analysis in which long-term performance does not include institutional controls.

9.1 (4279)
Comment - EIS001160 / 0087
Page 2-59: The No-Action Alternative should be recognized as more than simply "providing a baseline for comparison." In fact, DOE can choose the No-Action Alternative and the Secretary of Energy could do so in a subsequent Record of Decision. The DEIS must provide analytical evidence as to why whichever alternative is selected.

Response
DOE analyzed the No-Action Alternative to serve as a basis for comparing the magnitude of potential environmental impacts of the Proposed Action. Under the No-Action Alternative, and consistent with the NWPA, DOE would terminate activities at Yucca Mountain and undertake site reclamation to mitigate any significant adverse environmental impacts. In addition, DOE would prepare a report to Congress, with the Department's recommendations for further action to ensure the safe, permanent disposal of spent nuclear fuel and high-level radioactive waste, including the need for new legislative authority. Under any future course that would include continued storage at the generator sites, commercial utilities and DOE would have to continue managing spent nuclear fuel and high-level radioactive waste in a manner that protected public health and safety and the environment. However, the future course that Congress, DOE, and the commercial utilities would take if Yucca Mountain was not approved is uncertain.

In light of these uncertainties, DOE decided to illustrate the possibilities by focusing the analysis of the No-Action Alternative on the potential impacts of two scenarios – long-term storage of spent nuclear fuel and high-level radioactive waste at the current sites with effective institutional control for at least 10,000 years (Scenario 1), and long-term storage with no effective institutional control after about 100 years (Scenario 2). Although the Department agrees that neither of these scenarios is likely, it selected them for analysis because they provide a basis for comparison to the impacts of the Proposed Action and because they reflect a range of the impacts that could occur.

As discussed in Section 2.6 of the EIS, the Secretary of Energy would consider not only the potential environmental impacts and public comments on the EIS, but also other factors in determining whether to recommend the Yucca Mountain site to the President. Factors could include those identified through public input, but others as well, including:

- Ability to obtain necessary approvals, license, and permits
- Ability to fulfill stakeholder agreements
- Consistency with DOE mission
- Assurance of safety facility construction and operations flexibility
- Cost of implementation
- Ability to mitigate impacts

9.1 (4407)
Comment - EIS001555 / 0004
So as far as where this nuclear waste can go, who knows, there is no safe place.

Leaving it on site is the worst place to put it, short of dumping it in the middle of Lake Erie. And the reason why is every nuclear power plant in the United States is sited on a river, a lake, or around the ocean coast. The reason being they need all that water for their operations, you know, millions of gallons. And yet if you leave the waste on Lake Erie, on a river, on an ocean coast, if there is a tornado, whatever, the Nuclear Regulatory Commission has stated in a hearing they had in Lake County about the Perry Nuclear Power Plant that low level radioactive waste, if stored in a special radioactive waste storage building, that CEI was going to do there, but now apparently doesn't have to, could destroy the building and spread radioactive waste around the community, according to testimony that was in the transcript from an official at the NRC. So a tornado can pick up a car, it can pick up a cow, can a tornado pick up a dry cask of radioactive waste and throw it in to Lake Erie, sure, why not?

Response
DOE believes that the Federal policy to dispose of such wastes underground in a mined geologic repository continues to be the most promising method to provide reasonable expectation of adequate protection of public health and the environment from potential radiation impacts.

The Nuclear Regulatory Commission licenses spent nuclear fuel storage facilities at commercial nuclear generating sites under 10 CFR Part 72. License requirements for such facilities include extensive safety analyses that consider the impacts of plausible manmade and natural phenomenon accident-initiating events (including earthquakes, tornadoes, lightening, hurricanes, floods, tsunami, and seiches). These safety analyses must demonstrate that the facilities are able to withstand the most severe wind loadings (tornado winds and tornado-generated missiles) and flooding from the Probable Maximum Hurricane with minimal release of radioactive material. Therefore, it is highly unlikely that a tornado could pick up a dry cask of spent nuclear fuel and carry it into Lake Erie.

However, because of lower hazard and shorter storage times, these requirements might not exist under the 10 CFR Part 50 license used for storing low-level radioactive waste. DOE did not evaluate potential impacts associated with onsite storage of low-level radioactive waste because these wastes are not candidates for disposal at Yucca Mountain under the Proposed Action.

9.1 (4482)
Comment - EIS001376 / 0008
The DEIS states (at S.3.2) that neither No-Action Scenario would be likely, ostensibly because the Nation could pursue one of numerous other alternatives to manage SNF [spent nuclear fuel] and HLW [high-level radioactive waste] if Yucca Mountain is not licensed. However, history has shown that the Nation and the federal government have failed to implement any of those other alternatives and have also failed to identify and implement a viable permanent storage option. If there are other scenarios which are considered viable, they should be analyzed as part of the EIS.

The No-Action Scenarios emphasize the problems created by temporary, consolidated storage facilities, which are also not considered in the DEIS, e.g., a temporary facility at Yucca Mountain and/or the proposed PFS [the Private Fuel Storage] facility in Skull Valley, Utah. Moving SNF to temporary facilities, which would not be constructed but for the status of a permanent facility, transfer the risk of storage to new sites.

The federal government should not license or operate any consolidated, temporary SNF storage facilities at Yucca Mountain or in Utah. Under any Scenario other than No-Action, such facilities would not be needed, based on the evaluation in the DEIS.

On the other hand, if temporary, consolidated SNF storage facilities are licensed at Yucca Mountain or Skull Valley, but permanent storage at Yucca Mountain ultimately is not licensed, the risks (as defined in the No-Action Scenarios) will have been shifted from existing nuclear power plant facilities to new sites for which there is currently no risk or responsibility for management of high-level nuclear waste. That impact, as indicated above, is not adequately addressed for Skull Valley, Utah or Yucca Mountain, Nevada in this DEIS.

Response
DOE analyzed the No-Action Alternative to serve as a basis for comparing the magnitude of potential environmental impacts of the Proposed Action. Under the No-Action Alternative, and consistent with the NWPA, DOE would terminate activities at Yucca Mountain and undertake site reclamation to mitigate any significant adverse environmental impacts. In addition, DOE would prepare a report to Congress, with the Department's recommendations for further action to ensure the safe, permanent disposal of spent nuclear fuel and high-level radioactive waste, including the need for new legislative authority. Under any future course that would include continued storage at the generator sites, commercial utilities and DOE would have to continue managing spent nuclear fuel and high-level radioactive waste in a manner that protected public health and safety and the environment. However, the future course that Congress, DOE, and the commercial utilities would take if Yucca Mountain was not approved is uncertain.

DOE recognizes that a number of possibilities could be pursued, including continued storage of spent nuclear fuel and high-level radioactive waste at existing sites and/or one or more centralized locations, study and selection of another location for a deep geologic repository (Chapter 1 identifies the process and alternative sites previously selected by DOE for technical study as potential geologic repository locations), the development of new technologies (for example, transmutation), or reconsideration of alternatives to geologic disposal. The environmental considerations of these possibilities have been analyzed in other contexts in other documents to varying degrees.

In light of these uncertainties, DOE decided to illustrate the possibilities by focusing the analysis of the No-Action Alternative on the potential impacts of two scenarios – long-term storage of spent nuclear fuel and high-level radioactive waste at the current sites with effective institutional control for at least 10,000 years (Scenario 1), and long-term storage with no effective institutional control after about 100 years (Scenario 2). Although the Department agrees that neither of these scenarios is likely, it selected them for analysis because they provide a basis for comparison to the impacts of the Proposed Action and because they reflect a range of the impacts that could occur.

9.1 (4850)
Comment - EIS001215 / 0001
The draft EIS does not adequately address the potential impacts of various forms of "no action" on Hanford. Substantial quantities of high-level waste and spent fuel would remain in storage at Hanford. The impact of this indefinite long-term storage must be considered.

The EIS states that different and less conservative parameters were used in evaluating the No Action Alternative as compared to those used for the repository analysis so as not to unduly influence the results in favor of the repository. As a result, the standards of the analysis become a comparison of apples and oranges. It is abundantly clear from the current extensive contamination of soils and groundwater at Hanford that these wastes are mobile and they will spread in the surface and near-surface environment. There are also additional unique driving forces including burrowing animals, insects and plants that increase these problems. The No Action Alternative analysis must be conducted with equal rigor and protection in its general assumptions for the comparison to have any real meaning.

Response
DOE agrees that potential impacts at the Hanford Site could be greater than the estimates in this EIS. Section K.4.4 of the EIS acknowledges that the No-Action Alternative impacts in Chapter 7 and Appendix K could be much larger or smaller than those estimated because of uncertainties associated with the numerical values used in the calculations. However, such uncertainties are typical of predictions of the outcome of complex physical and biological phenomena over long periods (such as the 10,000-year analysis period). DOE believes that these estimates (with their uncertainties) adequately describe the potential environmental impacts that could occur from continued storage at or near existing facilities, and are valuable to the decisionmaking process.

DOE notes that potential impacts associated with onsite management of spent nuclear fuel and high-level radioactive waste have been analyzed in greater detail in other EISs, such as the *Final Environmental Impact Statement for the Tank Waste Remediation System, Hanford Site, Richland, Washington* (DIRS 103214-DOE 1996), and *Addendum (Final Environmental Impact Statement): Management of Spent Nuclear Fuel from the K-Basins at the Hanford Site, Richland, Washington* (DIRS 103213-DOE 1996).

9.1 (4852)
Comment - EIS001215 / 0003
The selection of wastes to send to the High Level Waste repository creates orphan wastes. This has serious repercussions. One such example is the spent nuclear fuel stored at Hanford. If some small part of this material is left at Hanford, nearly the full costs of continuing to operate the storage facilities for these wastes will continue for the indefinite future. It makes more sense to include all of the spent nuclear fuel from Hanford as a single unit for disposal. On the other hand, if the waste is not sent for disposal, it has no other path forward and additional work will be needed in the next 50 years to remove the fuel from storage and process it into a form that can either be safely maintained for the long term, or disposed elsewhere. It is not safe for storage in its currently planned form for more than about 50 years. Questions also remain unanswered about the ultimate status of "Greater than Class C" and "Special Case" wastes and other spent fuel waste forms, such as spent fuel from the Fast Flux Test Facility currently stored at Hanford.

Response
The two No-Action scenarios in the EIS include an evaluation of continued storage of the entire foreseeable inventory of spent nuclear fuel and high-level radioactive waste. However, as the commenter notes, under the DOE Proposed Action of disposal of 70,000 MTHM, some spent nuclear fuel and high-level radioactive waste would not be part of that capacity allocation and would require continued management. Its emplacement at Yucca Mountain would require legislative action by Congress unless a second repository was in operation. A separate National Environmental Policy Act evaluation, as well as legislative action, would have to occur before a second repository could be licensed for the disposal of the remaining inventory. The continued management of these materials at the Hanford Site are not within the scope of this EIS; they are already addressed in two other DOE documents: *Department of Energy Programmatic Spent Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (DIRS 101802-DOE 1995) and *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DIRS 101816-DOE 1997).

The No-Action analysis evaluated the DOE spent nuclear fuel and high-level radioactive waste at existing sites or at sites where existing Records of Decisions have placed or will place these materials. For example, the Record of Decision (60 *FR* 18589, April 12, 1995) for the *Final Supplemental Environmental Impact Statement, Defense Waste Processing Facility* (DIRS 103191-DOE 1994) decided to complete construction and operate the Defense Waste Processing Facility and associated facilities at the Savannah River Site to pretreat, immobilize, and store high-level radioactive waste. Similarly, the *Site Final Environmental Impact Statement for the Tank Waste Remediation System, Hanford Site, Richland, Washington* (DIRS 103214-DOE 1996) identified ex situ vitrification of high-level radioactive waste with onsite storage until final disposition in a geologic repository as the preferred alternative. For DOE spent nuclear fuel, the Record of Decision (60 *FR* 28680, June 1, 1995) for the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (DIRS 101802-DOE 1995) decided that Hanford production reactor fuel would remain at the Hanford Site; aluminum-clad fuel would be consolidated at the Savannah River Site; and non-aluminum-clad fuels (including spent nuclear fuel from the Fort St. Vrain reactor and naval spent nuclear fuel) would be transferred to the Idaho National Engineering and Environmental Laboratory.

The decisions on the types and quantities of materials that will be moved as well as the timeframe for these activities have been and are continuing to be made in programmatic documents (for example, DIRS 101802-DOE 1995). Therefore, the evaluation of impacts related to these decisions are in those documents and are beyond the scope of the Yucca Mountain EIS.

9.1 (4853)
Comment - EIS001215 / 0004
In addition to the serious discrepancies with the No Action Alternative noted by Washington, another major problem involves the potential failure and release mechanisms if the waste is processed into glass intended for repository disposal and which is instead left in near surface storage. The alloys planned for the containers may not be suitable for long term surface or near surface storage. The glass waste form is likewise not designed to withstand the corrosive effects of surface waters containing erosive organic vegetative decay products such as humic and fulvic

acids. These materials corrode glass far more rapidly than their low acidity would indicate. They do not exist in waters that would be encountered in a repository setting, but they are always present in surface waters.

Response
Under No-Action Scenario 2, the failure and release models used to evaluate the long-term impacts of onsite storage of high-level radioactive waste assumed that corrosion of the stainless-steel canisters and dissolution of the waste matrix would result from contact with precipitation–not surface water (see Section K.2 of the EIS). Therefore, vegetative decay products should not be an important consideration. However, the estimated Region 5 impacts attributable to high-level radioactive waste (135 person-rem) are less than 0.04 percent of those from spent nuclear fuel (382,000 person-rem), assuming the Proposed Action inventory (70,000 metric tons of heavy metal). Over the 10,000-year analysis period, these impacts would result from an estimated 1-percent dissolution of approximately 2,000 canisters of high-level radioactive waste and 100-percent dissolution of 2,300 metric tons of heavy metal of DOE spent nuclear fuel. In view of these estimates, even if the Department significantly underestimated the corrosion rate for the high-level radioactive waste containers or the dissolution rate for the waste matrix, the maximum additional dose could increase by a factor of 100 (assuming 100-percent dissolution) resulting in an additional dose of about 13,000 person-rem or 3 percent of the dose attributable to the DOE spent nuclear fuel. This additional dose could result in an additional 7 latent cancer fatalities over the 10,000-year analysis period. This increase would be a small fraction of the 230 latent cancer fatalities predicted for Region 5 (see Section K.3.1) and is well within the overall uncertainties that DOE acknowledges in Section K.4.

9.1 (4874)
Comment - EIS000337 / 0012
Pg. 2-65, High-Level Radioactive Waste Storage Facilities, 2nd par.: "the canister cavities are galvanized steel...." Why not stainless steel?

Response
The primary purpose of the canister cavities is to direct cooling air around the high-level radioactive waste. Because the high-level radioactive waste, which would be in welded stainless-steel canisters, would never come in direct contact with the wall of the canister cavity, DOE elected to use galvanized steel to reduce the overall cost.

9.1 (4894)
Comment - EIS000337 / 0034
Pg. 9-13, Long-Term Performance Measures Under Consideration: The referenced studies are useful for the No-Action Alternative. The implementation of the noted measures would be very germane to the dry storage facilities.

Response
The barrier measures described in Section 9.2.8 of the EIS would be appropriate for reducing package corrosion, delaying or reducing water transport, retarding radionuclide movement and release rates, and reducing potential damage to canisters from factors in the subsurface environment such as rockfall. These measures would be appropriate for a subsurface environment when human intervention is not possible or practicable (that is, loss of institutional control after repository closure).

The No-Action Alternative includes two hypothetical scenarios: (1) Scenario 1, which assumes the maintenance of institutional controls at the 77 storage facilities for the entire 10,000-year analysis and (2) Scenario 2, which assumes no credit for institutional controls after the first 100 years.

Under Scenario 1, the barrier measures described in Section 9.2.8 of the EIS would not be necessary or appropriate because continuous surveillance and maintenance of the facilities and storage canisters would ensure the timely identification and repair of environmental degradation of these structures and canisters, thereby ensuring containment of radioactive materials. Although DOE considers both scenarios unlikely (see Section 2.2 and the introduction to Chapter 7 of the EIS), if long-term onsite storage became a reality, storage facilities and canisters probably would undergo some design evolution to increase their useful lifetimes and to enhance the long-term integrity and corrosion resistance of the canister. However, because institutional control would remain in effect, design enhancements would probably not differ greatly from today's designs.

Because Scenario 2 takes no credit for institutional control after the first 100 years, it would not be appropriate to assume funding to construct long-term, surface storage facilities that could benefit from the barrier measures discussed in Section 9.2.8 of the EIS because of their high cost.

9.1 (5040)
Comment - EIS001520 / 0008
The Board believes that neither of the no-action scenarios evaluated in the draft EIS is likely to occur, but the two scenarios do appear to represent the extremes of a spectrum of possible futures. Because the no-action alternative is hypothetical, there may be little merit in attempting analyses of this alternative more sophisticated than those presented in the draft EIS.

Response
DOE agrees that neither of these scenarios would be likely if there was a decision not to develop a repository at Yucca Mountain. Because DOE did not want to influence the analysis results to favor the repository, it used assumptions that generally resulted in lower predicted impacts rather than applying the conservative assumptions used in many of the repository impact analyses.

9.1 (5426)
Comment - EIS001887 / 0125
Page 2-61; Section 2.2.2.1 - Storage Packages and Facilities at Commercial and DOE Sites

It is beyond the scope of this Draft EIS to assume, without further DOE commitment, how DOE spent fuel and high-level radioactive waste would be stored at DOE facilities. Most of the high-level waste is currently in liquid form in underground storage tanks and will still be in 2002, when the No-Action Alternative is assumed to start.

Response
The Department agrees that it is beyond the scope of this EIS to specify how DOE spent nuclear fuel and high-level radioactive waste would be stored at DOE facilities. Therefore, as discussed in Section 7.2 of the EIS, the No-Action analysis evaluated the impacts from continued storage assuming that the DOE materials were at the sites specified in existing DOE Records of Decision for prior environmental documentation. For example, the Hanford Site *Final Environmental Impact Statement for the Tank Waste Remediation System* (DIRS 103214-DOE 1996) identified ex situ vitrification of high-level radioactive waste with onsite storage until final disposition in a geologic repository as the preferred alternative. For DOE spent nuclear fuel, the Record of Decision (60 *FR* 28680, June 1, 1995) for the *U.S. Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (DIRS 101802-DOE 1995) decided that Hanford production reactor fuel would remain at the Hanford Site, aluminum-clad fuel would be consolidated at the Savannah River Site, and non-aluminum-clad fuels (including spent nuclear fuel from the Fort St. Vrain reactor and naval spent nuclear fuel) would be transferred to the Idaho National Engineering and Environmental Laboratory. Therefore, the analysis evaluated DOE aluminum-clad spent nuclear fuel at the Savannah River Site, DOE non-aluminum-clad fuels at the Idaho National Engineering and Environmental Laboratory, most of the Fort St. Vrain spent nuclear fuel at the Colorado generating site, and high-level radioactive waste at the generating sites (the West Valley Demonstration Project, the Idaho National Engineering and Environmental Laboratory, the Hanford Site, and the Savannah River Site).

In addition to assigning various materials to specific DOE facilities, the National Environmental Policy Act documents citied above also evaluate potential environmental impacts of various storage options for DOE spent nuclear fuel and high-level radioactive waste including, under the No-Action Alternative, continued storage of high-level radioactive waste in underground tanks. These documents also describe facilities used for long-term storage of processed waste (for example, borosilicate glass), most of which have been designed and are either completed (Savannah River Site Glass Storage Facility) or under construction.

Because the cited National Environmental Policy Act documents have addressed the environmental impacts associated with the processing and storage of DOE spent nuclear fuel and high-level radioactive waste, and to simplify the analyses, DOE limited the No-Action Alternative impact analyses to those resulting from long-term storage of processed, road-ready materials. These analyses assumed that these materials would be stored in the structures described in the cited National Environmental Policy Act documents.

9.1 (5427)
Comment - EIS001887 / 0126
Page 2-67; Section 2.2.2.3 - No-Action Scenario 2

This paragraph conflicts with the third paragraph on page 2-59 that describes the two scenarios for the No-Action Alternative. The information should be consistent.

Response
DOE can find no inconsistencies between the sections cited.

9.1 (5445)
Comment - EIS001660 / 0007
The DEIS must include a realistic no-action alternative. It repeatedly says that the no-action scenarios are unlikely and unreasonable; however, it says these scenarios provide a baseline for comparison. The no-action alternative is only the absence of the proposed action. It must be analyzed fairly using consistent assumptions regarding institutional controls and all other relevant factors.

According to the DEIS (p. 3-140), the description of the affected environment for the no-action alternative "describes the affected environment that reflect (sic) the average or mean conditions of the sites." Thus, "average" conditions mean nothing and provide no information that one could use to evaluate the no-action alternative. The DOE presumably knows, and must disclose the existing conditions in the vicinity of the sites that generate SNF and HLW. Without a description of the affected environment, no meaningful analysis of anticipated impacts is possible.

Response
DOE analyzed the No-Action Alternative to serve as a basis for comparing the magnitude of potential environmental impacts of the Proposed Action. Under the No-Action Alternative, and consistent with the NWPA, DOE would terminate activities at Yucca Mountain and undertake site reclamation to mitigate any significant adverse environmental impacts. In addition, DOE would prepare a report to Congress with the Department's recommendations for further action to ensure the safe, permanent disposal of spent nuclear fuel and high-level radioactive waste, including the need for new legislative authority. Under any future course that would include continued storage at the generator sites, commercial utilities and DOE would have to continue managing spent nuclear fuel and high-level radioactive waste in a manner that protected public health and safety and the environment. However, the future course that Congress, DOE, and the commercial utilities would take if Yucca Mountain was not recommended and approved is uncertain.

DOE recognizes that a number of possibilities could be pursued, including continued storage of spent nuclear fuel and high-level radioactive waste at existing sites and/or one or more centralized locations, study and selection of another location for a deep geologic repository (Chapter 1 identifies the process and alternative sites previously selected by DOE for technical study as potential geologic repository locations), the development of new technologies (for example, transmutation), or reconsideration of alternatives to geologic disposal. The environmental considerations of these possibilities have been analyzed in other contexts in other documents to varying degrees.

In light of these uncertainties, DOE decided to illustrate the possibilities by focusing the analysis of the No-Action Alternative on the potential impacts of two scenarios – long-term storage of spent nuclear fuel and high-level radioactive waste at the current sites with effective institutional control for at least 10,000 years (Scenario 1), and long-term storage with no effective institutional control after about 100 years (Scenario 2). Although the Department agrees that neither of these scenarios is likely, it selected them for analysis because they provide a basis for comparison to the impacts of the Proposed Action and because they reflect a range of the impacts that could occur.

DOE agrees that Chapter 3 of the EIS should include additional baseline information for the 77 storage locations to enable for a comparative evaluation of potential impacts of the No-Action Alternative. Accordingly, Section 3.3 now contains additional information on No-Action site conditions.

9.1 (5546)
Comment - EIS001660 / 0044
Unreasonable "No-action" alternatives - Two no-action alternatives were provided. One would have the radioactive waste stay where it is under institutional control for just 100 years. The second would have the waste stay under institutional control for 10,000 years. DOE acknowledges that neither is likely to occur but says that other scenarios would be too speculative. Reasonable alternatives should be analyzed and included in the DEIS. Mineral County accepts Eureka County's analysis for its own comments. See Attachment D (page 21 of 26 of Eureka County's comments.) [Following is text from reference.]

Analysis of no-action alternative inconsistent and biased. Despite statements to the contrary, the analysis of the proposed action and the no-action alternative is not consistent. (See pp. 7-9,-16) The statement on p. 7-9 that Chapter 3, section 3.3, discusses the conditions at the sites that formed the basis for identifying impacts of the no-action alternative is not true. The statement on p. 7-11 that the Yucca Mountain workforce would lose their jobs under the no-action alternative is unsupported and alarmist; it reflects bias. The statement on p. 7-12 that payments in lieu of taxes would be diminished under the no-action alternative is unsupported. The analysis of in-lieu payments should address both costs and revenues. The statement on p. 7-46 that concentrations and areas affected by radiation from Module 1 would be impossible to estimate is untrue on its face.

Response
DOE recognizes that neither No-Action Alternative scenario is likely to occur (see Section 2.2 and the introduction to Chapter 7 of the EIS). To enable a comparison of the impacts between the Proposed Action and the No-Action Alternative, DOE took care, for example, to maintain consistency, where possible, with the assumptions used to evaluate the proposed repository. In pursuit of this goal, the Department structured the Scenario 2 analysis to facilitate an impact comparison with the repository impact analysis. Section K.1 of the EIS describes these important consistencies.

Scenario 1, which includes an analysis of impacts under effective institutional control for at least 10,000 years, is consistent with the portion of the analysis of the Proposed Action that includes an analysis of effective institutional control at the repository for the first 100 years after closure. Scenario 2, in which the analysis does not consider institutional control after approximately 100 years, is parallel to the portion of the Proposed Action analysis in which long-term performance after 100 years also does not include institutional control.

Section 3.3 of the Final EIS contains more information on the No-Action site conditions.

Under the No-Action Alternative, DOE would not proceed with the development of a repository at Yucca Mountain. Following any reclamation actions, workers assigned to the repository would have no remaining work. Unless the workforce was reassigned or new missions were identified, the workforce would be reduced. This assumption is based on the fact the Department cannot use tax receipts or the Nuclear Waste Fund to support workers for whom there is no identified mission.

Payments-Equal-To-Taxes are made pursuant to Section 116(c)(3)(A) of the NWPA, which requires the Secretary of Energy to "...grant to the State of Nevada and any affected unit of government, an amount each fiscal year equal to the amount such State or affected unit of government, respectively, would receive if authorized to tax site characterization activities..." These payments, historically and for the future, are determined by estimating the amount of Yucca Mountain Project property, purchases (in and out of the State of Nevada), and business activities (employees) within the jurisdiction of an affected unit of local government. Under the No-Action Alternative for the repository, the number of employees and purchases would be significantly lower. As a consequence, it is accurate to state that Payments-Equal-To-Taxes would be correspondingly lower, and could even be eliminated in the long term.

Through Fiscal Year 1999, DOE has paid over $41 million to the State of Nevada and other affected units of local government. Estimated payments for Fiscal Years 2000 through 2003 would be about $44 million, for a total of about $85 million. Most of these payments are made to Nye County; for example, DOE's Fiscal Year 2001 budget and proposed Fiscal Year 2002 funding for Payments-Equal-To-Taxes for Nye County alone are $10 million each. [May 2, 2001, presentation by Victor Trebules to the meeting of the affected units of local government.)

DOE has not estimated Payments-Equal-To-Taxes beyond 2003 and does not intend to make long-term Payments-Equal-To-Taxes estimates. While the Nuclear Waste Policy Act requires Payments-Equal-To-Taxes, they are not discriminating factors in the EIS decisionmaking process.

DOE agrees with the commenter that the statement in Section 7.3.2.1 of the Draft EIS, "...concentrations and areas affected by radiation from Module 1 would be impossible to estimate..." is untrue. The statement in the EIS now reads "...concentrations and areas affected by radiation from Module 1 would be difficult to estimate with any level of accuracy...."

9.1 (5785)
Comment - EIS001887 / 0381
APPENDIX K. LONG-TERM RADIOLOGICAL IMPACT ANALYSIS FOR THE NO-ACTION ALTERNATIVE

Two No-Action Alternatives are considered by DOE, both involving long-term storage at present locations: (1) Long-term storage at present locations with effective institutional control for at least 10,000 years; and (2) Long-term storage at present locations with no effective institutional control after 100 years. Another alternative, perhaps more likely, is storage at a centralized location, such as the proposed PFS [Private Fuel Storage] facility in Skull Valley, Utah. The environmental impact of this alternative should be seriously investigated by DOE.

While DOE researchers have attempted to construct the impact analysis of the No-Action Alternative in parallel to the analysis conducted for the proposed Yucca Mountain repository, in several respects, researchers have not been successful.

For decentralized storage at reactor sites where spent fuel is presently stored, a major concern over the long-term is the freeze-thaw cycle. As DOE researchers note, freeze-thaw cycles lead to concrete spalling and weakening of the concrete overpacks around spent fuel canisters (page K-4). In addition, storage canisters can degrade due to corrosion caused by acidity and chloride concentration. This can be followed by water infiltration (page K-8). The final barriers to radionuclide release are the fuel cladding and the fuel matrix (page K-9).

According to DOE, degradation appears to begin at about 7,000 to 8,000 years. In year 10,000, less than 1% of the cladding has degraded. This is primarily the stainless steel clad fuel. For zirconium, degradation begins about 10,000 years (page K-11).

Table K-4 [Section K.2.2] lists radionuclides important to dose for this decentralized storage scenario: Am [americium]-241, Am-243, Np [neptunium]-237, Pu [plutonium]-238, Pu-239, Pu-240 and Tc [technetium]-99. (p. K-14) These radionuclides are important, but they are not the radionuclides considered in the repository analysis. Of these, only Np-237 is directly considered in the repository analysis. Pu-239 (49%) and Pu-240 (47%) contribute most of the dose, followed by Am-241 (3.2%).

Response
The scenario for possibly moving the spent nuclear fuel and high-level radioactive waste to a centralized interim storage or monitored retrievable storage site has been evaluated by others, and the Private Fuel Storage facility at Skull Valley, Utah, is currently under study by the Nuclear Regulatory Commission (see the introduction to Chapter 7 of the EIS for details). However, DOE recognizes interim storage at the Private Fuel Storage facility to be a reasonably foreseeable future action and has included this action as part of the cumulative impacts analysis in Chapter 8.

For the No-Action Alternative, DOE evaluated more than 200 radionuclides for potential human health impacts including all of the radionuclides considered in the repository analysis. Some of the radionuclides important to the repository analysis do not appear in the table in Section K.2.2 because they are not important contributors to radioactive dose in the No-Action case. However, the listed radionuclides are those determined to contribute more than 99.5 percent of the total dose under Scenario 2 of the No-Action Alternative.

9.1 (6016)
Comment - EIS001879 / 0041
The no action alternative scenarios are, even by the Department's admission, speculative in nature, and the assumptions for institutional control have no technical or historical basis. Such is the baseline “No action alternative” which the Department has examined in great detail. Yet, on-going NRC [Nuclear Regulatory Commission] licensing activities that would directly influence the implementation of the NWPA [Nuclear Waste Policy Act] (connected actions), and could also affect the need for a repository, are not even evaluated.

Response
DOE analyzed the No-Action Alternative to serve as a basis for comparing the magnitude of potential environmental impacts of the Proposed Action. Under the No-Action Alternative, and consistent with the NWPA, DOE would terminate activities at Yucca Mountain and undertake site reclamation to mitigate any significant adverse environmental impacts. In addition, DOE would prepare a report to Congress, with the Department’s recommendations for further action to ensure the safe, permanent disposal of spent nuclear fuel and high-level radioactive waste, including the need for new legislative authority. Under any future course that would include continued storage at the generator sites, commercial utilities and DOE would have to continue managing spent nuclear fuel and high-level radioactive waste in a manner that protected public health and safety and the environment. However, the future course that Congress, DOE, and the commercial utilities would take if Yucca Mountain was not approved is uncertain.

DOE recognizes that a number of possibilities could be pursued, including continued storage of spent nuclear fuel and high-level radioactive waste at existing sites and/or one or more centralized locations, study and selection of another location for a deep geologic repository (Chapter 1 identifies the process and alternative sites previously selected by DOE for technical study as potential geologic repository locations), the development of new technologies (for example, transmutation), or reconsideration of alternatives to geologic disposal. The environmental considerations of these possibilities have been analyzed in other contexts in other documents to varying degrees.

In light of these uncertainties, DOE decided to illustrate the possibilities by focusing the analysis of the No-Action Alternative on the potential impacts of two scenarios – long-term storage of spent nuclear fuel and high-level radioactive waste at the current sites with effective institutional control for at least 10,000 years (Scenario 1), and long-term storage with no effective institutional control after about 100 years (Scenario 2). Although the Department agrees that neither of these scenarios is likely, it selected them for analysis because they provide a basis for comparison to the impacts of the Proposed Action and because they reflect a range of the impacts that could occur.

9.1 (6076)
Comment - EIS001469 / 0002
I challenge the conclusion a little bit in terms of no action. While the Department of Energy states that both no-action alternatives are not feasible and wouldn’t be done, nevertheless, the actual health impacts from the long-term scenario 2 would actually be less than the Yucca Mountain repository by their own calculations, even though I suppose it’s not considered reasonable. So that implies to me that there must be something in between there that’s much more reasonable and much better for the health and safety and should be addressed.

Response
DOE analyzed the No-Action Alternative to serve as a basis for comparing the magnitude of potential environmental impacts of the Proposed Action. Under the No-Action Alternative, and consistent with the NWPA, DOE would terminate activities at Yucca Mountain and undertake site reclamation to mitigate any significant adverse environmental impacts. In addition, DOE would prepare a report to Congress, with the Department’s recommendations for further action to ensure the safe, permanent disposal of spent nuclear fuel and high-level radioactive waste, including the need for new legislative authority. Under any future course that would include continued storage at the generator sites, commercial utilities and DOE would have to continue managing spent nuclear fuel and high-level radioactive waste in a manner that protected public health and safety and the environment. However, the future course that Congress, DOE, and the commercial utilities would take if Yucca Mountain was not approved is uncertain.

DOE recognizes that a number of possibilities could be pursued, including continued storage of spent nuclear fuel and high-level radioactive waste at existing sites and/or one or more centralized locations, study and selection of another location for a deep geologic repository (Chapter 1 identifies the process and alternative sites previously selected by DOE for technical study as potential geologic repository locations), the development of new technologies (for example, transmutation), or reconsideration of alternatives to geologic disposal. The environmental considerations of these possibilities have been analyzed in other contexts in other documents to varying degrees.

In light of these uncertainties, DOE decided to illustrate the possibilities by focusing the analysis of the No-Action Alternative on the potential impacts of two scenarios–long-term storage of spent nuclear fuel and high-level radioactive waste at the current sites with effective institutional control for at least 10,000 years (Scenario 1), and long-term storage with no effective institutional control after about 100 years (Scenario 2). Although the Department agrees that neither of these scenarios is likely, it selected them for analysis because they provide a basis for comparison to the impacts of the Proposed Action and because they reflect a range of the impacts that could occur.

The EIS does not indicate that the impacts for No-Action Scenario 2 would be smaller than those for Scenario 1. Section 2.4 indicates that overall public health and safety impact estimates would be greater for Scenario 2 and cost impacts would be greater for Scenario 1.

9.1 (6146)
Comment - EIS001654 / 0036
Page S-64. DEIS Findings Clearly Support the Conclusion that the Proposed Action is Far Superior to No Action

The first two sentences of the first paragraph summarize well what the 1,400 page DEIS demonstrates: the impacts of the Proposed Action to develop the repository at Yucca Mountain are minor. Conversely, we simply repeat the third paragraph:

“There could be **large public health and environmental consequences** under the No-Action Alternative if there were no effective institutional control, causing storage facilities and containers to deteriorate and radioactive contaminant from spent nuclear fuel to enter the environment. In such circumstances, there would be *widespread* contamination at the 72 commercial and 5 DOE sites across the United States, with resulting human health impacts.” (emphasis added.)

Anyone who attended the 21 public hearings certainly heard numerous public expressions of fear over the perceived harmful radiological effects of either the repository itself or transportation of waste to it. That testimony, while sincerely stated, was often unrelated to the information in the DEIS. The harmful effects of the No-Action Alternatives, though greater by orders of magnitude and more certain, drew less attention, even though the DEIS does provide demonstrable quantification of the aggregate risk. That may be because:

- DOE is not actually proposing to leave the waste in those 77 locations for 10,000 years, and

- No analysis was provided for the long-term effects in a specific or typical temporary storage site, nor was a public hearing held at such a location.

We share the conclusion of Section S.11. We would restate it ourselves that there is simply no comparison of the certain and far more harmful impacts of either of the No-Action Alternatives with the relatively minor and manageable impacts of the Proposed Action.

Response
As discussed in the Foreword, the purpose of the EIS is to provide information on the environmental impacts that could result from the Proposed Action, as well as a basis for comparison of the two No-Action scenarios. DOE has developed this information for the Secretary of Energy’s consideration, along with other factors required by the NWPA, in making a determination whether to recommend Yucca Mountain as the site for the Nation’s first monitored geologic repository.

For this reason, and in accordance with the National Environmental Policy Act process, DOE has presented this environmental information without conclusions as to the level of environmental impacts that could be acceptably small or unacceptably large. These are in essence policy decisions that would ultimately be made by the President and Congress, if necessary.

9.1 (6474)
Comment - EIS001632 / 0032
Page 3-142, Section 3.3.3: This section states that, "DOE calculated the river flow past each population center ... and used this number in the calculation to determine dose to the population." The final EIS should provide the dose calculation used.

Response
Appendix K of the EIS cites reference documents that include the details of the dose calculations. Information on these documents is available at DOE Reading Rooms and on the DOE Internet site (*http://www.ymp.gov*).

9.1 (6573)
Comment - EIS001632 / 0059
Page 7-38, end of the first partial paragraph: EPA appreciates that for comparison purposes and to avoid the appearance of bias toward the preferred alternative, "DOE did not want to overestimate the impacts from Scenario 2." However, the document should provide an estimate or a range of impacts for the reader.

Response
As is typical for deterministic analyses such as those performed to evaluate No-Action Scenarios 1 and 2, the EIS analysis used best estimate single-input values to produce a best estimate result. As is also typical with these analyses, a separate analysis (semi-quantitative) addressed the uncertainty associated with the input values and assumptions and provided an assessment of the effects these uncertainties could have on the model results (see Section K.4 of the EIS for details).

However, for Scenario 2 the analysis provided a range of best estimate impact values between regions for collective, as well as individual, impacts (see the tables in Section K.3.1 of the EIS). This was done to illustrate the importance of environmental transport human exposure (exposed population) parameters. Also under this scenario, a range of accident impacts was provided for high and low populations. Under Scenario 1, impact ranges were not developed because all collective and individual impacts were extrapolated from information provided by the Nuclear Regulatory Commission's environmental assessment of the Calvert Cliffs Independent Spent Fuel Storage Installation (DIRS 101898-NRC 1991).

As stated in Section K.4 of the EIS, DOE attempted to quantify a range of uncertainties associated with mathematical models and input data, and estimated the potential effect these uncertainties could have on collective human health impacts. By summing the uncertainties discussed in Sections K.4.1, K.4.2, and K.4.3 of the EIS where appropriate, DOE estimated that total collective impacts over 10,000 years could have been underestimated by as much as 3 or 4 orders of magnitude. However, because there are large uncertainties in the models used for quantifying the relationship between low doses (that is, less than 10 rem) and the accompanying health impacts, especially under conditions in which the majority of the populations would be exposed at a very low dose rate, the actual collective impact could be zero.

On the other hand, impacts to individuals (human intruders) who could move to the storage sites and live close to the degraded facilities could be severe. During the early period (200 to 400 years after the assumed loss of institutional control), acute exposures to external radiation from the spent nuclear fuel and high-level radioactive waste material could result in prompt fatalities. In addition, after a few thousand years onsite shallow aquifers could become contaminated to such a degree that consumption of water from these aquifers could result in severe adverse health effects, including premature death. Uncertainties associated with these localized impacts relate primarily to the inability to predict accurately how many individuals could be affected at each of the 77 sites over the 10,000-year analysis period. In addition, the uncertainties associated with localized impacts would exist for potential consequences resulting from unusual events, both manmade and natural. Therefore, as discussed in Section K.4 of the EIS, uncertainties resulting from future changes in natural phenomena and human behavior that cannot be predicted, process model uncertainties, and dose-effect relationships, when taken together, could result in overestimating or underestimating the impacts by as much as several orders of magnitude relative to the values listed in Section K.3.

9.1 (6680)
Comment - EIS001632 / 0082
Page 14-19, definition of "inadvertent intrusion": The word "unintended" needs to be inserted before "disturbance," i.e., "The unintended disturbance of a disposal facility..." As currently written, the definition would include purposeful intrusions.

Response
DOE agrees with this recommendation and has included this change in the EIS Glossary.

9.1 (6683)
Comment - EIS001632 / 0083
Page 14-19, definition of "institutional control": This definition should distinguish between "active institutional control," which requires the presence of humans to take actions to safeguard and repair the repository, and "passive institutional control," which also includes controls such as permanent markers and land records to warn future generations of dangers from the disposal site.

Response
In the EIS Glossary, DOE has modified the definition of institutional control to include the distinction between active and passive control.

9.1 (6695)
Comment - EIS001632 / 0088
Page K-7, Figure K-3: This map shows failure times for above-ground concrete storage modules. The no-action impact analysis looked at a 100-year time frame, yet Figure K-3 indicates that in some areas of the country, failure could be expected in less than 75 years and, in other areas, between 75-100 years. The final EIS should evaluate the premature failure potential for those areas of the country where such could be expected in less than 100 years.

Response
Both No-Action scenarios assume that the onsite storage facilities would remain under effective institutional control for the first 100 years. This means that they would be monitored and maintained with repairs being made as necessary to ensure the integrity of the dry storage canisters. DOE recognizes that the weather-protection structures (metal buildings for DOE below-grade storage vaults and reinforced concrete storage modules for commercial spent nuclear fuel), as currently constructed, would not likely remain intact for the 100-year institutional control period without major repairs. Therefore, the Department assumed that a major repair effort would occur 50 years into the 100-year period (see the figure in the introduction to Chapter 7 of the EIS). For purposes of analysis, DOE assumed this major repair effort to require 50 percent of the manpower and materials required to completely replace the facilities. Collective occupational radiation doses were estimated to be 72 and 118 person-rem for the Proposed Action and Module 1 scenarios, respectively (see DIRS 104596-Orthen 1999). Although not reported separately, these impacts have been included in the short-term (first 100 years) impacts for both scenarios, as discussed in Sections 7.2.1 and 7.3.2 of the EIS.

Although the analysis assumed that under institutional control the storage facilities would be maintained and repaired as necessary, Sections K.4.1.1 and K.4.3.1 of the EIS discuss the uncertainties associated with maintenance of institutional control and uncertainties associated with environmental degradation and corrosion rates along with their potential impacts on the reported results. As stated in Section K.4.1.1, premature failure of effective institutional controls could result in an earlier release of radioactive materials to the accessible environment. However, this scenario would probably increase overall impacts by no more than a factor of 2.

9.1 (6724)
Comment - EIS001878 / 0076
Limitation on scope of analysis inappropriate. Although the DEIS says that the same spectrum of environmental impacts was considered for the no-action alternative as for the proposed action, it also says (in the same paragraph) that DOE decided to focus the no-action analysis on the health and safety of workers and members of the public.

(p. 7-6) This limitation on the scope of the no-action analysis is inappropriate. It rules out any meaningful comparison with the impacts of the proposed action.

Also, the implication (p. 7-7) that the proposed action does not affect the 72 commercial and 5 DOE facilities and their surrounding environments, but the no-action alternative does, is not true. Obviously, both alternatives would result in environmental impacts at all the sites.

Response
As the commenter noted, DOE considered the same spectrum of impacts for the Proposed Action and the No-Action Alternative. In accordance with Council on Environmental Quality regulations [40 CFR 1501.7 (a)], as part of the scoping process DOE identified the important issues to be analyzed in detail in the EIS. In addition, the Department was able to identify and eliminate from detailed study the issues that were either unimportant or had been covered by prior environmental review (40 CFR 1506.3). Thus, DOE focused the discussion on what it believes are the important issues.

DOE then identified the environmental impact areas with potential impacts common to both the Proposed Action and the No-Action Alternative. These common areas (occupational, public health and safety, and hydrology) received detailed evaluation under the No-Action Alternative.

DOE recognized that there would be potential for environmental impacts at the generator sites as part of the Proposed Action. The principal impacts identified were those associated with the loading of the spent nuclear fuel and high-level radioactive waste at the generator sites, and those associated with accidents that could occur during the loading operations. Section 6.2.2 of the EIS discusses the results of the impact analysis for the loading operations at the generator sites (specifically, radiological impacts and impacts from industrial hazards). Section 6.2.4.1 discusses potential impacts from accidents occurring during loading operations at the generator sites.

9.1 (7192)
Comment - EIS001337 / 0083
Page 2-74 Section 2.4.1. The use of the word "small" to describe impacts is not consistent with NEPA [National Environmental Policy Act] terminology. Although DOE considers impacts to be small they may yet be significant. For example, a small absolute change might represent a 50 percent increase or decrease in given parameter. The DEIS must evaluate impacts and risks on the basis of their significance not their absolute value. Further, NEPA requires that impacts, even if "small", be mitigated.

Response
The Council on Environmental Quality regulations require consideration of all impacts (large and small) and of both "context" and "intensity" when assessing the significance of a proposed action (40 CFR 1508.27). Consistent with the regulations, DOE quantifies impact estimates in most cases. The regulations also require that EISs be written in plain language so that the widest audience can readily understand them. To be consistent with the regulations, the Department has used descriptive terms, such as "small," to help convey the relative impacts of various actions on the environment.

Moreover, consistent with these requirements and the standards established by the Nuclear Regulatory Commission (DIRS 101899-NRC 1996; DIRS 101900-NRC 1996), the Department has determined, in general, that "small" means potential environmental effects (with or without mitigation) that are not detectable or are so minor that they would neither destabilize nor noticeably alter any important attribute of the resource. For example, human health impacts that do not exceed permissible levels as defined in Federal or state regulations are generally considered small because adverse health effects would not be expected for exposure to these levels.

The Department is committed to identifying mitigation measures. Potential mitigation measures are discussed in Chapter 9 of the EIS. However, the commenter's assertion that the National Environmental Policy Act requires mitigation of impacts (large or small) is incorrect.

9.1 (7379)
Comment - EIS001832 / 0010
The Draft Environmental Impact Statement's evaluation of two No Action Alternative (NAA) scenarios adequately bounds the complete spectrum of no action possibilities.

DOE included the two No Action Alternative (NAA) "to provide a baseline for comparison with the Proposed Action." The comparison provided demonstrates the tremendous societal benefit associated with the proposed action as opposed to doing nothing. These two scenarios adequately describe both ends of the full spectrum of "no action" possibilities. The NAA scenarios are comprehensive in describing the cost and environmental and human health impacts of the no action possibilities. NAA 1 sets the lower bound on environmental and human health impacts and the upper bound on the potential costs for the NAA. NAA 2 sets the upper bound on the environmental and human health impacts and the lower bound on the potential costs for the NAA. The human health impacts of the proposed action are shown to be lower than the lowest possible health impacts of "no action" (NAA 1) and the cost impacts of the proposed action are shown to be lower than the least costly "no action" possibility (NAA 2).

As part of the public hearing process, we understand that DOE has received some criticism for not constructing more realistic NAA scenarios. At the heart of much of this criticism is the realization that, in reality, society is unlikely to actually chose to take no action and simply leave spent fuel where it is over the long term. If the repository at Yucca Mountain does not go forward, society will "take some action" to manage spent nuclear fuel. DOE has recognized this in stating, regarding NAA Scenario 1 and 2, that "neither scenario would be likely if there were a decision not to develop a repository at Yucca Mountain, however they are part of the EIS to provide a baseline for comparison to the Proposed Action." In providing a basis for comparison through a bounding analysis, it is not necessary for DOE to address the likelihood of any specific "no action" possibilities or to attempt to identify the most likely outcomes. Any effort to be more specific within these bounds would only yield results that contain some combination of the costs and human health effects postulated for the two bounding scenarios, the net result of which will inevitably be higher impacts than for the proposed repository.

A true "no action" alternative means that no actions are taken beyond what is currently being done at reactor and DOE sites to store spent nuclear fuel. To assume, for DOE's purposes herein, that some action would be taken on the part of utilities or DOE, would not be consistent with the "no action" alternative concept. In short, in the case of used nuclear fuel management, there is an irreconcilable conflict between undertaking "no action" and being realistic. Therefore, DOE's bounding approach is a sound, complete and effective way to address the "no action" concept.

Rather than conducting additional "no action" analyses, a more valuable perspective would be provided for the public and decision-makers if DOE were to relate the risks and impacts of Yucca Mountain to other real risks and impacts that society already accepts.

Response
DOE agrees that the two No-Action scenarios provide a range of cost, environmental, and human health impacts that could result from a decision to abandon plans for the proposed Yucca Mountain Repository and that additional effort to perform more specific analyses would likely yield similar results and not provide substantive additional information. However, because DOE did not want to overestimate potential impacts and influence a decision in favor of the repository, neither of the No-Action scenarios was developed to provide the most pessimistic outcome based on the assumptions. In addition, DOE believes that the two No-Action scenarios provide an adequate basis for comparison to the Proposed Action.

DOE analyzed the No-Action Alternative to serve as a basis for comparing the magnitude of potential environmental impacts of the Proposed Action. Under the No-Action Alternative, and consistent with the NWPA, DOE would terminate activities at Yucca Mountain and undertake site reclamation to mitigate any significant adverse environmental impacts. In addition, DOE would prepare a report to Congress, with the Department's recommendations for further action to ensure the safe, permanent disposal of spent nuclear fuel and high-level radioactive waste, including the need for new legislative authority. Under any future course that would include continued storage at the generator sites, commercial utilities and DOE would have to continue managing spent nuclear fuel and high-level radioactive waste in a manner that protected public health and safety and the environment. However, the future course that Congress, DOE, and the commercial utilities would take if Yucca Mountain was not approved is uncertain.

DOE recognizes that a number of possibilities could be pursued, including continued storage of spent nuclear fuel and high-level radioactive waste at existing sites and/or one or more centralized locations, study and selection of another location for a deep geologic repository (Chapter 1 identifies the process and alternative sites previously selected by DOE for technical study as potential geologic repository locations), the development of new technologies (for example, transmutation), or reconsideration of alternatives to geologic disposal. The environmental considerations of these possibilities have been analyzed in other contexts in other documents to varying degrees.

In light of these uncertainties, DOE decided to illustrate the possibilities by focusing the analysis of the No-Action Alternative on the potential impacts of two scenarios–long-term storage of spent nuclear fuel and high-level radioactive waste at the current sites with effective institutional control for at least 10,000 years (Scenario 1), and long-term storage with no effective institutional control after about 100 years (Scenario 2). Although the Department agrees that neither of these scenarios is likely, it selected them for analysis because they provide a basis for comparison to the impacts of the Proposed Action and because they reflect a range of the impacts that could occur.

Discussions in the EIS relate the impacts from Yucca Mountain operations to other real risks and impacts that exist in society. Specific examples are the comparisons of radiological health impacts to workers and the public to the radiological impacts these same people receive from natural background radiation, to which they are continually exposed (see the last paragraph of Section 4.1.7 of the EIS). Another example is the discussion of fatalities from spent nuclear fuel and high-level radioactive waste shipping operations in relation to impacts from overall transportation activities (Section 6.2.4.2.2).

DOE has added a discussion of relative risks to Appendix F of the EIS, which includes a discussion of radiation and other common risk factors.

9.1 (7647)
Comment - EIS001912 / 0099
The no-action alternative provides more details about specific proposals than the action alternative does. Why?

Response
DOE believes that both the Proposed Action and the No-Action Alternative contain the level of detail appropriate for the evaluation of potential environmental impacts. Without further detail, DOE is unable to determine the precise nature of the commenter's concern.

9.1 (7981)
Comment - EIS001577 / 0003
The no action scenario number two is absolutely irresponsible but a highly likely scenario given the nature of the nuclear industry and the regulating community. It is important that the people of the United States, their government, the DOE and the commercial utilities not allow this scenario to develop in a de facto manner. We all have the responsibility to monitor their actions so as to not allow it to develop. Collectively, the world population and the more responsible governments of the world have a responsibility to prevent this scenario from developing within this country and elsewhere on our planet.

Response
DOE has stated that it believes that neither No-Action Alternative scenario is likely. Continued storage of high-level radioactive waste and spent nuclear fuel at existing sites could be required for some time in the future if the Yucca Mountain site was not approved for a geologic repository. However, if such events occurred, DOE, consistent with the NWPA [Section 113(c)(3)], would prepare a report to Congress with its recommendations for further action to ensure the safe, permanent disposal of spent nuclear fuel and high-level radioactive waste, including the need for new legislative authority. Until Congress provides additional direction for future actions, under current regulations and DOE directives, commercial and DOE sites have an obligation to continue to manage

the spent nuclear fuel and high-level radioactive waste in a manner that protects public health and safety and the environment.

No-Action Scenario 2 does not assume that there would be a decision to halt institutional control after 100 years. Rather, for purposes of long-term analysis, this scenario assumes no effective institutional control after approximately 100 years. DOE based its choice of 100 years on a review of the generally applicable Environmental Protection Agency regulations for the disposal of spent nuclear fuel and high-level radioactive waste (40 CFR Part 191) and Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada (40 CFR Part 197); Nuclear Regulatory Commission regulations for the disposal of low-level radioactive material (10 CFR Part 61); and the National Research Council report on standards for the proposed Yucca Mountain Repository (DIRS 100018-National Research Council 1995), all of which generally discount the consideration of institutional control for longer periods in performance assessments for geologic repositories. The assumption of no effective institutional controls after 100 years provides a consistent analytical basis for comparing the No-Action Alternative and the Proposed Action.

9.1 (8027)
<u>Comment</u> - EIS000817 / 0071
"No Action Alternative" -- why don't you evaluate creating no more spent fuel? If Yucca Mountain were found inadequate, certainly it would be prudent to stop spent fuel creation. It only makes sense. Yet DOE evaluates "no effective institutional control after 100 years" -- why? Of what value is that? Certainly the waste would be controlled and certainly less waste would be easier to control. Why is the assumption that we have to create 70,000 MTHM valid? It should not be.

<u>Response</u>
The No-Action scenarios were constructed to provide a basis for comparison with the Proposed Action (Section 2.2 of the EIS). Under the Proposed Action, as discussed in Section 2.1, DOE would dispose of 70,000 metric tons of heavy metal in the repository. Therefore, the amount of spent nuclear fuel and high-level radioactive waste considered in the No-Action analysis is also 70,000 metric tons of heavy metal. DOE analyzed the No-Action Alternative to serve as a basis for comparing the magnitude of potential environmental impacts of the Proposed Action. Under the No-Action Alternative, and consistent with the NWPA, DOE would terminate activities at Yucca Mountain and undertake site reclamation to mitigate any significant adverse environmental impacts. In addition, DOE would prepare a report to Congress, with the Department's recommendations for further action to ensure the safe, permanent disposal of spent nuclear fuel and high-level radioactive waste, including the need for new legislative authority. Under any future course that would include continued storage at the generator sites, commercial utilities and DOE would have to continue managing spent nuclear fuel and high-level radioactive waste in a manner that protected public health and safety and the environment. However, the future course that Congress, DOE, and the commercial utilities would take if Yucca Mountain was not approved is uncertain.

DOE recognizes that a number of possibilities could be pursued, including continued storage of spent nuclear fuel and high-level radioactive waste at existing sites and/or one or more centralized locations, study and selection of another location for a deep geologic repository (Chapter 1 identifies the process and alternative sites previously selected by DOE for technical study as potential geologic repository locations), the development of new technologies (for example, transmutation), or reconsideration of alternatives to geologic disposal. The environmental considerations of these possibilities have been analyzed in other contexts in other documents to varying degrees.

In light of these uncertainties, DOE decided to illustrate the possibilities by focusing the analysis of the No-Action Alternative on the potential impacts of two scenarios–long-term storage of spent nuclear fuel and high-level radioactive waste at the current sites with effective institutional control for at least 10,000 years (Scenario 1), and long-term storage with no effective institutional control after about 100 years (Scenario 2). Although the Department agrees that neither of these scenarios is likely, it selected them for analysis because they provide a basis for comparison to the impacts of the Proposed Action and because they reflect a range of the impacts that could occur.

9.1 (8386)
Comment - EIS001023 / 0002
The Department of Energy claims that the commercial and Department of Energy sites would remain under effective institutional control for at least 10,000 years. I honestly cannot believe the pretentiousness of the claim.

Response
DOE recognizes that both No-Action scenarios are unlikely. However, the Department selected these scenarios because it did not want to speculate on future actions that Congress could take if there was no recommendation of Yucca Mountain as a repository. DOE selected these scenarios to provide a basis for comparison of impacts from the Proposed Action and to reflect a range of impacts that could occur.

9.1 (8486)
Comment - EIS000817 / 0152
P. 7-16. What do you mean, “The No-Action Alternative assumes that the spent nuclear fuel and high level waste could be treated, packaged, and stored in a condition ready for shipment to a repository”? -- Do you mean it should all be in shipping casks? Then “storage only” casks should be unloaded and put in transport casks now. Not left on the pads. The concern is that we don’t know what to expect for sure when we open these casks in 20, 40 years. Can the fuel actually be transported after long term storage at a reactor? Maybe its “condition” will no longer allow it to travel on our roads and rails.

Response
The term “ready for shipment” means that the spent nuclear fuel and high-level radioactive waste would have been treated (in the case of high-level radioactive waste), processed (in the case of some DOE spent nuclear fuel), and packaged in a stable configuration in dry, stainless-steel storage canisters until it was time to transport them to a repository. Section 7.2 of the EIS describes these storage configurations. The No-Action Alternative assumes that the dry storage canisters would be loaded in shipping casks just before transport to the repository.

Licensed spent nuclear fuel dry storage systems are in operation at more than 10 nuclear powerplants across the United States, and are planned at others. The systems assumed for this analysis include stainless-steel canisters loaded with spent nuclear fuel in large structures designed to withstand environmental conditions for 40 years or longer without change in their safety and operational characteristics. With the exception of reductions in temperature and the radioactivity of the spent nuclear fuel over time, DOE does not expect that the storage canisters or their contents would change measurably. DOE assumes that the canisters could be handled and loaded directly into transportation casks – thus, in a condition ready for shipment.

Regarding knowledge necessary to handle and unload storage canisters after long-term storage, along with other information that must be provided to the Nuclear Regulatory Commission, licensees must demonstrate, as a condition of licensing, procedures they can use for handling, loading, and unloading the canisters. The Commission has addressed potential environmental impacts for dry storage systems (DIRS 147915-NRC 1991; DIRS 101899-NRC 1996) and concluded that long-term effects to nearby environments, including effects of direct radiation and skyshine (radiation scattered off air molecules), would be small. Nevertheless, to support their applications for licenses to store spent nuclear fuel, applicants must provide to the Commission technical information demonstrating that no gross degradation would occur while spent nuclear fuel is in storage.

Based on the information discussed above, DOE is confident that the integrity of spent nuclear fuel stored at commercial nuclear reactor sites for long periods would be satisfactory for transportation to a repository at Yucca Mountain and, if required, temporary storage prior to disposal.

9.1 (8488)
Comment - EIS000817 / 0154
P. 7-17. I’m not so very sure as you are that dry storage is the preferred answer. We may need to revert back to pools. The rosy picture you paint of dry storage safety, etc. may not prove to be accurate over time. Dry storage is only in its infancy. No utility has really had to deal with numerous full cask arrays on pads yet -- especially in bad weather. Surrey, I suppose, has the most. There are concerns about snow and ice at Trojan -- the VSC-24 [Ventilated Storage Cask, Model No. 24] was originally designed with a snow shield, but the shield blocked inlets too much, so the shield was eliminated. But snow can block inlets, and icicles can cover outlets (that happened once

at Pt. Beach and at Ft. St. Vrain). Imagine a blizzard and then melting icecaps on each cask in several pads full of casks -- those outlets and inlets need to be open. Outlets will not work as inlets if inlets are blocked. These are things to think about in the future too.

Are fuel rods, as you say, really “likely” to be environmentally “secure” for long periods of time? Is dry storage really “safe”? “Economical”? Is low level waste generated really “minimal”? Is dry storage really “simple” and “easy” to maintain? Better take a closer look at what really is happening with dry storage right now -- the repeated blunders cost money. Is having to UT [ultrasonically test] casks on the pad simple? Easy? No way. Think again. Dry cask storage could maybe be all those things -- but so far the track record is a mess. Make sure you know what NRC [Nuclear Regulatory Commission] is doing. What happens to that spent fuel at reactors now will affect the DOE program. You know it will, yet I think there is certainly not enough communication or interest in this issue between NRC, DOE, and NWTRB [Nuclear Waste Technical Review Board]. You have got to include dry cask storage issues at reactors now, and in the future, in your analysis. Look at reality. Studies predict -- they don’t tell you the actual situation. DOE needs to know what’s going on.

Response
At present, most commercial nuclear powerplant sites store their spent nuclear fuel in water-filled basins (fuel pools) at the reactors. However, because they have inadequate storage space, some of the sites have built independent spent fuel storage installations, in which they store spent nuclear fuel dry in above-ground metal casks or welded canisters inside reinforced concrete storage modules. Other commercial sites plan to build independent spent fuel storage installations so they can proceed with the decommissioning of their nuclear plants and termination of their operating licenses (for example, the Rancho Seco and Trojan plants). Because commercial sites could elect to continue operations until their fuel pools became full and then cease operations, the EIS analysis initially considered ongoing wet storage in existing fuel pools to be a potentially viable option for spent nuclear fuel storage. However, dry storage is almost certainly the preferred option among regulators and the industry for long-term spent nuclear fuel storage at commercial sites for the following reasons (see Section 7.2 of the EIS):

- Dry storage is a safe, economical method of storage.
- Fuel rods in dry storage are likely to be environmentally secure for long periods.
- Dry storage generates minimal, if any, low-level radioactive waste.
- Dry storage units are simpler and easier to maintain.

As licensees under 10 CFR Part 72, the commercial utilities are responsible for assuring that quality assurance programs (including vendor programs) and technical specifications comply with the site-specific license conditions. DOE believes that the most likely option for long-term storage at reactor sites would be dry storage and, thus, that is the scenario evaluated for the No-Action Alternative.

9.1 (8494)
Comment - EIS000817 / 0156
P. 7-28. The top paragraph is of interest -- DOE did not want to overestimate impacts from repackaging -- I don’t even know what you would base this on anyway as it hasn’t been done.

Response
In Section 7.2.1.7.3 of the EIS, DOE acknowledges that there is no experience on which to base an analysis of potential air quality impacts resulting from repackaging material removed from dry storage canisters. The Department did not want to speculate on the rate and extent of canister degradation because the rates are likely to be very site-specific. In addition, DOE did not want to overestimate the impacts for the No-Action scenarios. However, DOE believes that any impacts to air quality from repackaging are likely to be small.

9.1 (8608)
Comment - EIS001256 / 0007
The DEIS calculates the maximum potential dose from the underground testing inventory to be 0.2 millirem per year at 20 kilometers. (Section 8.3, page 8-76). We question how this dose was arrived at. How did the Yucca Mountain project get access to the underground testing radiological source term inventory, when the information is classified and not available yet to the UGTA [Underground Testing Area] program? Did you take each nuclear test

inventory separately or did you group the Pahute Mesa inventory together and take the summary? This calculation is inadequate because it seems to base on mostly speculation.

The DEIS states that no radioactive contamination attributable to underground tests has been detected in monitoring wells off the Nevada Test Site [NTS]. (Section 8.3, page 8-76). Absence of evidence is not evidence of absence. There is no state of the art monitoring system on or off the NTS, because no one has constructed one. This statement should be regarded as more of a belief and subject to change as more data is collected over the next decade.

It is highly likely that underground test contamination is past the NTS boundary, because that is exactly what personnel from the DOE UGTA program said at a Community Advisory Board meeting almost four years ago in June 1996. The phenomenon of prompt injection has probably blown the radionuclides past the NTS boundary, in a manner similar to the way it probably blew Europium 0.8 miles at Benham with a colloidal boost. DOE cannot afford to prove or disprove that contamination is past the NTS boundary, but Yucca Mountain could fund a well program to help make this statement more factual.

Response
In 1996, DOE published the *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DIRS 101811-DOE 1996). This document provided an estimate of the underground testing radionuclide source term that is the best available, unclassified, source-term information currently available. This data was used in a simplified calculation to provide a reasonably conservative estimate of potential long-term cumulative impacts resulting from the underground testing activities at the Nevada Test Site. Because of ongoing studies and the current uncertainty surrounding groundwater transport models, the Department did not attempt to estimate actual groundwater transport characteristics for the Nevada Test Site. Rather, the estimates of potential Nevada Test Site groundwater impacts provided in Section 8.3 of the Draft EIS were based simply on the ratio of inventories of radionuclides available for transport at the repository and the Nevada Test Site.

For the Final EIS, the Department has refined the Nevada Test Site groundwater impact analysis to consider not only the total inventories of radionuclides but also the relative source-term radionuclide concentrations and dilution factors for the repository and the Nevada Test Site. However, because of the large uncertainties remaining, the refined analysis did not attempt to model actual groundwater transport at the Nevada Test Site. Instead, the refined analysis assumed that the radionuclide constituents in the groundwater at the Nevada Test Site would be transported in an identical manner to those from the repository (that is, the repository groundwater transport model was applied to the Nevada Test Site source term). In doing so, the Department believes that the resulting estimates of the potential cumulative impacts from underground testing activities at the Nevada Test Site represent a reasonable upper bound of the actual impacts.

With regard to the commenter's concern about the adequacy of the Nevada Test Site Underground Testing Area groundwater characterization program, DOE continues to evaluate, outside of this EIS, the extent of contamination due to past underground testing and refine the monitoring network based on the results of this evaluation. This will provide a better understanding of the current distribution and extent of contaminated groundwater as well as the transport characteristics (including colloidal behavior) of the unsaturated soils and underlying aquifers. As new information becomes available, the Department will update impact estimates as appropriate.

9.1 (8646)
Comment - EIS000817 / 0196
P. K-25. The freeze-thaw cycle effect on dry cask storage needs more evaluation. We have been concerned about it for years.

Response
While the freeze-thaw cycle is a potential concern for the longevity of dry storage casks made of reinforced concrete and exposed to the elements, there would be no effect on the contents of the casks because they would be dry and emit large amounts of heat. Thus the casks would not experience the freezing and thawing. Nevertheless, the cladding integrity of spent nuclear fuel in these types of storage environments is being and would continue to be evaluated.

9.1 (8882)
Comment - EIS001834 / 0023
The “No-Action Alternative” is unrealistic and does not provide a baseline to which the proposed action can be compared. This section should either be entirely deleted from the DEIS, or a real no-action alternative should be described.

The “No-Action” alternative presented is not truly a no-action scenario. It would require action by the federal government to take control of the nuclear waste on the reactor sites and monitor it for at least one hundred years. The true no-action alternative would be to require the utilities to be responsible for safe storage of the waste on the reactor sites until an alternate sound solution is discovered. Although this scenario would raise some safety and environment concerns, it would be a truly “no-action” alternative, and would provide a better comparison model than the scenarios currently described in the DEIS.

Further, it would be possible for the DOE to propose other alternatives that would not be “no-action” alternatives (i.e., other actions). It is clear that the DOE is legally prohibited from looking at other repository sites, but it is not prohibited from looking at alternatives to repository sites. Although Public Citizen does not currently endorse any proposals currently in circulation, we do support continued research in this area and focused efforts to find a true solution.

Response
DOE analyzed the No-Action Alternative to serve as a basis for comparing the magnitude of potential environmental impacts of the Proposed Action. Under the No-Action Alternative, and consistent with the NWPA, DOE would terminate activities at Yucca Mountain and undertake site reclamation to mitigate any significant adverse environmental impacts. In addition, DOE would prepare a report to Congress, with the Department’s recommendations for further action to ensure the safe, permanent disposal of spent nuclear fuel and high-level radioactive waste, including the need for new legislative authority. Under any future course that would include continued storage at the generator sites, commercial utilities and DOE would have to continue managing spent nuclear fuel and high-level radioactive waste in a manner that protected public health and safety and the environment. However, the future course that Congress, DOE, and the commercial utilities would take if Yucca Mountain was not approved is uncertain.

DOE recognizes that a number of possibilities could be pursued, including continued storage of spent nuclear fuel and high-level radioactive waste at existing sites and/or one or more centralized locations, study and selection of another location for a deep geologic repository (Chapter 1 identifies the process and alternative sites previously selected by DOE for technical study as potential geologic repository locations), the development of new technologies (for example, transmutation), or reconsideration of alternatives to geologic disposal. The environmental considerations of these possibilities have been analyzed in other contexts in other documents to varying degrees.

In light of these uncertainties, DOE decided to illustrate the possibilities by focusing the analysis of the No-Action Alternative on the potential impacts of two scenarios–long-term storage of spent nuclear fuel and high-level radioactive waste at the current sites with effective institutional control for at least 10,000 years (Scenario 1), and long-term storage with no effective institutional control after about 100 years (Scenario 2). Although the Department agrees that neither of these scenarios is likely, it selected them for analysis because they provide a basis for comparison to the impacts of the Proposed Action and because they reflect a range of the impacts that could occur.

Based on regulations and directives that govern the safe and secure storage of spent nuclear fuel and high-level radioactive waste, under the No-Action Alternative commercial utilities and DOE sites would have to continue to manage these materials in a manner that protects public health and safety and the environment (that is, maintain the status quo). This is the assumption DOE used to evaluate Scenario 1 and the first 100 years of Scenario 2.

The NWPA directs DOE to perform detailed evaluations of the Yucca Mountain site and states that the Department need not consider alternatives to a Yucca Mountain Repository [Section 114 (f)(2)]. However, if the site was not approved, DOE would not proceed with development activities at Yucca Mountain. Rather, as directed by the NWPA [Section 113(c)(3)], the Department would prepare a report to Congress with its recommendations for further action to ensure the safe, permanent disposal of spent nuclear fuel and high-level radioactive waste, including the need for new legislative authority.

9.1 (9175)
Comment - EIS001971 / 0005
OTHER PROBLEMATIC ASSUMPTIONS (appendix K, & section 7): The structure of the analysis of the no-action alternative is built upon a series of hypothetical 'assumptions' for 'consistency' or 'purpose of analysis'. While this is an understandable strategy, it cannot be used to entirely evade analysis of the situation that the no-action alternative would actually create, which is 72 de-facto, at reactor storage sites with high exposures to water and people for an indeterminate period of time. Nor is it likely that other assumptions of the no-action analysis will be met (e.g.) "1) that the spent fuel and high level radioactive waste would be treated, packaged and stored in a condition ready for shipment to a repository" and that 2) a double barrier of cask and concrete storage module.

Response
DOE recognizes that the No-Action Alternative does not represent actual conditions at each of the 77 sites, but believes that the two scenarios present a range of impacts that could occur and represent an adequate basis for comparison to the impacts of the Proposed Action.

The No-Action Alternative analysis evaluated environmental impacts for the 77 sites based on National Environmental Policy Act documents prepared by DOE and the Nuclear Regulatory Commission that describe site-specific and "typical" storage configurations for facilities in operation or planned for the near future (DIRS 101898-NRC 1991; DIRS 101899-NRC 1996; DIRS 103191-DOE 1994; DIRS 103214-DOE 1996; DIRS 101802-DOE 1995; DIRS 155929-Jason 1999).

These documents, in addition to describing likely storage configurations (which DOE used to evaluate the No-Action Alternative), evaluated and discussed environmental impacts associated with stabilizing waste materials in preparation for onsite storage. In most cases, the stabilized waste forms are "road ready." Therefore, in accordance with Council on Environmental Quality regulations (40 CFR 1502.20 and 1502.21), DOE decided not to include impacts from stabilization of waste forms except by reference.

This dual-barrier concrete storage modular design is currently licensed by the Nuclear Regulatory Commission and employed at several sites.

9.1 (9229)
Comment - EIS001971 / 0006
The assumption that 10,000 years of institutional control is even a possibility is vain and vacuous; the D.E.I.S. does not even attempt to explain how it might be possible. And an analysis where "the long term impact analysis used recent climate and meteorological data, assuming they would remain constant throughout the evaluation period," is completely incredible. The D.E.I.S. offers this rejoinder:

"DOE recognizes that there could be considerable changes in the climate over 10,000 years (precipitation patterns, ice ages, global warming, etc.) but, to simplify the analysis, did not attempt to quantify climate changes" (at K-3)

Response
DOE recognizes that both No-Action scenarios are unlikely, just as losing effective institutional control after 100 years is unlikely (Section 2.2 and the introduction to Chapter 7 of the EIS). The Department selected these scenarios because it did not want to speculate on future actions that Congress could take if there was no recommendation of Yucca Mountain as a repository and because predicting a date for loss of institutional control would be speculative. The Nuclear Regulatory Commission and the Environmental Protection Agency have recognized this fact and, although they encourage the maintenance of monitoring and physical oversight for as long as possible, they recognize that projecting society's willingness and ability to provide such a function for more than 100 years into the future is not reasonable (see 40 CFR Part 197 and 10 CFR Part 63).

DOE selected these scenarios to provide a basis for comparison of impacts from the Proposed Action and to reflect a range of impacts that could occur. DOE does not believe either scenario is likely to occur. Scenario 1, which includes an analysis of impacts under effective institutional control for at least 10,000 years, is consistent with the portion of the analysis of the Proposed Action that includes an analysis of effective institutional control for the first 100 years after closure. Scenario 2, in which the analysis does not consider effective institutional control after approximately 100 years, is parallel to the portion of the Proposed Action analysis in which long-term performance after 100 years does not include effective institutional control.

For consistency with the repository analysis in the *Viability Assessment for a Repository at Yucca Mountain* (DIRS 101779-DOE 1998), the No-Action Alternative assumed constant climatology during the 10,000-year analysis period. This is consistent with climate studies that show the Yucca Mountain area is at most 35,000 years into a fluctuation between a cold glacial climate and a warm interglacial climate (similar to the present), which occurs about every 100,000 years (DIRS 101779-DOE 1998). DOE discusses the difficulties of modeling these changes and the potential effect on outcomes resulting from uncertainties associated with predicting future climatic conditions in Section K.4.1.2 of the EIS.

9.1 (9284)
Comment - EIS001971 / 0017
As the 'test of common sense' illustrates, the most difficult aspect of trying to respond formally to the no-action alternative in the context of the draft E.I.S for Yucca Mountain is that it really does not 'make sense.' The conclusion of 'no impact' for the no-action alternative simply eluded my most tenacious attempts to understand the process by which this conclusion was reached. Internal contradictions are fundamental; assumptions evade both the current reality of the no-action alternative and the very scenarios that are posited by the alternative.

The 'belief' of the drafters of the E.I.S., given to frame the no-action alternative, is perhaps the most problematic of all: that neither of the no-action alternatives is likely to happen. From the perspective of those of us living in the vicinity of ad hoc interim at-reactor-site storage, which would become defacto permanent storage under either an official no-action alternative or simply by continued failure on the part of DOE to fulfill its contract, this 'belief' is nonsense. It makes sense ONLY if the structure of the no-action alternative is entirely disingenuous: if what the drafters mean is that it is not likely that a 100 year storage period will be without institutional oversight, and that institutional oversight throughout a 10,000 year period is not likely. This would, of course, be true. But then, the whole structure of the alternative would have been set up to undermine itself. I do not choose to 'believe' that this was the intention – even if it was. I prefer to attribute the disjunction to the human capacity for denial – which has proved to be one of the most abiding factors of nuclear waste policy and politics. This is the fundamental dynamic that we must change.

Response
DOE prepared the EIS to provide information on environmental impacts that could result from the Proposed Action and a basis for comparison in the two No-Action scenarios. As such, the EIS provides estimates of environmental impacts without conclusions on their significance (that is, the EIS has not concluded that the No-Action Alternative would result in "no impacts"). In fact, the EIS presents local impact estimates under Scenario 2 that many would consider quite severe (see Section K.3.1 of the EIS).

DOE believes that both No-Action scenarios are unlikely as a permanent solution even though continued onsite storage of spent nuclear fuel and high-level radioactive waste would be necessary for some time if the site was not approved. If the Secretary of Energy did not recommend Yucca Mountain as a repository, DOE would, in accordance with the NWPA [Section 113(c)(3)], prepare a report to Congress, with the Department's recommendations for further action to ensure the safe, permanent disposal of spent nuclear fuel and high-level radioactive waste, including the need for new legislative authority. Under any future course that would include continued storage at the generator sites, commercial utilities and DOE would have to continue managing spent nuclear fuel and high-level radioactive waste in a manner that protected public health and safety and the environment. However, the future course that Congress, DOE, and the commercial utilities would take if Yucca Mountain was not approved is uncertain.

DOE recognizes that a number of possibilities could be pursued, including continued storage of spent nuclear fuel and high-level radioactive waste at existing sites and/or one or more centralized locations, study and selection of another location for a deep geologic repository, the development of new technologies, or reconsideration of alternatives to geologic disposal. The environmental considerations of these possibilities have been analyzed to varying degrees in other contexts in other documents (see the introduction to Chapter 7).

In light of these uncertainties, DOE decided to illustrate the possibilities by focusing the analysis of the No-Action Alternative on the potential impacts of two scenarios – long-term storage of spent nuclear fuel and high-level radioactive waste at the current sites with effective institutional control for at least 10,000 years, and long-term storage with no effective institutional control after about 100 years. Although the Department agrees that neither of these scenarios is likely, it selected them for analysis because they provide a basis for comparison to the impacts of the Proposed Action and because they reflect a range of the impacts that could occur.

9.1 (9321)
Comment - EIS001888 / 0051
EIS Statement (pg. 2-65) 2.2.2.2 - In No-Action Scenario 1, DOE would continue to manage its spent nuclear fuel and high-level radioactive waste in above- or-below-grade dry storage facilities at five sites around the country. Commercial utilities would continue to manage their spent nuclear fuel at 72 sites. The commercial and DOE sites would remain under effective institutional control for at least 10,000 years. DOE based the 10,000-year analysis period on the generally applicable Environmental Protection Agency regulation for the disposal of spent fuel and high-level radioactive waste (40 CFR Part 191), even though the regulation would not apply to disposal at Yucca Mountain.

Clark County Comment - This alternative is not authentic since it posits that institutional controls would remain for 10,000 years at 77 facilities that currently store spent fuel. DOE's alternative for institutional controls should be reasonably comparable. It is not reasonable to compare relaxed standards of the Nuclear Waste Policy Act with a more restricted national standard. Further, under this scenario, storage facilities would be completely replaced every 100 years. This artificially distorts the cost of a "realistic" on site storage for an interim period of 20-50 years while a fair search for an appropriate disposal solution is sought. Further, HLW [high-level radioactive waste] at DOE facilities throughout the country are the responsibility, in perpetuity, of the DOE. Replacement of buildings at these facilities should not be factored into the costs of the No-Action alternative. The spirit of NEPA [National Environmental Policy Act] requires the formulation of realistic scenarios in order to identify alternatives, impacts and potential mitigation strategies. The DEIS fails to meet the spirit and letter of NEPA in this regard. NEPA Regulation: Sec. 1502.14 Alternatives including the proposed action; Sec. 1502.16 Environmental consequences.

Response
DOE analyzed the No-Action Alternative to serve as a basis for comparing the magnitude of potential environmental impacts of the Proposed Action. Under the No-Action Alternative, and consistent with the NWPA, DOE would terminate activities at Yucca Mountain and undertake site reclamation to mitigate any significant adverse environmental impacts. In addition, DOE would prepare a report to Congress, with the Department's recommendations for further action to ensure the safe, permanent disposal of spent nuclear fuel and high-level radioactive waste, including the need for new legislative authority. Under any future course that would include continued storage at the generator sites, commercial utilities and DOE would have to continue managing spent nuclear fuel and high-level radioactive waste in a manner that protected public health and safety and the environment. However, the future course that Congress, DOE, and the commercial utilities would take if Yucca Mountain was not approved is uncertain.

DOE recognizes that a number of possibilities could be pursued, including continued storage of spent nuclear fuel and high-level radioactive waste at existing sites and/or one or more centralized locations, study and selection of another location for a deep geologic repository (Chapter 1 identifies the process and alternative sites previously selected by DOE for technical study as potential geologic repository locations), the development of new technologies (for example, transmutation), or reconsideration of alternatives to geologic disposal. The environmental considerations of these possibilities have been analyzed in other contexts in other documents to varying degrees.

In light of these uncertainties, DOE decided to illustrate the possibilities by focusing the analysis of the No-Action Alternative on the potential impacts of two scenarios – long-term storage of spent nuclear fuel and high-level radioactive waste at the current sites with effective institutional control for at least 10,000 years (Scenario 1), and long-term storage with no effective institutional control after about 100 years (Scenario 2). Although the Department agrees that neither of these scenarios is likely, it selected them for analysis because they provide a basis for comparison to the impacts of the Proposed Action and because they reflect a range of the impacts that could occur.

DOE also believes that any additional effort to perform more specific analyses probably would yield results that contain some combination of the costs and human health effects postulated for the two scenarios evaluated in the EIS and, therefore, would not provide substantive additional information for the decisionmakers.

DOE also believes that the assumptions made about facility replacement every 100 years could, if anything, underestimate the costs because current Nuclear Regulatory Commission regulations (10 CFR Part 72) allow only a 20-year license period for independent spent fuel storage installations.

DOE does not understand the reference to comparison of "relaxed standards of the Nuclear Waste Policy Act with a more restricted national standard." DOE believes that the NWPA and regulatory standards issued by the Environmental Protection Agency and Nuclear Regulatory Commission (40 CFR Part 197 and 10 CFR Part 63, respectively) are at least equivalent to and in many ways more demanding than current standards for independent spent fuel storage installations. In addition, DOE notes that 40 CFR Part 197 specifies a 10,000-year compliance period.

9.1 (9386)
Comment - EIS002149 / 0006
In the no action alternative, there's been a lot of talk about how well, we can't keep the stuff on-site because of all the potential dangers with on-site storage, which -- the on-site no action alternative in this document is -- is not very well addressed, and one of the issues that keeps coming up is oh, there's all this problem with flooding. I looked in this thing and I looked in volume 2 and I didn't really see a flood analysis in there, and I would be happy if you want to point it out to me if it's in there. So if it's such a big problem, then explain how it's a big problem, why it's going to be such a big problem to have on-site storage in areas which are relatively near to water, to water facilities, which is what one of the big arguments I've been hearing. So I'd like to see that addressed in this document, as well.

Response
Chapter 7 of the EIS provides quantitative estimates of environmental impacts from two No-Action scenarios without conclusions as to their significance. In Scenario 1, the spent nuclear fuel and high-level radioactive waste would be maintained for at least 10,000 years. The environmental impacts associated with this scenario would be predominantly to workers associated with ongoing monitoring and maintenance of the storage facilities. The analysis assumed that the storage facilities would be built at existing nuclear facility sites, where flooding is not an issue.

In Scenario 2, the storage facilities would again be at existing nuclear facility sites, but there would be no institutional control (ongoing monitoring and maintenance) after 100 years. As the concrete storage facilities, storage canisters, and spent nuclear fuel and high-level radioactive waste materials deteriorated, contaminants would enter surface waters from stormwater runoff from failed facilities and storage containers and exposed radioactive materials. Sections 2.2.2, 7.2.1, and 7.2.2 of the EIS describe the scenarios further. DOE is unaware of any implication of flooding as an issue for the No-Action scenarios unless the reference is to eventual widespread contamination of surface-water bodies from the stormwater runoff mentioned above.

9.1 (9756)
Comment - EIS001888 / 0339
[Clark County summary of comments it has received from the public.]

The No Action Alternative should include activities in addition to stopping work at Yucca Mountain and Continued storage of SNF [spent nuclear fuel] and HLW [high-level radioactive waste] at the generator sites. Other activities to be evaluated include: (1) long term storage and maintenance of SNF and HLW (also Greater than Class C), (2) the development and use of dry cask storage, (3) phaseout and replacement of nuclear power with alternative sources, (4) all SNF and HLW (not limited to 70,000 MTHM [metric tons of heavy metal]), and (5) site-specific activities (e.g., closure dates, handling options, onsite storage, SNF/HLW inventory). Several commenters stated that the No Action Alternative should not include discussions of the future of the nuclear energy industry, including future construction and operation. Some commenters stated that the No Action Alternative must be part of the EIS, while other commenters stated that the No Action Alternative should not be part of the EIS because it was not part of Congress's intent. One commenter stated that the No Action Alternative should be the only alternative evaluated in the EIS.

Response

Responses to the various points in this comment are numbered in accordance with the numbers in the comment.

Items 1 and 4. Section 7.3.2 of the EIS evaluates continued storage at the 77 existing sites of all spent nuclear fuel and high-level radioactive waste (called Inventory Module 1; see Table 7-9 in Section 7.3). Section 7.3.2 describes short- and long-term impacts at commercial and DOE sites. DOE has not included Module 2 in its consideration of potential impacts under the No-Action Alternative because not enough information about Module 2 wastes is available to enable a meaningful analysis. For example, materials such as sealed radioactive sources, calibration, medical, and well-logging sources are used and stored by private industry at hundreds of locations in the United States (DIRS 101798-DOE 1994). Environmental information at the hundreds of sites at which Greater-Than-Class-C and Special-Performance-Assessment-Required low-level radioactive wastes are used and stored is not readily available. Although specific analysis is not possible, DOE believes short-term impacts such as those to socioeconomics and land use would not increase appreciably, but health effects could increase over the long term because workers and the public could be exposed to these waste types.

Item 2. Regarding the development and use of dry cask storage at the 72 commercial storage sites, DOE points to the Nuclear Regulatory Commission's findings in its *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (DIRS 101899-NRC 1996). The Commission stated: "Within the context of a license renewal review and determination, the Commission finds that there is ample basis to conclude that continued storage of existing spent fuel and storage of spent fuel generated during the license renewal period can be accomplished safely and without significant environmental impacts." Although applicable only to the continued storage of spent nuclear fuel generated up to and through the 20-year license renewal period for the nuclear powerplants, DOE believes the conclusions remain valid for much longer periods assuming that current institutional controls and regulatory frameworks (for example, 10 CFR Part 72) continue. Dry cask storage is and will continue to be an option for nuclear utilities to safely manage spent nuclear fuel until ultimate disposal.

Item 3. Speculation regarding the phaseout of nuclear power and replacement with alternative energy sources is beyond the scope of this EIS. DOE has revised the introduction to Chapter 7 of the EIS to discuss some of the potential impacts that could result from the phaseout of nuclear powerplants. This section also identifies the actions required of DOE by the NWPA to determine alternative means to ensure safe, permanent disposal of spent nuclear fuel and high-level radioactive waste if a decision was made not to proceed with the development of a repository at Yucca Mountain. The NWPA does not contain provisions concerning any phaseout of nuclear power.

Item 5. Section 2.2 of the EIS describes the No-Action Alternative and rationale for selection of scenarios for analysis. Chapter 7 and Appendix K contain the details of the analysis and results.

9.1 (10124)

Comment - EIS001295 / 0005

Section 7.2.1.13 on environmental justice effects of the so called "no-action" scenario is also severely lacking in attention to the justice issues which are involved in NOT moving this waste. If Yucca Mountain is not used, yet the DOE requires that the waste be moved away from the sites where it has been generated, someone, somewhere will have to become the new, probably unwilling host to an HLRW [high-level radioactive waste] disposal facility. The "no-action" scenario #1 attributes no positive aspect to the justice exhibited when those communities which have been responsible for creating the waste are the same communities which stand guard over the waste into the foreseeable future and beyond.

No positive aspect of the "no-action" scenario #1 is attributed to the salvation of possible transportation accidents, unplanned exposures, diminished land values along transportation routes and the most unfortunate ruining of the Yucca Mountain location and surrounding urban areas at Las Vegas, Los Angeles and elsewhere by the placement of this waste there. The negative impacts in terms of environmental justice issues are much greater in fact if the waste is removed from where it is currently located, shipped through urban, often poor communities next to railroad tracks and highways, and dumped into a hole out back on the Indian reservation as planned at Yucca Mountain. The "no-action" scenario #2 is absolutely irresponsible, but a highly likely scenario given the nature of the nuclear industry and the regulating community. It is important that the people of the United States, their government, the DOE and the commercial utilities not allow this scenario to develop in a de facto manner. We all have a responsibility to monitor their actions so as not to allow it to develop. Collectively, the world population and the more responsible governments of the world have a responsibility to prevent this scenario from developing within this country and elsewhere on our planet.

Section 7.3.2.7 claims that the employment of personnel involved with construction and maintenance of 77 facilities is the only contributing factor in socioeconomic impacts due to on site storage. I would comment that the potential of collective public responsibility for the safeguarding of these wastes for the time period considered would allow the creation of much greater socioeconomic impact. Participation in the activity of oversight, construction and maintenance of the storage facilities beyond the previously mentioned 100-year planned obsolescence, the possibility of tourism and pilgrimages; and educational and interpretational opportunities to understand and contemplate the profoundly deep social and economic commitment that human ancestors made to nuclear technology and the ongoing efforts of current generations to keep its waste products from contaminating the planet could have enormous social, economic and political impacts which are not even alluded to in the DEIS. Furthermore, the actual economic impact of the "no action" scenario #2 (basically ignoring the problem and burying the waste onsite) is not elaborated upon, and would include immediate short term economic benefit to the DOE, the public and the commercial utilities - this aspect of the problem, the potential unprofitability of dealing with this waste, contributes to the notion that Yucca Mountain is the only answer, because the utilities and waste handling contractors are already lined up at the trough like pigs. To address this waste problem involves huge economic subsidies by the people through their government, which would employ at great expense large nuclear industry contractors to hire low-cost workforces who would then build railroads, drive trucks and engineer casks and carriages and shuffle the waste around the country. The potential for local economic development in finding ways to collectively and democratically secure and isolate these wastes well into the future is great, yet the DEIS fails completely to explore it.

In summary, I do not think that the two scenarios for so-called "no action" are at all similar, and are not developed adequately to fully understand what the impact of long-term population-wide maintenance of the isolation of these wastes mean. I think that this failure to create a reasonable scenario for long term on site storage allows no adequate comparison to the environmental impact of transportation and storage of this waste at Yucca Mountain and I would request that more investigation be done on the possibility of long-term on site or near on site storage where the population as a whole is involved in the process of maintaining the isolation of these wastes from the environment.

Response

DOE does not believe that this alternative would result in beneficial impacts to the Nation as a whole. On the contrary, the No-Action Alternative would have potentially severe detrimental environmental consequences.

The National Environmental Policy Act process defines the No-Action Alternative as providing a benchmark, enabling decisionmakers to compare the magnitude of environmental effects on the action alternatives ["Forty Most Asked Questions Concerning National Environmental Policy Act Regulations" (46 *FR* 18026, March 21, 1981), Question and Answer No. 3]. The Council on Environmental Quality defines the No-Action Alternative as "no change" from current direction (that is, conditions that would result if the Proposed Action did not happen). Using the example of nationwide transportation, the No-Action impact assessment would compare potential transportation impacts (adverse or beneficial) to existing impacts. Because no transportation activities are under way related to the disposal of spent nuclear fuel and high-level radioactive waste and the No-Action Alternative assumed no transportation would occur, the net transportation impacts associated with the No-Action Alternative would be zero. The analysis captured transportation impacts for the Proposed Action by comparing them to the benchmark provided by the No-Action Alternative (that is, zero). Chapter 6 of the EIS discusses transportation impacts from the Proposed Action.

DOE believes that both No-Action scenarios are unlikely, even though continued onsite storage of high-level radioactive waste and spent nuclear fuel would be necessary for some time if the Yucca Mountain site was not approved. If DOE did not recommend Yucca Mountain, it would, as directed by the NWPA [Section 113(c)(3)], prepare a report to Congress with its recommendations for further action to ensure the safe, permanent disposal of spent nuclear fuel and high-level radioactive waste, including the need for new legislative authority.

As noted by the comment, DOE estimated the workforce impacts associated with the No-Action Alternative. This estimate included construction, oversight, and maintenance activities. On the other hand, the Department cannot speculate on the possible role of generator sites as tourism or educational destinations. Commercial utilities, as nuclear plant operators under Nuclear Regulatory Commission regulations, determine the scope of public outreach and interpretive programs provided at their nuclear facilities. DOE believes that this level of activity does not provide discriminating information for the decisionmakers.

The costs associated with the Proposed Action would be greater during the first 100 years; the ongoing costs associated with continued storage under Scenario 1 would be far greater. Most of the funding for repository investigation and development comes from ratepayers who benefit directly from the use of nuclear power. In addition, ratepayers would fund continued storage of spent nuclear fuel at generator sites. The EIS analysis assumed that facilities would require replacement every 100 years, and that there would be a major facility repair halfway through the first 100-year cycle. Under Scenario 2, the projected economic impacts would be the same as those for Scenario 1 for the first 100 years, but after that approximately 800 jobs would be lost.

9.1 (10431)
Comment - EIS001927 / 0036
How about the "No Action Alternative" of phasing out nuclear power?

Response
In accordance with the NWPA, the EIS evaluates the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at the proposed Yucca Mountain Repository. The No-Action Alternative evaluated in the EIS is continued storage of spent nuclear fuel and high-level radioactive waste at generator sites, or maintenance of the status quo.

Speculation on the phaseout of nuclear power and replacement with alternative energy sources is beyond the scope of this EIS. DOE has revised the introduction to Chapter 7 of the EIS to discuss some of the potential impacts that could result from the phaseout of nuclear powerplants. This section also identifies the actions required of DOE by the NWPA to determine alternative means to ensure safe, permanent disposal of spent nuclear fuel and high-level radioactive waste if a decision was made not to proceed with the development of a repository at Yucca Mountain. The NWPA does not contain provisions concerning any phaseout of nuclear power.

9.1 (10662)
Comment - EIS001966 / 0002
In the No Action Alternative section, there is the statement that the drafters of the EIS do not believe either of the No Action Alternatives are likely to happen. However, the drafters give no reasons for this assumption. If this assumption is going to be made, it must be substantiated. In my opinion, this is the most likely event because thus far, there has been no DOE action and Secretary Richardson has recommended that the DOE take title on site, relieving the federal government of its duty and relieving the utilities of their potential liability.

Response
DOE analyzed the No-Action Alternative to serve as a basis for comparing the magnitude of potential environmental impacts of the Proposed Action. Under the No-Action Alternative, and consistent with the NWPA, DOE would terminate activities at Yucca Mountain and undertake site reclamation to mitigate any significant adverse environmental impacts. In addition, DOE would prepare a report to Congress, with the Department's recommendations for further action to ensure the safe, permanent disposal of spent nuclear fuel and high-level radioactive waste, including the need for new legislative authority. Under any future course that would include continued storage at the generator sites, commercial utilities and DOE would have to continue managing spent nuclear fuel and high-level radioactive waste in a manner that protected public health and safety and the environment. However, the future course that Congress, DOE, and the commercial utilities would take if Yucca Mountain was not approved is uncertain.

DOE recognizes that a number of possibilities could be pursued, including continued storage of spent nuclear fuel and high-level radioactive waste at existing sites and/or one or more centralized locations, study and selection of another location for a deep geologic repository (Chapter 1 identifies the process and alternative sites previously selected by DOE for technical study as potential repository locations), the development of new technologies (for example, transmutation), or reconsideration of alternatives to geologic disposal. The environmental considerations of these possibilities have been analyzed in other contexts in other documents to varying degrees.

In light of these uncertainties, DOE decided to illustrate the possibilities by focusing the analysis of the No-Action Alternative on the potential impacts of two scenarios–long-term storage of spent nuclear fuel and high-level radioactive waste at the current sites with effective institutional control for at least 10,000 years (Scenario 1), and long-term storage with no effective institutional control after about 100 years (Scenario 2). Although the Department agrees that neither of these scenarios is likely, it selected them for analysis because they provide a basis for comparison to the impacts of the Proposed Action and because they reflect a range of the impacts that could occur.

9.1 (10669)
Comment - EIS001966 / 0009
Because the siting guidelines require consideration of many factors in siting a repository, including natural resources, hydrology, geophysics, seismic activity, population characteristics, socioeconomic factors, and transportation, under NEPA these specific factors must also be considered in the "No Action Alternative," where on-site storage at nuclear generation plants is said to be an Alternative.

Response
Although the same degree of rigor was not comparable for all areas of environmental impacts, the same spectrum of impacts was considered for the Proposed Action and the No-Action Alternative. In accordance with Council on Environmental Quality regulations [Section 1501.7(a)], as part of the scoping process DOE identified the significant issues to be analyzed in detail in the EIS. DOE was also able to identify and eliminate from detailed study the issues that were not significant or that have been covered by prior environmental review (Section 1506.3). In doing so, it narrowed the discussion of these issues in the EIS to a qualitative or semi-quantitative presentation, including a statement of why they would not be expected to adversely affect the human environment.

DOE then identified the environmental impact areas associated with important issues that were common to both the Proposed Action and the No-Action Alternative. These common areas (occupational and public health and safety, and hydrology) received detailed evaluation under the No-Action Alternative.

9.1 (11152)
Comment - EIS000278 / 0002
The DEIS evaluates two scenarios of what is called the no-action alternative, which it says provides a baseline for comparison with proposed action. In both scenarios, storing waste at the plant sites for 10,000 years, scenario one; and storing waste at the plant sites for 100 years, scenario two, the spent fuel remains at the plant sites. Currently more than 38,500 metric tons of uranium are stored on site at 72 commercial nuclear power plants in 36 states. Additional high-level radioactive waste is stored at five DOE sites. In scenario one, the waste remains at the current sites under institutional controls for 10,000 years with repackaging approximately every 100 years. Nearly five trillion dollars would be required for canister replacement. According to the cost estimates in the DEIS, this scenario is double the cost of storing the waste on site for 100 years under institutional controls, scenario two. In human terms, an additional three latent cancer deaths would occur in the exposed population and 28 additional latent cancer deaths in the population of on-site workers. This is substantially more radiation-related cancer deaths than occur if the repository is completed in the Yucca Mountain site.

Scenario two is not as financially burdensome. Waste remains at the plant sites under institutional controls for only 100 years, but the waste still remains at the plant sites for 10,000 years. For the first 100 years, the costs of scenario one and two are the same. However, the number of people who would be affected by the migration of radioactive materials is far greater. In scenario two, additional latent cancer deaths in the exposed population increase to 3,300 with 12 additional latent cancer deaths in the on-site worker population. Such high numbers of latent cancer deaths are unacceptable.

Response
This comment accurately summarizes the estimated impacts for the No-Action Alternative. The Secretary will consider all information, including the estimated number of latent cancer fatalities, for both the Proposed Action and the No-Acton Alternative in determining whether to recommend the Yucca Mountain site to the President for further development.

9.1 (11607)
Comment - EIS001654 / 0037
Page S-66. Table S-1 Needs More Clarity of the Meaning of the Data it Displays

Just as we felt the major findings of the EIS in S.11 needed more emphasis, Table S-1 needs some improvement because it is the summary display of the supporting evidence that led to the findings.

For example, the impact on hydrology for the Scenario 2 is more than just "Potential for radiological contamination of groundwater around 72 commercial and 5 DOE sites." Is it not a certainty that there will be contamination in that scenario if the spent fuel and other waste are left unmanaged over the 9,900 years after institutional controls no longer exist?

We find some difficulty (and assume others do) in interpreting the data displayed to represent the long-term consequences in occupational health and safety for the Proposed Action and the Scenario 2 No-Action Alternative. The Latent Cancer Fatalities (LCF) for the Maximally Exposed Individual (MEI) and population are 4.4×10^{-5} and 5.3×10^{-4} for the Proposed Action compared to death within a few months for MEI and a population of 3,300 for Scenario 2 with a footnote that "downstream exposed population of approximately 3.9 *billion* over 10,0.90 years." (emphasis added) We conclude that there is a very slight radiological risk over 10,000 years under the Proposed Action. That compares with thousands of deaths with No-Action Scenario 2 and billions of people potentially exposed "downstream." If we have interpreted that even correctly, it should be presented more boldly in the Summary. If we have drawn an incorrect conclusion, then maybe others will and the table should be revised to prevent misinterpretation.

Response
DOE believes that contamination would probably occur at most of the 77 sites if they were left unmanaged for 9,900 years. However, excluding possible damage from manmade external events or severe natural phenomena, the Department's evaluations of environmental concrete degradation for some regions of the United States predict that the above-ground storage modules could maintain their integrity longer than 10,000 years, thus preventing the release of radioactive material to the accessible environment during the period of evaluation.

Regarding the presentation of the latent cancer fatalities in Table S-1 in Section S.11.1 of the EIS, the Department believes the presentation is sufficient and has made no related changes to the table.

9.1 (12711)
Comment - EIS001337 / 0084
Page 2-75 Table 2-7 [Section 2.4.1]. This table should be revised to include a comparison of the population likely to accrue the risks associated with the No Action and Preferred alternatives. For example, what is the number of persons potentially exposed to risks associated with the No Action Alternative (ie., population near on-site storage and transportation routes). This information would be helpful in evaluating the extent to which the alternatives tend to concentrate risks among persons exposed to them. This concentration of risk is an important impact, which must be considered for mitigation or compensation.

Page 2-76 Table 2-7. Under No Action Alternative estimates of Radiological Latent Cancer Fatalities why is not a range of estimates given similar to estimates for the Preferred Alternative. Absent a range, does this imply a lack of uncertainty in the estimates under the No Action alternative, which is not available for the Preferred Alternative. The presentation of comparative data in Table 2-7 for each parameter for each alternative should be consistent.

Page 2-76 Table 2-7. As the analysis in Table 1 of these comments illustrates, the number of fatalities associated with the Proposed Action [and] No Action alternatives. This is due to the fact that transportation is the key source of risk during the first 100 years. This analysis suggests that for at least 100 years the No Action serves to better protect public health and safety. The analysis in Table 1 also suggests that if the Preferred Action is implemented that during the first 100 years there will be a disequitable distribution of risk from existing storage sites to primarily Nevada, and in particular, communities located along transportation routes. The DEIS must consider the temporal and geographic distributions of risk associated with the Preferred and No Action alternatives. The DEIS must consider methods to mitigate risks transferred to Nevada. The DEIS must recognize that the Preferred Action does not minimize risk during the first 100 years of repository operation.

Table 1.
Draft Yucca Mountain Environmental Impact Statement
Comparison of Proposed Action to No Action Alternatives Total Fatalities Per Year
(derived from data in Table 2-7 of Yucca Mtn. DEIS)

Alternative	0-24yrs.	24 yr. Total	25-100yrs.	75 yr. Total	100yr. Total	101-10,000yrs.	9,900yr. Total
Proposed	.75-2.69	18.70-67.13	.04-.06	3.01-4.53	12.70-71.66	5 X 10^{-8}-5.3 X 10^{-8}	5 X 10^{-5}-5.3 X 10^{-4}
No Action #1	.25	6.35	.25	19.06	25.4	.11	1,095
No Action #2	.25	6.35	.25	19.06	25.4	.33	3,300

Table Conclusions[1]

1. During the period 0-24 years Proposed Action is 3-10 times riskier that the No Action alternatives.
2. During the period 25-100 year No Action #1 is 4-6 times riskier than the Proposed Action.
3. During the first 100 years Proposed Action is a little less to nearly three times riskier than No Action alternatives.
4. During the period 101 - 10,000 years No Action Alternative is 1,000 to 3,000 times riskier than the Proposed Action.
5. During first 24 years of repository operation, transportation is the source of over 95 percent of all fatalities, with most being from highway accidents rather than exposure to radiation.

1/ Proposed Action - disposal at Yucca Mountain
No Action Alternative #1 - on-site storage of wastes with long-term institutional controls
No Action Alternative #2 - on-site storage of wastes without long-term institutional controls

Response
DOE agrees that detailed affected population information is important. However, because of space considerations in Chapter 2 of the EIS, this detailed information is in later chapters and technical appendixes (principally Chapter 4 for short-term impacts for the Proposed Action, Chapter 5 for long-term impacts of the Proposed Action, Chapter 6 for transportation impacts, and Chapter 7 for impacts from the No-Action Alternative) rather than in the summary table in Section 2.4.1, which provides a broad overview of impacts.

The range of impacts to which the commenter refers in Table 2-7 was not meant to reflect uncertainty in the estimates, but rather to show the range of impacts of various implementation scenarios. For example, the range of radiological impacts for the repository given in the Draft EIS reflects the differences between the high, intermediate, and low thermal load scenarios. Similarly, the range for transportation impacts reflects the range of impacts for accidents that could occur in areas with low and high population densities.

For the No-Action Alternative, impacts for each of the scenarios evaluated are in separate columns (that is, Short-term, Scenario 1, and Scenario 2), and ranges are, therefore, not shown. However, Section K.4 of the EIS discusses the uncertainties associated with the No-Action Alternative in detail.

The purpose of the EIS is to provide information on the potential environmental impacts that could result from the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at the Yucca Mountain site. The repository and transportation analyses have captured the geographic shift of risks, as discussed in Chapters 4 and 6, respectively. Chapter 9 discusses the potential for mitigation of these risks. The EIS also provides information on potential environmental impacts resulting from a No-Action Alternative that assumes that the spent nuclear fuel and high-level radioactive waste would continue to be stored at the generator sites for some time into the future. The EIS does not, however, make judgments on whether the temporal and geographic distribution of impacts is equitable.

9.1 (13109)
Comment - EIS010227 / 0027
The SDEIS indicates that there could be a need for more surface cooling of the fuel assemblies, and suggests building an on-site above ground monitored retrievable storage area. What's the rush to move the fuel if it's just

going to sit in dry casks at Yucca Mountain? Why doesn't the DOE assume responsibility for putting the waste into dry casks at the reactor sites?

Response
The Nuclear Waste Policy Act of 1982 affirms the need and establishes a process for the siting, construction, and operation of a repository that will provide reasonable assurance that the public and the environment will be adequately protected. DOE is obligated to construct, operate and monitor, and eventually close a repository in accord with the provisions of this Act.

If the Secretary of Energy decided not to recommend Yucca Mountain for a repository DOE would prepare a report to Congress with its recommendations for further action to ensure the safe, permanent disposal of spent nuclear fuel and high-level radioactive waste, including the need for new legislative authority. Such legislative authority could include DOE involvement in at-reactor storage activities only if approved and directed by Congress.

9.1 (13371)
Comment - EIS010296 / 0016
Section S-1 S&ER Flexible Design (p.S-2): The DOE proposed [land] surface cooling/aging of waste at the repository site prior to loading may constitute "interim storage." The DOE does not specify how much waste might be aging/cooling at any one time, and that this aging process could be accomplished at the nuclear reactor sites.

Response
Although the flexible design described in the Supplement to the Draft EIS, and carried forward in this Final EIS, includes a surface aging facility for storage of as much as 40,000 metric tons of heavy metal (MTHM) over 50 years, this facility has been proposed as a repository operational option that could provide a cost-effective method of achieving a lower-temperature repository. DOE does not believe that the siting limitations for interim storage facilities contained in the NWPA constrain the operational flexibility of the repository or ultimately the long-term performance of the repository. Therefore, DOE believes that the surface aging facility option constitutes a potential operational element of a proposed repository.

DOE has indicated that 40,000 MTHM would be the maximum size of a surface aging facility at the Yucca Mountain site. Accordingly, the 40,000-MTHM facility was analyzed for the EIS to ensure that the impacts covered the total range possible. However, a surface aging facility as large as 40,000 MTHM might not be required after all aspects of the shipping scenarios, such as the age of the spent nuclear fuel to be shipped first, had been defined.

As discussed in Section 7.3 of the EIS, DOE believes (as does the Nuclear Regulatory Commission), that continued onsite storage of spent nuclear fuel can be accomplished safely and without significant environmental impacts (DIRS 101900-NRC 1996). Therefore, the Department believes that if necessary, utilities could continue to safely store spent nuclear fuel at their sites and the impacts of such storage would be similar to the short-term (100-year) impacts evaluated for the No-Action Alternative (see Table 7-6).

9.2 Accidents

9.2 (6698)
Comment - EIS001632 / 0089
Page K-26, Section K.2.5.2: This section discusses the potential for criticality involving stored spent fuel. EPA agrees with the assessment that criticality for high-level nuclear waste is impossible, but believes the EIS should expand the assessment of low probability for criticality in stored spent fuel canisters. The text states that only water entry, and its retention in the canisters, would allow a criticality to develop; and, the discussion further acknowledges the possibility of degradation of the concrete storage facilities, allowing water entry. Yet, the text does not assess the probability that dripping water could corrode the fuel containers, allowing water to enter and remain there for some time, potentially causing a criticality.

The text discusses three types of criticality events, but does not connect them to more explicit container corrosion failures scenarios or evaluate the relative probabilities of each failure type. DOE should more explicitly analyze corrosion failures (penetration of the container and corrosion of the internal components) from water entering the storage container and the potential for various criticalities. It is plausible that dripping water could corrode a storage container, allowing water to collect and fill the container (a scenario similar to NRC's performance scenario for a breached waste package in the repository).

Response

DOE agrees that there is some limited potential for a criticality event to occur in degraded spent nuclear fuel canisters. However, DOE believes the discussion in Section K.2.5.2 of the EIS includes the appropriate level of analysis and qualitative description of probability. There are many uncertainties and speculative processes involved in the hypothetical scenario that assumes no effective institutional control after approximately 100 years, as well as the sequence of events that could occur within that scenario. DOE does not believe it is possible to establish defensible probabilities for this No-Action accident scenario or the components of the scenario described in this comment that could lead to potential criticality during extended periods of dry storage with no institutional control (Scenario 2 of the No-Action analysis). Other factors that the analysis would have to quantify to estimate those probabilities would be different climatic conditions around the country, the different types of commercially available dry storage configurations, the range of burnup in the spent nuclear fuel, and the initial enrichment of the fuel.

Rather than specific probability analyses of the impacts associated with this No-Action scenario, the EIS provides qualitative descriptions of the relative likelihood of criticality events. First, the EIS states that criticality could be possible (in degraded storage canisters) if other conditions were met simultaneously. Those other conditions are a configuration that would allow water to enter but not drain out of the storage canister and fuel containing sufficient fissionable atoms to allow criticality. The second condition would depend on initial enrichment and burnup of the fuel. The EIS also states that a small amount of the spent nuclear fuel would be likely to have the appropriate enrichment burnup combinations, which could enable criticality to occur. Three types of criticality events were acknowledged as possible with only the most energetic type having potential to produce large impacts. That event is possible, but highly unlikely. It could happen only if sufficient amounts of fissionable material were brought together suddenly into a critical configuration. The more likely possibility would be for water to build up around degraded fuel elements. If fissions began to occur, the water would boil away and the criticality would stop. As noted in Section K.2.5.2 of the EIS, even the most energetic criticality would be unlikely to exceed the impacts associated with an aircraft crash onto a degraded dry storage module as evaluated in Section K.2.5.1. Therefore, DOE believes that further quantification of the probability of such an event would not provide useful information or be defensible.

9.2 (7769)

Comment - EIS000817 / 0029

Your radiological impact from scenario 1 (no-action) is based on a postulated aircraft crash it says. However I do not see this airplane crash (with fuel fire from the plane) into a full cask array in most safety analysis reports for dry cask designs. Has DOE looked carefully at what NRC and cask vendors are evaluating here? Just what is the scenario? It should be a full cask array and a large jet crash with a full fuel tank fire, and probably a cask pushed into another cask or tipped over, etc. Just what could happen here?

Response

In evaluating existing information on dry cask storage accidents, DOE did not find any reference to aircraft crashes on dry cask storage arrays. However, as noted in Section K.2.5.1 of the EIS, an aircraft crash into a nondegraded concrete storage module would not result in a significant release because the limiting aircraft missiles (engines and engine shafts) would not be able to penetrate the concrete modules and the storage casks. For degraded storage modules (Scenario 2), such penetration would be possible after significant degradation occurred. Section K.2.5.1 evaluates this scenario and provides a reference for details of the accident analysis, including estimated consequences.

9.2 (8495)

Comment - EIS000817 / 0157

P. 7-31. This airplane crash postulated accident -- what kind of airplane? How much airplane fuel in the fire? What kind of cask? One with flammable materials in it? These variables need more site specific evaluation. I have always been very concerned about the simplified analysis of airplane crashes into a full cask array -- it needs more evaluation. It is one of the big concerns. Seems to me several casks analyze only the fuel from the transporter in their fire analysis -- a plane with full fuel load should be analyzed for a cask design.

Response
Section K.2.5.1 of the EIS and the references cited in that section contain details about the postulated airplane crash onto dry storage modules. The jet selected for the crash analysis would be a midsize commercial jet with a significant fuel load. The analysis assumed that the storage array would be 100 concrete modules, each containing a typical steel storage cask with 24 pressurized-water reactor fuel assemblies. It also assumed there would be no flammable materials in the casks because DOE would not use the casks to store such materials. Based on the spacing of the storage modules and the size of the aircraft, the analysis assumed that the crash would destroy two full casks and release all the pellets from the fuel rods in the assemblies. The jet fuel from the aircraft would burn and oxidize the exposed fuel pellets into a powder. The analysis predicted the release and dispersal of a fraction of the powder to the environment. It computed impacts from the released material for a high-population site and a low-population site, including doses to human receptors as far as 80 kilometers (50 miles) from the release point. Section K.3.2.1 describes the consequences of the accident.

9.2 (11950)
Comment - EIS000817 / 0155
P. 7-21 [high-level radioactive waste storage facility figure in Section 7.2]. What are the canister supports? I'm always very interested in any supporting structures for the casks. They can be a real hazard. Basket designs and spacers can be a real problem too in drop and lift analysis -- tip-overs and surfaces the casks can hit.

Response
The canister supports in the high-level radioactive waste storage building shown in the relevant figure in Section 7.2 of the EIS would be large-diameter galvanized-steel pipe sections arranged in a grid and supported by a concrete base mat. Each pipe would hold one high-level radioactive waste canister. The space between the pipes would be filled with overlapping horizontally steel plates designed to direct most of the ventilation air through the storage cavities to remove heat generated by the waste canister.

9.3 Socioeconomics

9.3 (7985)
Comment - EIS001577 / 0005
Furthermore, the actual economic impact of the no action scenario number two, and this is basically ignoring the problem and burying the waste on site, is not elaborated upon and would include immediate short-term economic benefit to the DOE, public and the commercial utilities. This aspect of the problem, the potential unprofitability of dealing with this waste contributes to the notion that Yucca Mountain is the only answer because the utilities and waste handling contractors are already lined up at the trough like pigs. To address this problem involves huge economic subsidies by the people through their government which would employ at great expense large nuclear industry contractors to hire low cost work forces, who would then build railroads, drive trucks and engineer cask carriages to shuffle the waste around the country. The potential for local economic development in finding ways to collectively and democratically secure and isolate these wastes well into the future is great, yet the DEIS fails completely to explore it.

Response
DOE has stated that it believes that neither No-Action scenario is likely, even though continued storage of spent nuclear fuel and high-level radioactive waste would be required for some time in the future. If DOE decided not to recommend Yucca Mountain for a repository, DOE would prepare a report to Congress with recommendations for further action, including the need for new legislation in compliance with Section 113(c)(3) of the NWPA.
The future course that Congress, DOE, and the commercial nuclear power utilities could take if the Secretary of Energy did not recommend Yucca Mountain as a repository site is uncertain. The continued storage scenarios analyzed in the EIS, although reasonable for analytical purposes, do not necessarily represent a likely action. Therefore, DOE believes that Congress, DOE, and the commercial utilities would identify a permanent disposal solution even if the Secretary of Energy did not recommend the Yucca Mountain site.

Section 2.1.5 of the EIS presents cost estimates for a Yucca Mountain Repository (including costs for transportation, repository development, construction, operation and monitoring, and closure). It also includes costs of waste acceptance, storage, and national transportation; Nevada transportation; program integration (quality assurance, human resources and administration, Nuclear Regulatory Commission fees, and Nuclear Waste Technical Review Board funding); and program institutional costs (Payments-Equal-To-Taxes, benefits payments to the State of Nevada, transportation training assistance, and other financial assistance payments). Section 2.2.3 of the EIS presents cost estimates for the No-Action Alternative. DOE based these estimates on the best available data and standard cost estimating techniques.

DOE developed these estimates for comparative purposes and to aid decision-makers in discriminating between the No-Action Alternative and the Proposed Action discussed in the EIS. The estimates do not include costs before early 2002, when DOE anticipates a decision on repository development, or the costs for siting and characterization of Yucca Mountain. The No-Action estimate includes only costs that differ from those of the Proposed Action estimate. For example, it does not include storage costs until 2010 when a repository would first accept spent nuclear fuel and high-level radioactive waste because storage would be necessary until then under both the Proposed Action and the No-Action Alternative. The No-Action estimate is based on, and consistent with, industry experience for dry storage of spent nuclear fuel and high-level radioactive waste.

Concerning economics, the costs associated with the Proposed Action would be greater during the first 100 years; the ongoing costs associated with continued storage under the institutional control scenario would be far greater. Most of the funding for repository investigation and ultimately development, should the project proceed to that stage, would come from commercial utilities and their ratepayers who benefit directly from the use of nuclear power. Continued storage of spent nuclear fuel at generator sites would also be ratepayer-funded. The analysis assumed that continued storage facilities would require replacement every 100 years, and there would be a major facility repair halfway through the first 100-year cycle. Under Scenario 2, loss of institutional control, the projected economic impacts would be the same as those for Scenario 1 for the first 100 years, but after that approximately 800 jobs would be lost.

9.4 Human Health and Safety

9.4 (1537)
Comment - EIS000456 / 0002
We didn't ask for this nuclear neighbor. The plant was forced on us more than 30 years ago. In 1994, the utility company was given permission to build a pad to hold up to 48 casks on Prairie Island. As of today, they have 17 casks sitting and they will need, I think, three or four more to reach the year 2012 when they are going to go for their relicensing.

Today we face a real threat that how it's been called a temporary storage facility while in fact its permanent. Our children, our children's children will be forced to live with this, which to us is a very real health and safety threat.

Response
The Nuclear Regulatory Commission has stated, "The overall conclusion for on-site storage of spent fuel during the term of a renewed license is that the environmental impacts will be small for each plant" (DIRS 101899-NRC 1996). Although this finding is applicable only to the continued storage of existing spent nuclear fuel and spent nuclear fuel generated during the 20-year license renewal period for the nuclear powerplant, for purposes of analysis, DOE assumed that potential environmental and radiological impacts for the storage facility would remain small for much longer periods assuming effective institutional controls are maintained. Environmental impacts would remain small because no additional fuel would be generated beyond the operation of the nuclear powerplant (plants are assumed to be closed after the first 20-year license renewal period), and radiological impacts would remain within regulatory limits specified in the storage facility license (10 CFR Part 172).

9.4 (6136)
Comment - EIS001654 / 0038
Page S-65. The Proposed Action Poses Some Small Health Risks in the Short-term While No Action Alternatives Pose Either Far Greater Health Risks or Unimaginable Financial Costs Based on S.11.3.

The impacts can be summarized as follows:

Impact Type	Proposed Action	No-Action Scenario 1	No-Action Scenario 2
Socio-Economic	2,400 jobs	Jobs lost	Jobs lost
Health (Latent Cancer Fatalities)			
Transportation	6-28	0	0
Construction-Pre-closure	3-4	16	16
First 100 years[a]	22-50	25	25
Long-term (100-10,000yrs)	<1	15	3,300

a. Includes non-radiological fatalities in all scenarios

It would be irresponsible to suggest that the Scenario 2 No-Action Alternative is acceptable in terms of long-term public health. Further, it does not fulfill the objective of the Nuclear Waste Policy Act, namely that it not only does not provide for geologic disposal of nuclear waste, it also does not isolate the waste from the environment.

Response
DOE agrees that the No-Action Alternative fails to fulfill the objectives of the NWPA to develop a repository for the disposal of spent nuclear fuel and high-level radioactive waste. The No-Action Alternative provides a basis for comparison of the potential environmental impacts of no action with those of the Proposed Action.

9.4 (9873)
Comment - EIS002150 / 0002
Has the department figured out how many latent cancer deaths there will be if the future waste is left in storage on-site? Why is it necessary to drag it across the country and put so many Americans at risk?

Response
Congress enacted the Nuclear Waste Policy Act of 1982, which acknowledges the Federal Government's responsibility to provide permanent disposal of the Nation's spent nuclear fuel and high-level radioactive waste. In 1987, Congress significantly amended the Act to identify Yucca Mountain as the only site to be studied as a potential location for a geologic repository. The NWPA establishes a process leading to a decision by the Secretary of Energy on whether to recommend that the President approve Yucca Mountain for development of a geologic repository. The NWPA requires that DOE submit a Final EIS along with any site recommendation to the President of the United States. The purpose of the EIS is to provide information on the potential environmental impacts that could result from the Proposed Action and provide a basis for comparison in the two No-Action scenarios.

In Chapter 7 of the EIS, DOE evaluated potential human health impacts that could result from continued long-term storage of spent nuclear fuel and high-level radioactive waste at the generator sites. This No-Action Alternative evaluated two scenarios: long-term storage of spent nuclear fuel and high-level radioactive waste at the current sites with effective institutional control for at least 10,000 years (Scenario 1), and long-term storage with no institutional control after approximately 100 years (Scenario 2). Although DOE does not consider either of these scenarios to be likely, they were selected for analysis because they provide a basis for comparison to the impacts of the Proposed Action. The EIS presents information about the potential radiological impacts to workers and members of the public from both No-Action scenarios, including potential latent cancer fatalities (see Chapter 7 of the EIS).

9.5 Native American Issues

9.5 (7631)
Comment - EIS001928 / 0003
While we recognize that the Nuclear Waste Policy Act prevents the DOE from considering the need for the repository or alternatives to geologic disposal, and the no-action alternative was considered to provide a baseline for comparison with the proposed action, we believe that it is necessary to point out that the No-Action alternative has serious ramifications for our Tribal community. The [Shoshone-Bannock] Tribes have consistently taken the position that the waste has remained too long in the aboriginal area of the Tribes. To even suggest that the spent fuel

will remain on site at INEEL [Idaho National Engineering and Environmental Laboratory], either with institutional controls or unimaginably, without controls, is not acceptable to our people.

As discussed in the draft EIS, if the spent fuel is left on-site in dry storage, eventually the radioactive material would escape to the environment, contaminating the atmosphere, soil, surface water and groundwater. Although there is no mention of what would happen to the people living near these sites, we assume that they would either be removed or face contamination. Such federal action as the Supreme Court succinctly stated in Lane v. Pueblo of Santa Rosa, 249 U.S. 110 (1919), "would not be an exercise of guardianship, but an act of confiscation" or "spoilation" as Justice Cardozo tartly stated in Shoshone Tribe v. United States, 299 U.S. 470, 498 (1937).

The DOE must recognize that tribal lands play a different role than in the non-Indian context. And, any federal action affecting such tribal lands must evaluate using the trust doctrine. First, the Tribal land base is the sine quo non of tribal sovereignty. Surrounded by a majority non-Indian society of a vastly different orientation, a distinct tribal territory remains essential to fulfilling the federal promise of native separatism envisioned in the treaty-making era. The vast cessions of land by tribal peoples through the treaty process were premised on federal promises that native people could continue their way of life on homelands of smaller size, free from intrusions of the majority society. The dominant tenet which emerges from these origins is that the Indians' best interests lie in preserving the tribes' sovereign nation status, resisting assimilation forces, and preserving homelands. Today, most fundamentally, the modern form of the trust obligation is the federal government's duty to protect this separatism by protecting tribal lands, resources and way of life, and shielding Indian lands from environmental threats. See e.g., United States v. Creek Nation, 295 U.S. 103, 110 (1935); Northern Arapahoe Tribe v. Hodel, 808 F.2d 741, 750 (10th Cir. 1987) (finding trust responsibility to protect tribe's wildlife resources); Joint Passamaquoddy Tribal Council v. Morton, 528 F.2d 370, 379 (1st Cir. 1975) (noting that the federal government's fiduciary duty to protect tribal lands is "beyond question"); Northern Cheyenne Tribe v. Hodel, 12 Indian L. Rep. 3065, 3070 9D.Mont, May 28, 1985) (mem.) (noting trust duty extends to off-reservation federal activities that impact tribes).

Second, intergenerational habitation is unquestionably a dominant feature of tribal land tenure. We have no intention of leaving our permanent homeland, land that was reserved by Treaty for present and future generations. The Tribes have justifiable expectations of a perpetual and stable land base. This stands in marked contrast to non-Indian owned lands, which [are] typically held by individuals for transitory habitation or business for investment.

Third, Indian land is essentially irreplaceable. This is due in part to the unavailability of alternate consolidated tracts of land, but also these lands form the basis for cultural and economic survival of the Tribes. Loss of a tribal land base because of contamination would be devastating to tribes and would lead to irreversible cultural extinction for some tribes. Moreover, if tribal lands are contaminated and damaged, habitation is restricted or eliminated which will result in the tribe losing its political powers to control and regulate the activities occurring on its homelands. Finally, the tribe may be unable to adequately preserve or protect its members' general health, welfare and safety through the loss of contaminated lands.

The concept of a secure usable tribal homeland for future generations must guide the trust analysis in the DOE's decisionmaking regarding the no-action alternative. Accordingly, relocating a tribe in a manner similar to the relocation of the non-Indian residents of Times Beach or Love Canal would be disastrous to the Tribe's well being, and inconsistent with the federal government' trust obligations to the tribe. See, e.g., Continental Insurance Co. v. Northeastern Pharmaceutical & Chem. Co., Inc., 811 F.2d 1180, 1182 n.1 (8th Cir. 1987) (noting high levels of the hazardous substance dioxin resulted in the government purchasing the entire town of Times Beach, Missouri with its population of approximately 2,200 people for $37 million); Smith v. Reagan, 842 F.2d 28 (2d Cir. 1988) (residents of Love Canal, New York received relocation assistance when 21,000 tons of chemical waste dumped by Hooker Chemical & Plastics Corp. in the Love Canal landfill leaked out and made many residences uninhabitable).

Response

The purpose of the EIS is to provide information on the potential environmental impacts that could result from the Proposed Action to construct, operate and monitor, and eventually close a repository for the disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain. DOE analyzed the No-Action alternative to serve as a basis for comparing the magnitude of potential environmental impacts of the Proposed Action. In making a determination on whether to recommend Yucca Mountain, the Secretary will consider not only the potential environmental impacts identified in the EIS, but other factors such as technology, economics, and national policy.

DOE acknowledges the Federal Government's trust responsibilities to Native Americans, but analysis of these obligations or issues associated with securing tribal homelands for future generations is beyond the scope of this EIS. If the Yucca Mountain site was not approved, DOE would not proceed with the development of a repository there and, as directed by Section 113(c)(3) of the NWPA, would prepare a report to Congress with its recommendations for further action to ensure the safe permanent disposal of spent nuclear fuel and high-level radioactive waste, including the need for new legislative authority. DOE has stated that it believes that both No-Action Alternative scenarios are unlikely even though continued onsite storage of high-level radioactive waste and spent nuclear fuel would be necessary for some time in the event that the Yucca Mountain site was not approved.

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10

Cumulative Impacts

10. CUMULATIVE IMPACTS

10 (3)
Comment - 16 comments summarized
Commenters said that the EIS did not adequately account for the cumulative impacts from past, present, and future transport of all radioactive and hazardous materials to the repository, to the Nevada Test Site, and to the Waste Isolation Pilot Plant in New Mexico. Some said that the cumulative impacts from all these waste shipments should have been integrated into one risk model, especially considering that the Nevada Test Site is a preferred alternative for the disposal of the Nation's low-level and mixed low-level radioactive waste and other hazardous materials. Commenters stated the routes that would be used to transport waste to Yucca Mountain are the same routes being used to carry transuranic wastes to the Waste Isolation Pilot Plant in New Mexico. Others said that all this waste transport is a violation of the principle of informed consent for citizens traveling the Nation's highways. Some said that DOE has also failed to inform emergency responders and state transportation departments of potential problems by not integrating accident and risk data from the Waste Isolation Pilot Plant and Yucca Mountain. Some said that the cumulative impacts from waste transport would be particularly adverse to residents of Nye and Clark Counties, Nevada.

Response
Section 8.4 of the EIS describes the cumulative impacts of past, present, and reasonably foreseeable shipments of radioactive materials throughout the nation and in Nevada. Table 8-58 lists the collective worker-dose and general-population dose (in person-rem), and traffic fatalities, from these actions between 1943 and 2047 (including mixed low-level radioactive waste). The table includes shipments of low-level waste to the Nevada Test Site (this includes the designation of the Nevada Test Site as a regional DOE low-level waste disposal site); shipments of transuranic waste to the Waste Isolation Pilot Plant in New Mexico; and shipments of spent nuclear fuel and high-level radioactive waste to various storage and disposal sites throughout the nation.

The Department is not aware of the specific "informed consent" principle to which the commenters refer. Transportation of hazardous materials requires informing the appropriate government agencies and adhering to requirements of the Federal Government and affected state governments, which act to protect the public. Further, transport vehicles must have special placards to identify hazards that might be on board the transport vehicle; these placards are visible to other drivers on the highways. In addition, public documents, such as this EIS, inform the public of potential risks that might accompany transportation activities.

Section 180(c) of the Nuclear Waste Policy Act, as amended (this EIS refers to the amended Act as the NWPA), requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions the Department would transport spent nuclear fuel and high-level radioactive waste. The training shall cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. If there was a decision to proceed with the development of a repository at Yucca Mountain, shipping routes would be identified approximately 5 years before shipments begin and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. See Section M.6 of the EIS for a discussion of the DOE Section 180(c) Policy and Procedures.

The Price-Anderson Act establishes a system of financial protection (compensation for personal injury and property damage, including loss of use of property) for the public in a nuclear accident, regardless of who causes the damage. See Section M.8 of the EIS for a discussion of the Price-Anderson Act.

10 (91)
Comment - 12 comments summarized
Commenters said that the EIS did not examine (or did not examine adequately) the cumulative impacts to groundwater from the repository and from past, present, and future activities at the Nevada Test Site. Some noted that DOE had detonated nuclear explosions below the water table and that plutonium had migrated more than a mile from these detonations via colloids. According to some, plutonium migration might be more extensive, but DOE has gathered little information about groundwater conditions on the Nevada Test Site and groundwater flow between

the Test Site and Yucca Mountain. Some wanted to know why DOE has not examined the groundwater system on the Test Site with the same vigor that it has examined groundwater conditions at Yucca Mountain.

Response

Chapter 8 of the EIS discusses the cumulative impacts from the repository, along with the impacts of past, present, and reasonably foreseeable activities in the region. Section 8.3.2.1 describes the impacts to groundwater from past underground testing at the Nevada Test Site. Section 8.3.2.1 also discusses the movement of plutonium from underground test sites by binding with colloids, which is believed to account for this movement. Since issuing the Draft EIS, the Department has revised the analyses of impacts associated with the Nevada Test Site. Section 8.3 of the Final EIS includes updated estimates of future impacts to groundwater from activities on the Test Site. These estimates indicate that the potential dose to a receptor from groundwater from the Nevada Test Site is much less than 1 millirem per year, and the Department does not believe that adverse impacts would result from this small dose alone or combined with long-term releases from a repository at Yucca Mountain.

When DOE prepared the Draft EIS, it used the best available information to estimate cumulative impacts. While some data were available for the groundwater system at the Nevada Test Site, these data were not as complete as those available for the groundwater system between the repository and populated areas to the south. This is why the EIS analysis could not apply the same rigor to areas on the Nevada Test Site north of the repository compared to areas south of the repository. To compensate for this imbalance in available information, the EIS used a very conservative approach to bound estimated impacts. In other words, the Department believes that potential impacts associated with the Nevada Test Site were overestimated. This type of conservative analysis is designed to account for uncertainties by assuming very conservative values for parameters and not taking credit for possible mitigating effects. For example, the regional groundwater flow model developed by the U.S. Geological Survey for the repository program (DIRS 100131-D'Agnese et al. 1997) indicates that some groundwater from the Nevada Test Site flows southward toward the Amargosa Desert in the vicinity of Yucca Mountain. However, the actual transport times and groundwater pathways from potential radionuclide contaminants on the Test Site are not clearly known. Although very unlikely to occur, the Department assumed, for purposes of analysis in the Draft and Final EIS, that contaminants from the Nevada Test Site would move through identical pathways and have identical transport times as the material from the repository because this would provide an upper, bounding estimate of the possible impact to groundwater from the repository and the Nevada Test Site.

The qualitative calculation of the cumulative groundwater impacts from the Nevada Test Site and from a repository at Yucca Mountain indicates that the potential cumulative peak dose would be well below the regulatory limits in 40 CFR Part 197 (see Section 8.3.2.1.1). Moreover, this cumulative peak-dose would occur only in the unlikely event that the peak radiological concentrations from the Nevada Test Site and from Yucca Mountain occurred at the same time in the future and in the same location, which is unlikely.

10 (104)

Comment - 20 comments summarized

Commenters said that the EIS did not examine the cumulative impacts from all Federal and non-Federal actions and policies in the affected area. Agencies and organizations cited included the DOE, the Department of Defense, the Forest Service, the U.S. Fish and Wildlife Service, the Bureau of Land Management, the National Park Service, the Timbisha-Shoshone Tribe (with regard to the acquisition of trust lands), and the Clark County/Las Vegas Valley Water District. Others focused specifically on Nye County, stating that the EIS did not consider the cumulative impacts from the repository withdrawal, along with the millions of acres of Federal land already withdrawn for national parks, forests, wildlife refuges, and defense purposes in and near Nye County. Some said that the many separate resource-planning documents prepared by these and other agencies have not been coordinated among the agencies and have had, and will continue to have, cumulative impacts on the residents of Nye County through a variety of lost opportunities. Others said that residents of Nye County have been disproportionately affected by these Federal actions, citing lost opportunities due to the many land-use restrictions that have been imposed in Nye County, including what some commenters contend is a stated policy of the National Park Service and the Bureau of Land Management to protest local water-right applications in southern Nye County.

Response

Chapter 8 of the EIS discusses the potential impacts of the proposed repository, along with the impacts from past, present, and reasonably foreseeable future actions in the affected area. In preparing this chapter, the Department reviewed many documents to determine where there was potential for cumulative impacts. These documents included resource plans by land management agencies, EISs, environmental assessments, strategic plans, records of tribal meetings, and other documents prepared by Federal, state, local, and private organizations. The analyses and results described in Chapter 8 considered only those impacts from activities that have the potential to coincide in time and space with impacts from the repository. Based on some of the comments received by the Department on the Draft EIS and the Supplement to the Draft EIS and more recent information on activities at the Nevada Test Site, DOE modified several analyses in the Final EIS. DOE believes that the Final EIS analyzes the appropriate range of past, present, and reasonably foreseeable future actions that could contribute to cumulative impacts.

The Department understands that large tracts of land have been withdrawn from public use in southern Nevada and adjoining parts of California for reasons of national defense and environmental protection. Section 8.2.1 of the Final EIS includes a more detailed discussion of potential cumulative impacts from these land withdrawals. While it is true that land in Nevada has been withdrawn for national defense and environmental protection, other lands have passed out of the public domain. For instance, the Southern Nevada Public Land Management Act allows the Bureau of Land Management to sell public lands to promote responsible and orderly development.

The opposition to a water-appropriation application by an agency is not an environmental impact associated with the availability of water resources. This is because the filing of a protest does not determine the outcome of the water-application process. The Nevada State Engineer is independent of the Federal Government.

10 (242)
Comment - 3 comments summarized
Commenters said that nuclear weapons are still being tested at the Nevada Test Site and that this needs to be included in the cumulative impacts assessment. Others cited a high likelihood for a resumption of nuclear weapons testing at the Nevada Test Site, citing the recent failure of the Comprehensive Test Ban Treaty in Congress. Some stated that the Draft EIS did not contemplate a resumption of weapons testing, but that the 1986 environmental assessment of Yucca Mountain did, stating that workers would not be allowed in the underground repository during planned weapons tests for safety reasons.

Response
Since 1992, there has been a moratorium on nuclear testing. Even though the Nevada Test Site must maintain the ability to resume testing, the Department does not believe that a resumption of testing is a reasonably foreseeable action. Therefore, it was not included in the analyses in Chapter 8 of the EIS. Nevertheless, a recent evaluation of impacts from a resumption of underground testing at the Nevada Test Site (DIRS 103273-Walck 1996) concluded that the only impact such testing would pose on the repository would be ground motion from the energy released by the detonations. DOE has determined that such effects would not exceed the seismic design criteria for the repository. In other words, the design-basis earthquake for the repository would generate stronger ground motions than would underground nuclear detonations on the Nevada Test Site. Because DOE has designed the repository to survive the design-basis earthquake with minimal damage, ground motion from the resumption of underground testing would be unlikely to result in substantial damage to the surface or underground facilities at Yucca Mountain.

Section 8.3.2.1.1 of the EIS describes the cumulative impacts of past nuclear weapons testing based on information in the *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DIRS 101811-DOE 1996). As stated in that EIS, DOE continues to perform tests at the Nevada Test Site including dynamic, hydrodynamic, and other tests as well as a small number of subcritical experiments using special nuclear materials. The Department has revised Chapter 8 to include a more complete description of these activities so the public and decisionmakers have a clear understanding of the potential cumulative impacts.

10 (258)
Comment - 27 comments summarized
Commenters said that the EIS failed to examine the cumulative health effects to people in Nevada from all past, present, and future exposures to radiation. Some said that residents of counties in eastern Nevada have been repeatedly exposed to radiation, beginning with fallout from above-ground nuclear testing and from DOE's failure to contain atmospheric releases during underground testing. Others said that residents are still being exposed through hiking, hunting, farming, and continuing fallout. Commenters said that DOE must evaluate the cumulative health effects (higher risk of latent cancers) of weapons testing, along with the health effects from the transport of all

radioactive materials through communities in eastern Nevada, including the effects of accidents. Others wanted to know what the impacts would be to current residents who were exposed to these past sources, as well as to residents who are genetically related to people who have been repeatedly exposed to radiation. Others wanted to know whether DOE examined the cumulative health effects to selected groups of people (pregnant women, children, elderly people, ethnic groups, etc.) from repeated exposure to radiation from all manmade and natural sources of radiation.

Response
As part of its analysis of cumulative impacts in Chapter 8, the Department quantified, where possible, the total radiation dose that local residents have received. The Department calculated the total risk to the population based on the conservative assumption that radiation risks from different exposures are additive.

With respect to person-specific exposures, the Department cannot account for each resident's past exposure to radiation. To do so would require accounting for person-specific lifestyles and habits, such as the frequency of cross-country airline flights, past residences in locations that might have substantially higher or lower cosmic radiation, and the frequency and nature of medical diagnostic tests and treatments. Instead, the Department used population risk factors (5×10^{-4} latent cancer fatality per person-rem for the public and 4×10^{-4} latent cancer fatality per person-rem for workers) based on the recommendations of the International Commission on Radiological Protection (DIRS 101836-ICRP 1991). These factors account for the variety of individuals in the population, including differences in risk due to age. An estimate of impacts to specific groups of people (such as pregnant women, children, the elderly, and certain ethnic groups) was not made because such estimates would have greater uncertainty. The doses that have been calculated thus far for downwind residents have uncertainty associated with them that would tend to overshadow differences in risk to the various groups cited. The use of the average risk factors adequately covers all groups within the population and gives a reasonable estimate of the risk to the group as a whole.

Section 8.3.2.1 of the EIS describes the activities on the Nevada Test Site that could contribute to cumulative impacts with the proposed repository. Section 3.1.8.2 estimates the annual radiation dose to a hypothetical individual in Springdale, Nevada (located eight miles north of Beatty), from airborne radioactive materials released during past testing of nuclear weapons at the Nevada Test Site. Since issuing the Draft EIS, DOE has revised the analyses of impacts associated with the Nevada Test Site. Sections and 8.2.2.2 and 8.4.2.7 now include information on radiation exposure from past nuclear weapons testing, and Section 8.3 includes updated estimates of future impacts to groundwater and air resources from activities on the Test Site. In addition, Section 8.4.2.7 incorporates the human health impacts from the transportation activities discussed in Section 8.4 (for example, Table 8-58 describes radiological and nonradiological impacts from waste transport between 1943 and 2047). Section 8.3 estimates the long-term future impacts to groundwater from potential migration of radiological and hazardous contaminants from the repository, the Nevada Test Site, and the Beatty low-level waste site.

As indicated in Section 3.1.8.2, DOE made quantitative estimates of the offsite doses from releases from past weapons testing at the Nevada Test Site. In response to public comments, Appendix J of the Final EIS contains maps showing routes used in analyzing impacts, and estimates radiological and nonradiological impacts for each state. This is in addition to the route maps that were in the Draft EIS (see Section 2.1.3.2 for national maps and Section 2.1.3.3 for Nevada maps).

Readers interested in more information about the effects of past testing of nuclear weapons should refer to the *National Cancer Institute Study Estimating Thyroid Doses of I-131 Received by Americans From Nevada Atmospheric Nuclear Bomb Tests* (DIRS 152469-Institute of Medicine and National Research Council 1999).

10 (335)
Comment - EIS000056 / 0001
The proposed repository is predicted to leak additional radioactive contamination into the aquifers in the southwestern portion of the Nevada Test Site...water that is currently potable will be contaminated if the DOE's Performance Assessment is correct. This will result in a significant adverse impact on the water resources that must be mitigated.

Response
DOE recognizes that some radionuclides or potentially toxic chemicals would eventually enter the environment outside the repository. However, modeling of the long-term performance of the repository shows that the combination of natural and engineered barriers at the site would keep such a release small enough to pose no serious impact to the health and safety of people or the environment. The releases would be well below the radiation protection standards established by the Environmental Protection Agency for a repository at Yucca Mountain [40 CFR Part 197].

The U.S. Geological Survey regional flow model (DIRS 100131-D'Agnese et al. 1997) suggests that some of the water from the Nevada Test Site flows southward toward the Amargosa Valley in the vicinity of Yucca Mountain. However, the actual transport times and groundwater pathways from potential radionuclide contaminants on the Site are not clearly known at this time. A "qualitative" calculation of the combined impact from the Nevada Test Site and Yucca Mountain in Section 8.3.2.1.1 indicates that the potential cumulative peak dose would be well below the Environmental Protection Agency's regulatory limits. This combined peak dose would occur only in the unlikely event that the peak concentrations from the Test Site and Yucca Mountain occurred at the same time and same location. See Sections 3.1.4.2.1, 5.4, and 8.3.2.1.1 of the EIS for more information.

10 (380)
Comment - EIS000044 / 0002
The results of Nye County's water resource evaluations found that the direct impacts of water withdrawals for the proposed repository will be limited to a localized lowering of water levels that was not deemed to be significant. However, the evaluation did find that the predicted leakage from the repository and the cumulative impacts of the proposed repository will indeed be significant and that mitigating measures must be implemented. The Draft Yucca Mountain EIS is inadequate with regard to its evaluation of impacts on water resources and corresponding mitigation and must be revised extensively.

The cumulative impacts on water resources will include the direct and indirect impacts of 1) the total radiological burden that will be imposed on Nye County; 2) the impacts of federal land withdrawals on water resource availability: 3) the impacts of federal policies regarding nuclear weapons testing, waste disposal, and environmental protection; and 4) the water resource use and management practices on both private and federal lands in the County.

The Department of Energy, through their selection of a reduced region of influence, limited their analysis to only the direct impacts of their water withdrawals from a single basin while ignoring documented impacts that occur over a much broader region. Further, the Department ignored other federally prepared reports that detailed the direct, indirect, and cumulative impacts of Department of Defense, Energy, and the Interior actions over the same region. This approach is inconsistent with the CEQ [Council on Environmental Quality] guidance for considering cumulative impact assessment under NEPA [National Environmental Policy Act] and with 40 CFR 1508.25.

All the Yucca Mountain EIS says with regard to cumulative impacts is that the potential impacts to groundwater would be small and limited to the immediate vicinity of the land disturbances associated with the action and that some minor incremental risk would occur from drinking the groundwater down gradient of the repository at some distant time in the future.

This approach is inconsistent with statements in the Draft EIS:

"The general path of water that infiltrates through Yucca Mountain is south toward Lathrop Wells, into and through the area around Death Valley Junction in the lower Amargosa Valley. Natural discharge of groundwater from beneath Yucca Mountain probably occurs farther south at Franklin Lake Playa." Vol. I, p. 5-23.

"The implementation of the proposed action could potentially affect the water supply in Death Valley National Park, which is downgradient from Yucca Mountain" Vol. II, Appendix C, page C-9.

The region of influence evaluated for cumulative impacts cannot be smaller than the region over which impacts are expected to occur. Thus, the Department's approach is inconsistent with the letter and intent of NEPA, CEQ guidance, and other federal documents including the EIS for the Nevada Test Site, and the Special Nevada Report.

If the Department of Energy chooses to continue to ignore the local perspective by not evaluating the impacts identified in the Nye County document and by other federal agencies, then it is imperative that Nye County's perspective be clearly documented in the EIS as an opposing viewpoint.

Response
Chapter 8 of the EIS analyzes reasonably foreseeable cumulative impacts to water resources from a repository at Yucca Mountain. The region in which the cumulative impacts could occur includes the entire groundwater flow system south of Yucca Mountain described in Section 3.1.4.2.1 of the EIS, as well as areas to the north on the Nevada Test Site that could contribute impacts to this groundwater flow system. In other words, the region examined for cumulative impacts is larger than the region examined for impacts from just the repository. In relation to short-term impacts to water resources, Section 8.2.3 describes the cumulative impacts from the Proposed Action and from additional inventories of nuclear waste. As stated in Section 8.2.3.2.2, no other Federal, non-Federal, or private actions in the affected area during the short term would have cumulative impacts with the Proposed Action, with one exception; cumulative impacts to groundwater resources from water demands of the Yucca Mountain Repository, along with groundwater demands from activities on the Nevada Test Site. Impacts to downgradient users in the Amargosa Desert from cumulative water demands for the repository and the Test Site, however, would be small compared to impacts from local pumping in the Amargosa Desert. With regard to long-term cumulative impacts to groundwater resources (those that could occur 10,000 years after closure of the repository), the Department limited the scope to cumulative impacts from the repository along with impacts from the Nevada Test Site and the Beatty low-level radioactive waste site (see Section 8.3).

The first cited quote in the comment, from Section 5.3 of the EIS, is accurate. A fraction of the groundwater might flow through fractures in the relatively impermeable Precambrian rocks in the southeastern end of the Funeral Mountains toward spring discharge points in the Furnace Creek area of Death Valley. Sparse potentiometric data indicate that a divide could exist in the Funeral Mountains between the Amargosa Desert and Death Valley. Such a divide would limit discharge from the shallow flow system, but not necessarily affect the deeper carbonate flow system that might contribute discharge to the Furnace Creek area. Even if part of the flow from Yucca Mountain mixed into the carbonate pathway that supplies the Furnace Creek springs, it would be too little to have a noticeable effect on the chemistry of the springs. Considering the small fraction of water that would infiltrate though the repository area (approximately 0.3 percent or less) compared to the total amount of water flowing through the basin and the large distances involved [more than 60 kilometers (37 miles) from the source], any component of the flow from Yucca Mountain in this very long and complicated flowpath would be diluted to such an extent that it would be indistinguishable.

The second quote in the comment is consistent with the Department's conclusion that some minor incremental risk would occur from ingesting groundwater downgradient of the repository at some distant time in the future. The main point of Appendix C is to summarize interactions with organizations that have an interest in, or authority over, land that the Proposed Action could affect, such as the National Park Service, which manages the Devils Hole Protective Withdrawal and Death Valley National Park. DOE and National Park Service officials held discussions during which time the Department addressed Park Service concerns about water use for repository construction and operation.

Finally, DOE did consider planning and other documents from Federal, state, and local agencies in determining future actions that are reasonably foreseeable that could have impacts that are cumulative with the Proposed Action. With regard to the *Special Nevada Report* (DIRS 153277-SAIC 1991), Section 8.2 of the Final EIS describes this report and the reasons why DOE did not use the analysis in that report.

10 (421)
Comment - EIS000071 / 0019
Nye County, by virtue of its location, characteristics and overwhelming federal presence has been disproportionately impacted by past, present and continuing federal action.

Nye County must receive just equity offsets, mitigation and compensation from the United States to mitigate the cumulative impacts of these past, present actions and the proposed repository should it go forward.

Nye County's analysis and evaluations arrange direct, indirect cumulative and direct cumulative have been identified in areas of land use, water resources, lost economic opportunity, perceived risks, stigma and others.

Nye County believes that these impacts, although adverse and significant, can be mitigated through various measures.

Response
Impacts of the Proposed Action, along with other past, present, and reasonably foreseeable actions that are spatially and temporally related to impacts of the proposed repository, are discussed throughout Chapter 8 of the EIS. These other actions include, among others, activities at the Nevada Test Site, the Beatty waste-disposal site, and Nellis Air Force Range (now called the Nevada Test and Training Range).

Based on its method of analysis in Chapter 8, the Department believes that it has accounted for all past, present, and reasonably foreseeable actions in Nye County that could meaningfully contribute to cumulative impacts with the repository.

After the Draft EIS was published, the Department reviewed the activities in the region of influence that could contribute to cumulative impacts. Chapter 8 of the Final EIS includes a more detailed discussion of cumulative impacts related to projected water use for the repository and water availability and water rights issues in Nye and surrounding counties.

The Department is not considering mitigation of cumulative impacts that are unrelated to the proposed repository.

Section 116 (c) of the NWPA establishes a procedure, unrelated to this EIS, by which affected units of local government, such as Nye County, can report effects from the proposed repository to DOE. Affected units of local government can receive impact assistance upon agreement with DOE on the nature and severity of the impacts. Section 116(c) commits DOE to participate in this procedure and to provide assistance consistent with direction from Congress.

10 (437)
Comment - EIS000080 / 0008
You're looking at radioactivity and the risks associated with exposure to radioactivity. There's a little thing out here called toxicity and you only look at the toxicity of the non-radioactive constituents.

The radioactive constituents also have a toxicity and a risk associated with that toxicity, so if you want to look at the total risk to Amargosa Valley over the coming decades, you've got one, the risk of the naturally occurring uranium in the water up north of [U.S.] 95; two, the risk of the migration of tritium and other contamination off of the Nevada Test Site; three, the toxicity of the materials on the Test Site; four, any contributions from radionuclides coming from Yucca Mountain; and five, the toxicity of those.

The EIS does not cover all of those. It only looks at the radioactivity from Yucca Mountain and it needs to be revised to incorporate the entire suite of what is out there.

Response
The five items mentioned in the comment are characterized in Section 3.1.8.2 of the EIS and various sections in Chapter 8, particularly Section 8.3.2.

DOE realizes that radionuclides have chemical properties that could present an additional toxicity risk. For this reason, the Department considered the chemical toxicity of radionuclides in the screening criteria used for the long-term performance assessment, as discussed in Section I.3.2 of the EIS. Section 8.3 discusses the cumulative impact to groundwater of long-term releases from the Nevada Test Site and the proposed repository.

10 (475)
Comment - EIS000069 / 0007
Once this material arrives, we will have it here forever. We suggest that this document does not adequately address the issue of cumulative impacts that this county, Nye County has had to bear from a number of federal agencies; not

just a nuclear community, but we have huge presence with federal land management agencies, national parks, National Fish and Wildlife, Bureau of Indian Affairs and other federal agencies, all of them wanting to come to Nye County and manage the resources and none of them talking to each other. The United States must deal with this issue in a fair and equitable way and must deal effectively with the actual as well as the perceived risks.

Response
Based on available information, DOE analyzed the potential cumulative impacts to current and future populations surrounding the proposed repository at Yucca Mountain. Chapter 8 of the EIS contains this information. The Department realizes that, as in other communities in our country, many activities take place in Nye County. Not all of these activities, however, have had or would have cumulative impacts with the proposed repository.

During scoping for the EIS, DOE received comments on the need to address perception-based and stigma-related impacts that could arise from the construction and operation of a repository, and from the transportation of spent nuclear fuel and high-level radioactive waste. In considering these comments, DOE recognized that nuclear facilities could be perceived to be either positive or negative, depending on the underlying value systems of the individual forming the perception. Perception-based impacts would not necessarily depend on the actual physical impacts or risks from repository operations or transportation. Further, people do not consistently act in accordance with negative perceptions, so the connection between public perception of risk and future behavior would be uncertain or speculative at best. For these reasons, DOE determined that including analyses of perception-based and stigma-related impacts in the Draft EIS would not provide meaningful information.

However, in light of the comments received on the Draft EIS on this subject, DOE examined relevant studies and literature on perceived risk and stigmatization of communities to determine whether the state of the science in predicting future behavior based on perceptions had advanced sufficiently since scoping to enable DOE to quantify the impact of public risk perception on economic development or property values in potentially affected communities. Of particular interest were those scientific and social studies carried out in the past few years that relate directly to either Yucca Mountain or to DOE actions such as the transportation of foreign research reactor spent nuclear fuel. DOE also reevaluated the conclusions of previous literature reviews such as those conducted by the Nuclear Waste Technical Review Board and the State of Nevada, among others. DOE has concluded that:

- While in some instances risk perceptions could result in adverse impacts on portions of a local economy, there are no reliable methods by which such impacts could be predicted with any degree of certainty.

- Much of the uncertainty is irreducible.

- Based on a qualitative analysis, adverse impacts from perceptions of risk would be unlikely or relatively small.

While stigmatization of southern Nevada can be envisioned under some scenarios, it is not inevitable or numerically predictable. Any such stigmatization would likely be an aftereffect of unpredictable future events, such as a serious accident, which might not occur. As a consequence, DOE addressed but did not attempt to quantify the potential for impacts from risk perceptions or stigma in this Final EIS. See Section 2.5.4 and Appendix N for more information.

10 (524)
Comment - EIS000105 / 0001
The cumulative impacts on water resources will include the direct and indirect impacts of the total radiological burden that will be imposed on Nye County, the impacts of federal land withdrawals on water resource availability, the impacts of federal policies regarding nuclear weapons testing, waste disposal and environmental protection and the water resource use and management practices on both private and federal land in the county.

The Department of Energy limited their cumulative analysis to the Jackass Flats hydrographic basin and limited their analysis to only the direct impacts of their water withdrawals from that basin.

This approach is inconsistent with the CEQ [Council on Environmental Quality] guidance for considering cumulative impact assessment under NEPA [National Environmental Policy Act].

Response
In general, the analysis of cumulative impacts in Chapter 8 followed the process recommended in the Council on Environmental Quality's handbook *Considering Cumulative Effects Under the National Environmental Policy Act* (DIRS 103162-CEQ 1997). This process included the identification, through research and consultation, of Federal, non-Federal, and private actions with possible effects that would be coincident with those of the Proposed Action on resources, ecosystems, and human communities.

Chapter 8 of the EIS analyzes reasonably foreseeable cumulative impacts to water resources. In relation to short-term impacts to water resources, Section 8.2.3 describes the cumulative impacts from the Proposed Action and from additional inventories of nuclear waste. As stated in Section 8.2.3.2.2, no other Federal, non-Federal, or private actions in the affected area during the short term would have cumulative impacts with the Proposed Action, with one exception; cumulative impacts to groundwater resources from water demands by the Yucca Mountain Repository, along with groundwater demands from activities on the Nevada Test Site. Impacts to downgradient users in the Amargosa Desert from cumulative water demands for the repository and the Nevada Test Site, however, would be small compared to impacts from local pumping in the Amargosa Desert.

In relation to long-term cumulative impacts to groundwater resources (those that could occur 10,000 years after closure of the repository), the Department determined that the analysis of cumulative impacts from the repository should include impacts from the Nevada Test Site and the Beatty low-level radioactive waste site (see Section 8.3). In addition to considering cumulative radiological impacts to the Jackass Flats hydrographic basin, DOE also considered the primary discharge point for groundwater flowing beneath Yucca Mountain, which it believes to be Franklin Lake Playa. Groundwater reaching this area could, over the long term, contain small amounts of radioactive and hazardous materials from the repository, the Nevada Test Site, and the Beatty low-level waste site, as described in Section 8.3.2 of the EIS. Furthermore, the EIS recognizes that some groundwater reaching this far might bypass Franklin Lake Playa and continue to Death Valley, and that a very small amount of this groundwater beneath the Amargosa Desert might flow toward springs in the Furnace Creek Wash area of Death Valley. DOE expects that impacts to people and the environment of Death Valley would be negligible.

DOE has revised Sections 8.2.1 and 8.2.3.2 of the EIS to further explain potential cumulative impacts of land withdrawals on water resources. In relation to policies on weapons testing, the EIS uses information from the Expanded Use Alternative in the Nevada Test Site EIS (DIRS 101811-DOE 1996), which allows for weapons testing under a "supreme national interest." Several sections of the EIS discuss the impacts of waste management; for example, Section 8.2.12 discusses the management of waste generated at the repository, and Section 8.4 discusses impacts of waste transportation.

10 (893)
Comment - EIS000410 / 0001
I do not believe that a reasonable conclusion can be drawn from a study which does not include a comparison study of the radiation which already exists. While I am no physicist, it would be hard to convince me that the radiation from over 110 above-ground tests and 1,100 underground tests (+/- a few hundred) set off in shafts which were 5,000 to 15,000 feet deep over a period of 30 years has not already contaminated the ground and the water in unimaginable proportions for miles around.

I believe that the following questions need to be answered before your department can come to a reasonable conclusion - and inform the public of what already exists at Yucca Mountain and surrounding area:

1. Exactly how many nuclear tests were conducted, both above and below ground, and their exact proximity to population and water.

2. The depth of underground tests, and how they have already affected the water table.

3. Quantify the radiation which exists there now, both above and below ground, its potential life expectancy, comparing it to the proposed waste dump.

4. Conditions which exist from the testing which would affect workers at the project.

5. A complete public airing of all information concerning the detonations at the site, including any information considered classified by the military, insofar as radioactive contamination is concerned - I do not believe the military or DOE has the right to keep that sort of information secret.

Response
DOE described past activities at the Nevada Test Site in the *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DIRS 101811-DOE 1996). Chapter 8 of the repository EIS discusses the cumulative impacts of the repository along with past, present, and reasonably foreseeable future actions at the Nevada Test Site, Nellis Air Force Base, the Beatty low-level radioactive waste disposal site, and other non-Federal actions in the affected area (see Table 8-1). Section 8.3.2.1 describes possible impacts to groundwater quality from activities on the Nevada Test Site, including past weapons testing.

The five specific questions raised by the commenter are addressed to varying degrees in DIRS 101811-DOE (1996) and in Section 8.3.2.1 of the EIS. In brief, 821 underground and 100 atmospheric detonations have been conducted at the Nevada Test Site. The areas where these tests were conducted are shown on Figure 3-2 of the EIS and Figure 4-22 of DIRS 101811-DOE (1996). Many underground tests were conducted near and below the water table; contaminant migration from these points of detonation has been negligible. Total radioactivity is estimated to be more than 300 million curies, as cited in Table 8-55 of the EIS. Some of this material is long-lived, some is short-lived, but it will be there for the long term, not unlike the material that would be placed in the proposed repository. There are no known "conditions" caused by weapons testing that would affect workers at Yucca Mountain. Finally, DOE is obligated to comply with laws of the United States regarding the release of classified information.

10 (981)
Comment - EIS000242 / 0002
Nye County has found that the Department of Energy has not adequately addressed the cumulative impacts, that the proposed repository on the resources, ecosystems, or the human communities of Nye County.

The impacts of past federal actions, including the existing residual contamination from the conduction of more than 900 nuclear tests at the Nevada Test Site, have sacrificed the groundwater resources under more than 250 square miles of Nye County.

The withdrawal of lands from public use for the Nevada Test Site for the Nevada test and training range, part of the Nellis Range Complex, and the federal management of millions of acres of national parks, forests, and wildlife refuges have resulted in lost opportunities from those lands for the residents of the county.

Because of its location and characteristics, Nye County and its residents have been disproportionately impacted by past and present federal actions. Yucca Mountain will significantly add to these impacts, yet this draft EIS portrays to the decision maker that the Yucca Mountain Project is just another casual federal action with no more impact than clearing a road through a forest. Nothing could be further from the truth.

Response
Chapter 8 of the EIS analyzes a reasonable range of past, present, and reasonably foreseeable future actions that could contribute to cumulative impacts. In preparing this chapter, DOE reviewed many documents to determine where there was potential for cumulative impacts. These documents included resource plans, EISs, environmental assessments, tribal meeting records, and other documents prepared by Federal, state, local, and private organizations.

Section 8.3.2.1.1 of the EIS discusses the potential long-term impacts on groundwater from past weapons testing at the Nevada Test Site. This analysis does not show that groundwater resources have been sacrificed underneath Nye County.

The Department understands that large tracts of land have been withdrawn from public use in southern Nevada and adjoining parts of California for reasons of national defense and environmental protection. Section 8.2.1 now includes a more detailed discussion of potential cumulative impacts from land withdrawals by Federal agencies.

10 (1119)
Comment - EIS000225 / 0005
The document fails to address the broad scope of impacts on the 1,500 people who live spread over 200 square miles in the area. There needs to be further examination of cumulative impacts such as existing subsurface contamination at the nearby Nevada Test Site, disposal of low-level radioactive waste in the county and other federal uses of land by such agencies as the Defense Department, the U.S. Forest Service and the Bureau of Land Management.

Response
Chapter 8 of the EIS discusses the impacts of the repository along with the impacts from past, present, and reasonably foreseeable future actions that could affect this area. In preparing this chapter, DOE reviewed many documents to determine where there was potential for cumulative impacts. These documents included resource plans, EISs, environmental assessments, strategic plans, consultation documents, tribal meeting records, and other documents prepared by Federal, local, and private organizations. The analyses and results described in Chapter 8 consider only those activities with a potential for cumulative impacts with the repository.

10 (1135)
Comment - EIS000270 / 0020
Factors that give rise to public concerns about and opposition to approval of the Yucca Mountain site include:

Failure to account for additive sources of contamination from nearby areas, including but not limited to spread of radioactivity and hazardous materials or wastes from the Nevada Test Site and Nellis Air Force Base, or for future potential additional pollution sources in adjoining areas.

Response
Chapter 8 of the EIS describes the cumulative impacts from a repository, along with past, present, and reasonably foreseeable future actions at the Nevada Test Site, Nellis Air Force Base, the Beatty low-level radioactive waste disposal site, and other non-Federal actions in the affected area (see Table 8-1). In preparing Chapter 8, DOE reviewed many documents to determine the potential for cumulative impacts. These documents included Federal resource management plans, reports provided by the State of Nevada, environmental impact statements and assessments, and records of tribal meetings. Except for some factual changes and clarifications that have been included in the Final EIS, DOE believes that the Draft EIS adequately characterized the cumulative impacts associated with the proposed repository.

10 (1168)
Comment - EIS000119 / 0010
Federal agencies, including the DOE, the BLM [Bureau of Land Management], US Forest Service, the National Park Service, the United States Air Force, the United States Navy, the Bureau of Indian Affairs and US Fish and Wildlife Service have repeatedly failed to fulfill their obligations under NEPA [National Environmental Policy Act] by refusing to acknowledge such impacts [cumulative] in their NEPA reviews and provide the mitigation measures that are appropriate.

Nye County's analyses and evaluations identified a range of direct and indirect cumulative impacts in areas such as transportation, land use, water resources, lost economic opportunity and others.

The county believes that these are adverse and significant impacts and that they must be mitigated through various measures.

With the cessation of nuclear weapons testing in 1992, Nye County has made substantial efforts to plan for its economic future in the US 95 corridor.

The EIS does not recognize these plans and it does not reflect an obligation by DOE to ensure that this proposal will not thwart those plans.

Nye County by virtue of its location, characteristics and its overwhelming federal presence has been disproportionately impacted by past, present and continuing federal actions.

Nye County must receive just equity offsets, mitigation, and compensation from the United States to mitigate the cumulative effects of these past and present actions and the proposed repository should it go forward.

Response
Impacts of the Proposed Action, along with other past, present, and reasonably foreseeable actions that are spatially and temporally related to impacts of the repository, are discussed throughout Chapter 8 of the EIS. These other actions include, among others, activities at the Nevada Test Site, the Beatty waste-disposal site, and Nellis Air Force Range. Based on its method of analysis in Chapter 8, the Department believes that it has accounted for all past, present, and reasonably foreseeable actions in Nye County that could meaningfully contribute to cumulative impacts with the repository.

After publishing the Draft EIS, DOE reviewed activities in the region of influence and updated information in the Final EIS where appropriate. Chapter 8 of the Final EIS includes a more detailed discussion of cumulative impacts related to water use at the repository and water availability and water rights issues in Nye and surrounding counties.

The Department is not considering mitigation of cumulative impacts that are unrelated to the proposed repository.

10 (1723)
Comment - EIS000578 / 0001
I'd like to convey my concerns about what I think is a huge void in this whole Environmental Impact Statement, and that is the fact of addressing what's already there. I think it's important to know that. I don't think any of us would be here if it wasn't for the fact that that place had about 1500 or so, give or take a hundred, nuclear bombs blown up down there, and it's my opinion that the place is probably the most irradiated place on the planet now.

My concern is that there have been I think 1200 underground tests down there. We're all concerned about the water tables. I know a person personally who helped drill some of the holes they blew the bombs off in. They were a mile deep. If they didn't get through three or four water tables by then, I think we're dreaming.

So what I would like to know is if any tests or any environmental study has ever been done to figure out what is there now, and is this study being done so we'll know relatively, I mean, how much more could we screw up the place versus what is already there.

Nobody ever talks about it. I very rarely hear anything about this in the news, in the media. I have been to a couple of these meetings. Nobody really ever talks about that.

I think we have got military and that entity of government not transmitting information to you folks who I think need it. And I would like to know because I think that the place is already contaminated. I'm not in favor particularly of having any more come there, but my concern is knowing what's already there.

I think we have got our heads buried in the sand when it comes to knowing anything at all about what's there already. And I don't know how we can even approach this particular study without knowing what already exists there, and I don't think you can make a rational decision about anything until we know, and just as a citizen, I'd like to know.

Response
DOE described past activities at the Nevada Test Site in the *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DIRS 101811-DOE 1996). Section 8.3.2.1 of the Draft EIS discussed the activities at the Nevada Test Site and acknowledged the potential for large amounts of radioactivity as a potential long-term impact. In the Final EIS the Department has updated the information based on more recent analyses of the potential long-term impacts from these activities.

In 1998, the Department published *Accelerating Cleanup: Paths to Closure* (DIRS 107294-DOE 1998) and has continued to update that report with supplemental information to present the status of cleanup efforts in the DOE complex. The report estimated a total cost of less than $3 billion (DIRS 107294-DOE 1998) for all projects at the Nevada Test Site. In addition to cleanup and remediation activities, this estimate includes subsurface monitoring and surveillance of the sites for up to 100 years (DIRS 107294-DOE 1998).

The Department is continuing environmental restoration at the Nevada Test Site and is studying and monitoring groundwater contamination of the underground test areas. No long-term plans for remediating the underground test areas have been developed.

10 (1777)
Comment - EIS000392 / 0002
Cumulative effects: The DEIS fails to examine all of the past and reasonably foreseeable actions discussed for cumulative impacts. Specifically the impacts of low level radioactive waste transportation to the Nevada Test Site (NTS) are ignored. Issues such as land withdrawal, water resources, cultural resources, socioeconomic impacts and environmental justice have received inadequate analysis.

Response
Section 8.4 of the EIS discusses the cumulative impacts of waste transport to a repository at Yucca Mountain along with shipments of low-level radioactive waste to the Nevada Test Site. Sections 8.2 and 8.3 describe other possible cumulative impacts. Since the publication of the Draft EIS, DOE has revised some of these analyses and believes that the Final EIS presents a reasonable estimate of the cumulative impacts that could be expected in the region.

10 (1792)
Comment - EIS000630 / 0009
Military air space impacts. Also absent from the EIS was the adequate analysis of the cumulative impacts and the potential conflicts between the military air space practice areas, the ranges to the south, and the rail route.

Response
Section J.3.3 in the EIS describes the scenarios considered in the evaluation of transportation accidents, which included military airspace operated by the U.S. Air Force.

10 (1808)
Comment - EIS000332 / 0007
DOE fails to include reasonably foreseeable action proposals identified in other federal, state, and local documents (e.g., many DOI [Department of the Interior] actions are not included; Las Vegas Valley Water District water right applications are not included). DOE also relies upon analyses performed by other agencies where such agencies failed to identify impacts to Nye County and its resources, even when Nye provided supporting analyses and documentation through the agencies' administrative process.

Response
Chapter 8 of the EIS evaluates the cumulative impacts of the repository along with the impacts of other Federal, non-Federal, and private actions. If the impacts from the repository would not interact or somehow overlap in time or space with impacts from these other actions, DOE did not include them in the assessment of cumulative impacts. The commenter suggests that actions by the Department of the Interior and the Las Vegas Valley Water District should have been included in the assessment of cumulative impacts. However, the water rights applications filed by the Las Vegas Valley Water District are not within the groundwater basins potentially affected by the repository. Actions by the Department of the Interior that could have cumulative impacts with the Proposed Action are described in Section 8.1.2.2 of the EIS.

The commenter suggests that DOE relied upon analyses by other agencies where such agencies fail to identify impacts to Nye County, even when Nye County provided supporting analyses and documentation through the agencies' administrative processes. DOE cites analyses performed by other agencies when they provide insight to or a context for the Proposed Action. Whether these analyses reflect Nye County's input is not germane to the Department's use of documents. On the other hand, DOE has documented opposing viewpoints and analyses in the EIS. DOE included these views if they were based on scientific, regulatory, or other information supported by credible data and analytical methods. For example, opposing views on the nature of the groundwater system at Yucca Mountain are discussed in Section 3.1.4.2.2. Opposing views on other subjects are discussed elsewhere in this EIS.

10 (1815)
Comment - EIS000332 / 0013
With the cessation of nuclear weapons testing in 1992, Nye County has made substantial efforts to plan for its economic future in the US-95 corridor. The DEIS does not recognize these plans, and does not reflect a DOE obligation to ensure that the YMP [Yucca Mountain Project] will not thwart those plans. Nye County, by virtue of its location, characteristics, and overwhelming federal presence has been disproportionately impacted by past, present, and continuing federal actions. Nye County must receive just equity offsets, mitigation, and compensation from the U.S. to mitigate the cumulative [impacts] of these past and present actions, and the proposed repository, should it go forward.

Through Nye County's analyses and evaluations, a range of direct and indirect cumulative impacts have been identified (land use, water resources, lost economic opportunity, and others). Nye County believes that these impacts, although adverse and significant, can be mitigated through various measures.

Nye County will present its technical basis and evaluations to support the position that impacts stemming from the implementation of the proposed action can be mitigated, and will continue to request mitigation pursuant to NEPA [National Environmental Policy Act].

Response
Consistent with regulations of the Council on Environmental Quality (40 CFR 1508.7), DOE considered past, present, and reasonably foreseeable actions in its assessment of cumulative impacts and has reviewed a number of actions both current and proposed to determine their relevance. The expression "reasonably foreseeable" refers to future actions for which there is reasonable expectation that the action could occur, such as a proposed action under analysis, a project that already started, or a future action that has obligated funding.

DOE structured the cumulative impact assessments in Chapter 8 of the EIS by identifying actions the effects of which could coincide in time and space with the effects from the proposed repository and associated transportation activities.

The identification of the relevant actions was based on reviews of resource, policy, development, and land use plans prepared by agencies at all levels of government and from private organizations, other environmental impact statements, environmental assessments, and tribal meeting records. Consistent with regulations of the Council on Environmental Quality [1502.16(c) and 1506.2], in addition to the assessment of potential environmental impacts, the potential conflicts with plans issued by various entities were considered to the extent they provided relevant information.

The commenter indicated that Nye County would present its technical basis and evaluations to support their position that impacts from the Proposed Action can be mitigated. DOE would consider this information, when it is available, and would develop appropriate mitigation actions consistent with the Council on Environmental Quality regulations (40 CFR Parts 1500-1508) and Section 116(c) of the NWPA. Chapter 9 of the EIS identifies DOE-determined impact reduction features, procedures and safeguards, and mitigation measures under consideration for inclusion in the project plan and design. Chapter 9 also identifies ongoing studies that could eventually influence mitigation measures related to the project plan and design.

10 (2227)
Comment - EIS000622 / 0011
There is also no cumulative figures that I could find regarding the fact that this is being built adjacent to the Nevada Nuclear Test Site. The Nevada Nuclear Test Site is already exposing everyone in the area through the air, through soils that blow around in high level winds, through the water, and there's not information about how this would cumulatively affect people in terms of genetics, natural wildlife or human health. I think this is inadequate and needs to be addressed with a lot more concern.

Response
Table 8-1 of the EIS lists the past, present, and reasonably foreseeable actions that DOE analyzed in Sections 8.2, 8.3, and 8.4 for cumulative impacts. Activities at the Nevada Test Site that would affect the cumulative impact analyses included past nuclear weapons testing; treatment, storage, and disposal of low-level radioactive waste,

mixed waste, transuranic waste, high-level radioactive waste, and hazardous waste; construction and operation of an intermodal transfer station near Caliente for the shipment of low-level radioactive waste to the Nevada Test Site; historic shipments of radioactive materials to and from the Nevada Test Site for other DOE facilities; and possible future shipments of radioactive materials to the Nevada Test Site. DOE believes that it has considered all past, present, and reasonably foreseeable actions on the Nevada Test Site in the cumulative impact analyses in Chapter 8.

10 (2330)
Comment - EIS000614 / 0015
The following issue needs to be addressed and thoroughly analyzed concerning direct impacts to Lander County in a detailed manner: military overflights and other federal agency interactions.

Response
DOE did consider the potential impacts of military overflights in its analysis of the proposed Yucca Mountain Repository. Section J.3.3, for example, describes potential transportation accidents associated with military operations from Nellis Air Force Base. As described in Section 8.1.2.2, the Department also considered other Federal activities in the region.

10 (2761)
Comment - EIS000897 / 0002
Will radiation sources in the area, other than the repository, be considered in a total dose calculation? Will the recently reported spent fuel buried somewhere in Area 25 of the Nevada Test Site be included? What about the cumulative impacts to groundwater from nuclear testing?

Response
The EIS discusses possible radiological sources other than the repository in Chapter 8. The cumulative impacts of such actions would not always be directly additive, however, due to spatial differences in the sources, time differences in potential releases, and differing transport mechanisms. For instance, the maximally exposed individual dose from airborne emissions from a particular facility would not be additive to the maximally exposed individual dose from the repository because the calculations are for two different locations. Therefore, DOE has quantified the impacts given such differences among the various potential sources of radiological emissions.

Section 8.3.2.1 describes the activities on the Nevada Test Site that could contribute to cumulative impacts with the proposed repository. Since issuing the Draft EIS, DOE has revised some of the analyses of impacts associated with the Nevada Test Site. Sections 8.2.2.2 and 8.2.7 now include information on radiation exposure from past nuclear weapons testing, and Section 8.3 includes updated estimates of future impacts to groundwater and air resources from activities on the Test Site.

There are no known sites in Area 25 where spent nuclear fuel has been buried. Parts from the old nuclear rocket program, and perhaps some fuel from this program, might be buried somewhere in Area 25, but nothing definite is known about the nature of the material or where it might be buried. This material was not accounted for in the cumulative impacts analysis because its existence, location, amount, and characteristics are not known.

10 (3004)
Comment - EIS000692 / 0005
I would like to say that it is almost laughable to any Nevada citizen that the DOE seriously claims to be taking cumulative impacts into consideration in the final choice between a Yucca Mountain repository and the two no action scenarios.

One look at the cumulative impacts evaluated sheet of your presentation should be enough to disqualify Yucca Mountain from further study.

Response
DOE has prepared this EIS so the Secretary of Energy can consider it, together with other factors required by the NWPA, in making a determination whether to recommend Yucca Mountain for development as a repository, rather than to present a choice between the Proposed Action and the No-Action Alternative.

DOE believes that Chapter 8 of the EIS provides a credible discussion of the cumulative impacts from the repository, along with the impacts of past, present, and reasonably foreseeable activities in the region. These discussions include short- and long-term cumulative impacts of the repository, the cumulative impacts of transportation, and the cumulative impacts of manufacturing disposal containers and shipping casks.

10 (3092)
<u>Comment</u> - EIS000706 / 0005
Despite [the key role of Clark County] there is almost no evaluation of the potential implications of transporting nuclear waste through our urbanized, congested and increasingly developing valley.

The DEIS also fails to evaluate cumulative impacts associated with other Nevada Test Site activities. As an example, there is no examination of the probable use of the Nevada Test Site as the disposal site for the nation's low level radioactive waste. This offers the potential to dramatically increase the total numbers of shipments through Clark County and Southern Nevada.

<u>Response</u>
Section 8.4 of the EIS discusses the cumulative impacts of transportation in the region, and includes the impacts of shipping a wide variety of nuclear materials. DOE examined many documents to determine the likely number of waste shipments in the region and the resultant impacts. For all the actions identified in Section 8.4, the Department described the radiological impacts and the impacts from vehicle accidents.

Section 8.2.12.2 discusses the cumulative impacts from the storage of low-level waste, which includes the reasonably foreseeable action of the Nevada Test Site becoming a regional low-level waste-disposal site.

10 (3990)
<u>Comment</u> - EIS000724 / 0005
Another problem with the DEIS is that there is no way to discover the total risk associated with the Yucca Mountain Project. The DEIS should clearly spell out what the accumulation of all the possible impacts could be, especially for the residents of southern Nevada. For instance, what if I were born near Yucca Mountain and I grew up drinking contaminated water and eating contaminated food? What if I am an involved worker at Yucca Mountain and I become pregnant and nurse my child? How can I determine from reading the DEIS what the total risk is to myself and my child? Or, what if I am a truck driver who transports casks from the east coast to Yucca Mountain, and I live along the transportation route and my partner is a crossing guard at one of the intersections on the transportation route, and we have a child who attends a school on the route. How can I determine our total risk as a family?

<u>Response</u>
DOE is not able to calculate past and future doses to each resident in the region. To do so would require accounting for lifestyle habits such as cross-country airline flights, past residence in locations that might have substantially higher or lower background cosmic radiation, medical diagnostic tests and treatments, etc. However, the Department has calculated the impacts to various receptor groups in Chapters 4 through 8, which provide a reasonable estimate of radiation doses. These groups include involved radiation workers, noninvolved workers, members of the public exposed along the transportation route, and members of the public in the vicinity of the proposed repository. To estimate impacts, individuals could identify the appropriate receptor group or groups to which they belong and add the impacts for individuals in those groups. For example, if an individual was a noninvolved worker and lived near the repository, that person would be in two receptor groups: the general public and the noninvolved worker group. This would provide a first-order approximation of the total radiation dose to that individual.

10 (4206)
<u>Comment</u> - EIS001160 / 0022
The DEIS does not adequately address issues raised and substantiated by White Pine County during the scoping process. For example:

The repository EIS must consider the possibility that U.S. Highways 93 and 6 and State Highway 318 through White Pine County will be used for both high-level and low-level radioactive waste [LLRW] shipments. Alternatives considered within the EIS should consider with and without LLRW shipments along highway access options through White Pine County. The DEIS does not consider the cumulative impacts (radiological, socioeconomic, etc.) of shipments of HLW [high-level radioactive waste] and LLW through White Pine County.

Response
Under regulations issued by the U.S. Department of Transportation (49 CFR 397.101), truck shipments of spent nuclear fuel and high-level radioactive waste could not use a route through White Pine County. Therefore, an analysis of cumulative impacts is not necessary. However, Appendix J of the EIS evaluates the sensitivity of impacts to variations in routing through Nevada. For comparison purposes, Section J.3.1.3 considers a route through White Pine County, but this route would not be used.

10 (4555)
Comment - EIS000225 / 0006
Nye County consultant Thomas Buqo and Steve Frishman, a consulting geologist with the State Nuclear Projects Agency, questioned calculations by Yucca Mountain Project scientists that show the radioactive inventory after 1,000 years of waste storage would be 120 million curies, or units of radioactivity. That amount is less than half the current burden of 300 million curies left from below-ground nuclear tests at the Nevada Test Site. Frishman said the Yucca Mountain inventory would be at least 4 billion curies after 1,000 years of decay, potentially adding more contamination to ground water supplies in Nye County than from what exists now as a result of full-scale U.S. nuclear weapons.

Response
DOE is not aware of the origin of the 120-million-curie estimate provided by the commenter. Table A-10 in the EIS provides the estimated curies of each radionuclide projected for disposal in the repository. If one added the amounts of each radionuclide in the list, the total would be approximately 14 billion curies. This is the estimate of the number of curies of various radionuclides at the time of receipt at the repository. By considering the radioactive decay of the radionuclides for 1,000 years, the radionuclide inventory remaining in the mountain at that time would be approximately 140 million curies.

It appears that the commenter might be referring to the number of kilograms of uranium projected for Modules 1 and 2, which was listed as 120 million in Table 8-36 of the Draft EIS. This figure was used to evaluate the potential for uranium (evaluated here for its chemical toxicity as opposed to its radioactivity) to affect the offsite drinking water, along with any other chemically toxic materials that could dissolve in the groundwater (see Section 8.3.1.1 of the EIS).

DOE recognizes, and the EIS acknowledges, that the radioactivity stored in the repository would be greater than the radioactivity that is currently estimated at the Nevada Test Site. However, the quantity of activity alone is not the sole indicator of risk. As described in the EIS, the repository would be an engineered facility designed to contain the material placed in it over very long periods. This is very different from underground detonation sites at the Nevada Test Site where the radioactivity is not in a facility designed for long-term containment.

10 (4570)
Comment - EIS001521 / 0084
Page 8-35, fifth paragraph--the 15,000 acre-feet per year reference should be to page 3-40, Table 3-11 (not Table 3-10), and the correct withdrawal amount is 14,000 acre-feet (not 15,000 acre-feet as stated).

Response
The comment is correct, and DOE has revised the EIS accordingly.

10 (4610)
Comment - EIS001430 / 0008
Page 8-74, 2. incorrectly states that Figure 8-3 (p. 8-11) shows the locations of underground nuclear tests.

Response
Thank you for your comment. DOE has changed the text to refer to the appropriate figure.

10 (4611)
Comment - EIS001430 / 0009
Page 8-7, bullet 2 has different numbers of waste packages given than in Table 8-34 (p. 8-60).

Response
Thank you for your comment. The Department has changed the reference in bullet two to refer correctly to the actual number of waste packages listed under the reference "DIRS 102030-CRWMS M&O 1999."

10 (4749)
Comment - EIS001450 / 0010
There are several problems where words state that a figure or table shows something that it doesn't, as noted below:

a. Page 8-7 — the text in the second bullet gives different (and lower) ranges for the number of waste packages than the totals for each category in referenced Table 8-34 (page 8-60).

b. Page 8-74, activity 2 — this description incorrectly states that Figure 8-3 (page 8-11) shows the locations of underground nuclear tests; the location of the nuclear and high explosive test zones are, however, shown on Figure 3-2 (page 3-8).

Response
DOE has changed the text in the Final EIS as follows: (a) the reference in bullet 2 was changed to refer correctly to the actual number of waste packages that are listed under the reference "DIRS 102030-CRWMS M&O 1999"; and (b) the reference to Figure 8-3 was changed to the correct figure.

10 (5167)
Comment - EIS001910 / 0006
The Draft EIS does not go far enough to address cumulative impacts which are likely results because of past, present and future impacts from NTS [Nevada Test Site] activities. For instance, the DOE mentions a proposed federal action to return certain lands of the Timbisha Shoshone. An important factor left out regarding this return is that the land was subjected to years of radioactive fallout from the Nevada Test Site. The amount of radiation exposure experienced by the indigenous people residing in the area has not been assessed nor have any baseline health studies been conducted. The people still living in the area may have experienced significantly higher levels of exposure because of the many exposure pathways common to Native American peoples. The added impacts of long-term releases from the transportation of radioactive waste and spent nuclear fuel cannot be accurately calculated. The status of the Indian nation populations should give rise to a higher degree to assurance that they will be protected from increased exposures.

The absence of previous exposure data also is important regarding impacts of long-term releases from the transportation of radioactive waste and spent nuclear fuel. A true picture of potential impacts from transportation exposure cannot be accurately calculated unless information from past Nevada Test Site releases can be added to the project exposure data.

A joint NCI/CDC [National Cancer Institute/Centers for Disease Control] effort to assess human health impacts from bomb testing at the NTS is currently underway. The people whose homelands are near the Nevada Test Site were subjected to multiple detonations of atomic weapons. This project affirms what Native American people in the area have known for years--that radioactive fallout caused significant negative health impacts which includes chromosomal damage, debilitating diseases, and mortality.

Utmost protective considerations must be accorded to the people indigenous to this area. An apparent conclusion or response to the Timbisha land return issue may be that the reservation is being created well after the Yucca Mountain has begun, thereby absolving the DOE of its trust responsibility. Once again, the Timbisha Shoshone have lived there thousands of years prior to any encroachment or intrusion of federal actions.

The fact of primary habitation of indigenous peoples, whom the federal trust responsibility is to protect, is an important point in regard to the divergence of opinion of ground-water protection requirements. The Native American tribes and citizens are entitled to assess the viability of the water protection issues. The DOE acknowledges that further studies of impacts are needed along transportation corridors. The tribes do not have emergency response programs in place and are isolated from federal, or other assistance in an emergency situation. At the pace and funding level proposed by current DOE officials charged with delivery of emergency preparedness program planning for corridor states and tribes, when the shipments commence, even several years from now, it does not appear that tribes will be ready. Tribal governments will continue to have unmet needs and unfunded mandates.

Response
The commenter is correct that the assessment of impacts of past nuclear weapons testing at the Nevada Test Site is part of an ongoing effort by several organizations, including the National Cancer Institute and the Centers for Disease Control. However, the available information does not indicate that these assessments have concluded "that radioactive fallout caused significant negative health impacts which includes chromosomal damage, debilitating diseases, and mortality." Readers interested in further information about the effects of past testing of nuclear weapons should refer to the *National Cancer Institute Study Estimating Thyroid Doses of I-131 Received by Americans From Nevada Atmospheric Nuclear Bomb Tests* (DIRS 152469-Institute of Medicine and National Research Council 1999).

DOE has reviewed the available information and has included a discussion in Chapter 3 of the Final EIS on the health impacts of past above-ground weapons testing at the Nevada Test Site. In addition, Chapter 8 considers these impacts as they contribute to cumulative impacts.

Since DOE issued the Draft EIS, Congress enacted legislation, signed by the President, that created the Timbisha Shoshone Trust Lands. These lands consist of discontinuous parcels in southeastern California and southwestern Nevada. The Bonnie Claire Alternate variation of the Carlin and Caliente Corridors crosses a parcel of the trust lands near Scottys Junction, Nevada. In addition, potential shipments using the Caliente route for heavy-haul trucks would cross the same parcel on U.S. 95. DOE believes that radiation exposure impacts to persons on the Timbisha Shoshone Trust Lands from the repository, spent nuclear fuel and high-level radioactive waste transportation, and other past, present, and reasonably foreseeable activities, including past weapons testing, would be small due to the initial indications that minimal exposures would be associated with the parcels that comprise the reservation, including the parcel near Scottys Junction.

The commenter also correctly states that DOE would conduct further studies of impacts along a rail corridor or route for heavy-haul trucks should one of the implementing alternatives described in the EIS be selected for use in transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain (see Section 6.3.3 of the EIS). The studies would be conducted and reported in accordance with the applicable requirements of the National Environmental Policy Act.

As stated in Appendix M of the EIS, approximately 4 years prior to the first shipment through state or tribal reservation boundaries, DOE plans to implement Section 180(c) of the NWPA through a grants program. It is DOE's objective to provide funding and technical assistance, subject to annual appropriations, to assist states and tribes to obtain access to the increment of training necessary to prepare for NWPA shipments (63 *FR* 23753, April 30, 1998).

10 (5186)
Comment - EIS001443 / 0011
The DEIS treats both geohydrologic and transportation impacts of the proposed repository as "stand alone" issues without recognition of the fact that the repository would operate in an environment already heavily impacted by past and ongoing nuclear waste activities. Territory adjacent to the Yucca Mountain site is heavily contaminated by radioactive materials as a result of decades of Atomic Energy Commission (AEC)/Department of Energy nuclear testing, while many of the roadways and rail corridors expected to be used for transport of spent nuclear fuel and high-level nuclear waste are already in service for the transport of low level and defense wastes to the Nevada Test Site and the Waste Isolation Pilot Plant in New Mexico. Operation of the Yucca Mountain repository would be one in a series of similar, linked actions undertaken by a single agency: the Department of Energy. The additional risks which Yucca Mountain would place on groundwater resources, human populations and national and regional transportation resources must be analyzed and weighted within the context of past, present and foreseeable non-Yucca Mountain-related AEC/DOE actions in order to meet the intent of NEPA [National Environmental Policy

Act] and allow decisionmakers and the public to place the proposed action in the proper context. The NEPA exemptions provided DOE by the Nuclear Waste Policy Act do not include exemption from addressing cumulative impacts.

Response
DOE believes that Chapter 8 of the EIS contains a credible discussion of the impacts from the repository that could be cumulative with the impacts of past, present, and reasonably foreseeable activities in the region. This chapter includes discussions of short- and long-term cumulative impacts of the repository, the cumulative impacts of transportation, and the cumulative impacts of manufacturing disposal containers and shipping casks. Section 8.3 discusses the impacts of past nuclear weapons testing at the Nevada Test Site and the cumulative effects of this action and of the proposed repository. Section 8.4 discusses the cumulative effects of the transportation of radioactive material in the area, including waste transport to the Test Site and the Waste Isolation Pilot Plant.

10 (5187)
Comment - EIS001443 / 0012
The DEIS should be amended to include description of the environmental context within which repository operations and transportation of nuclear waste will take place. Specifically, the DEIS needs to map and quantify the current level of environmental contamination in the region, and current and projected non-Yucca Mountain nuclear and hazardous waste shipment activity. This information needs to be compiled in a manner such that the incremental increase in risk posed by the repository and the total risk to humans and natural resources posed by the sum of DOE activities is clearly discernable.

Response
DOE believes that Chapter 8 of the EIS contains a credible discussion of the impacts from the repository that could be cumulative with the impacts of past, present, and reasonably foreseeable activities in the region. This chapter includes discussions of short- and long-term cumulative impacts of the repository, the cumulative impacts of transportation, and the cumulative impacts of manufacturing disposal containers and shipping casks. Section 8.4 of the EIS contains an analysis of the cumulative transportation impacts that could occur as the result of past, present, and reasonably foreseeable actions. While the total impacts from these separate actions is not necessarily the sum of the impacts of the individual actions, the list of impacts in Table 8-58 provides a sense of the scale of the potential impacts.

10 (5261)
Comment - EIS001887 / 0020
The Draft EIS fails to adequately assess cumulative impacts from past, current, and future activities at the Nevada Test Site (NTS). Estimates of the NTS contribution to off-site radiation exposures and projections of future cumulative exposures are based on woefully inadequate and incomplete data. Known and suspected contaminated sites in the proposed withdrawal area are not acknowledged, and their remediation status is not described.

DOE's own estimates place the combined source term for all tests conducted at the NTS at 300 million curies. The geographic scope of existing groundwater contamination in the region may exceed 300 square miles and extend to depths ranging from 500 to 5,000 feet. Yet the Draft EIS concludes that the maximum potential dose from the underground testing inventory is calculated to be 0.2 millirem per year and that the cumulative annual dose from both NTS and Yucca Mountain sources would [be] 0.42 millirem per year.

In fact, DOE does not have the data required to calculate a base case scenario for determining groundwater travel time in the region, let alone to make an estimate of radionuclide movement in the groundwater. Estimates of hydraulic conductivity contained in the Draft EIS (e.g., movement of contaminants through the groundwater) rely on only one data set obtained from a single well for a period of fifty years. This limited data is then extrapolated over a 10,000 year period to produce the estimated 0.2 millirem per year dose figure (as the contribution to cumulative groundwater impacts caused by nuclear testing). As a result, it is not possible, with any reasonable level of confidence, to estimate the amount of radionuclides released through the groundwater to the biosphere in the region of influence beneath the NTS and offsite locations. Both the State of Nevada and DOE's own independent peer review group (2) have documented these facts as part of ongoing technical and regulatory reviews of DOE's Underground Test Area program for the NTS.

Developing believable and reasonable estimates of the potential cumulative impacts to groundwater from existing contamination beneath the NTS and future contamination from a proposed repository at Yucca Mountain is mandatory for assessing the degree to which the Proposed Action would affect public health and safety. The Draft EIS fails to make this fundamental assessment and is, therefore, deficient. The Draft EIS fails to meet the basic requirement of NEPA [National Environmental Policy Act] as defined by the Council of Environmental Quality implementing regulations, Sec. 1500.1(b).

The Draft EIS also fails to adequately assess impacts from contaminated sites known to be located within the proposed repository withdrawal area. For example, it is known that there are high-level waste residues from the nuclear rocket program buried at an unknown location in Area 25 of NTS. The Draft EIS must contain affirmative information regarding the location of this material and assure that, if it is in the proposed withdrawal area, it will be recovered and managed according to applicable laws, regulations, and orders. In addition, there are reportedly at least 20 other known contaminated sites within the portion of the NTS that is included in the proposed withdrawal area. These areas must be fully rehabilitated under the jurisdiction of NTS so they are not passed on to OCRWM [Office of Civilian Radioactive Waste Management], where they would remain a continuing hazard. The impacts associated with required clean-up activities should have been addressed in the Draft EIS.

(2)"External Peer Review Group Report on Frenchman Flat Data Analysis and Modeling Task, Underground Test Area Project," (ITLV/13052-077A0), prepared for U.S. Department of Energy, Nevada Operations Office under contract No. DE-ACO8-97NV13052 (September 1999).

Response
Section 8.3.2.1.1 of the EIS acknowledges that there is uncertainty in estimating potential impacts to groundwater from past weapons testing on the Nevada Test Site. Some groundwater parameters are not known with certainty, and other information cannot be disseminated to the public due to national security concerns. The Draft EIS analyzed the cumulative impacts to groundwater from the repository, as well as from past underground weapons testing and low-level radioactive waste disposal at the Nevada Test Site. The Final EIS contains additional, more detailed analyses based on more recent data.

DOE believes that the values and assumptions used in the updated analyses in the Final EIS ensures the Department considered the associated range of cumulative impacts. DOE chose these values based on analyses in the Nevada Test Site EIS (DIRS 101811-DOE 1996) and believes it has made a reasonable estimate of the impacts. As stated in the EIS, DOE believes that its assumptions resulted in a conservative estimate of the true impacts. It is true that the Department used data for hydraulic properties based on measurements from a single well, as stated in Section 8.3.2.1.1. This point is one of the sources of uncertainty in the analysis; DOE used the best available data and the professional judgment of its analysts to arrive at an estimate of the impacts.

DOE has not determined future responsibilities for the management of Area 25. There are no known sites in Area 25 where spent nuclear fuel has been buried. Parts from the old nuclear rocket program, and perhaps some fuel from that program, might be buried somewhere in Area 25, but nothing definite is known about the nature of the material or where it might be buried. This material was not accounted for in the cumulative impacts analysis because its existence, location, amount, and characteristics are not known.

10 (5282)
Comment - EIS000817 / 0160
P. 8-1. So now you want to dump everything you can in the repository if you open it -- surely not what Nevada was told at the beginning of this speculation! So if the NRC [Nuclear Regulatory Commission] says put it in the repository -- Congress will agree -- and in all these other types of waste go -- further complicating materials interaction analysis -- and the "radioactive soup" at the end of repository life becomes more "spicy" than before. (And Nevada gets the Nevada Test Site waste and Beatty Waste Disposal area, too.) Poor Nevada.

Response
Comments that DOE received from the public during the scoping process for this EIS expressed the concern that more spent nuclear fuel and high-level radioactive waste would be generated than the 70,000 metric tons of heavy metal accounted for in the Proposed Action. In response to those comments, DOE evaluated the emplacement of the total projected inventory of commercial spent nuclear fuel and DOE spent nuclear fuel and high-level radioactive

waste (Inventory Module 1) and of that total inventory plus the inventories of commercial Greater Than-Class-C low-level waste and DOE Special-Performance-Assessment-Required waste (Inventory Module 2). Sections 8.2 and 8.3 of the EIS examine the cumulative short- and long-term impacts of the Proposed Action along with the disposal of Inventory Modules 1 and 2. The analysis of future activities in Chapter 8 is not restricted to activities that would occur with certainty; rather, the analysis gives an estimate of potential cumulative impacts from actions that are reasonably foreseeable.

Disposal of more than 70,000 metric tons of heavy metal at the repository would require legislative action by Congress unless a second licensed repository was in operation. Disposal of Greater-Than-Class-C low-level waste and Special-Performance-Assessment-Required waste at the repository would require either legislative action or a determination by the Nuclear Regulatory Commission that the material should be classified as high-level radioactive waste.

10 (5549)
Comment - EIS001887 / 0188
Page 3-79; Section 3.1.8 - Occupational and Public Health and Safety

It is known that there is some high-level waste residue from the nuclear rocket program buried at an unknown location in Area 25 of NTS [Nevada Test Site]. The Draft EIS must contain affirmative information regarding its location and assure that, if it is in the proposed withdrawal area, it will be recovered and managed according to applicable laws, regulations, and orders. Also, there are reportedly some 20 contaminated sites within the portion of Area 25 of the NTS that is included in the proposed withdrawal area. Before issuance of a Final EIS, these areas must be fully rehabilitated under the jurisdiction of NTS so they are not passed on to OCRWM [Office of Civilian Radioactive Waste Management] where they would remain a continuing hazard.

Response
DOE has not determined future responsibilities for the management of Area 25. There are no known sites in Area 25 where spent nuclear fuel has been buried. Parts from the old nuclear rocket program, and perhaps some fuel from this program, might be buried somewhere in Area 25, but nothing definite is known about the nature of the material or where it might be buried. This material was not accounted for in the cumulative impacts analysis because its existence, location, amount, and characteristics are not known.

10 (5550)
Comment - EIS001660 / 0045
Mineral County submits Eureka County's analysis as Mineral County's comments (see Attachment E). [Following is text from reference.]

Analysis of shared rail use inadequate. The analysis of the impacts of shared public/private use of DOE branch rail lines is inadequate. (pp. 8-4, -15) The analysis properly belongs in Chapter 6, Transportation Impacts. The statement that predicting increases in rail traffic from shared use would be difficult and, therefore, is not done is unacceptable. The DEIS says there will be impacts, and they must be analyzed, disclosed, and mitigated as necessary. (p. 8-87)

Analysis of impacts on public services inadequate. The DEIS does not adequately address cumulative impacts on emergency response services. The DEIS says that cumulative operations impacts would result because of the extra 14 years of shipping required for Modules 1 or 2 (p. 8-85) but that the DOE expects no cumulative socioeconomic impacts. This conclusion is contradictory and improbable since state, local, and tribal government emergency services would continue to be impacted.

Other comments. The failure of Congress to ratify the Nuclear Test Ban Treaty makes the future resumption of nuclear weapons tests more likely. (pp. 8-3,-11, -12) The statement that interim storage was not analyzed for cumulative impacts because it is uncertain is inappropriate; it is reasonably foreseeable and must be included. (p. 8-5) The inadequacies of the air pollution analysis are similar to those in Chapter 4: the discussion is vague and the conclusions unsupported by the evidence, particularly the statement that there will be no effect on the Las Vegas Valley air basin. (pp. 8-24 to 8-30) The statement that the final EIS will review new information from the Pipeline

Southeast Expansion Project for cumulative impacts is unacceptable, since the public will not have the opportunity to comment (p. 8-85).

Response

DOE structured the cumulative impact assessments presented in Chapter 8 of the EIS by identifying actions the effects of which could coincide in time and space with the effects from the proposed repository and associated transportation activities. Consistent with Council on Environmental Quality regulations (40 CFR 1508.7), DOE considered past, present, and reasonably foreseeable actions in its assessment of cumulative impacts and has reviewed a number of actions, current and proposed, to determine relevance. The expression "reasonably foreseeable" refers to future actions for which there is reasonable expectation that the action could occur, such as a proposed action under analysis, a project that has already started, or a future action that has obligated funding.

The identification of the relevant actions was based on reviews of resource, policy, development, and land use plans prepared by agencies at all levels of government and from private organizations, other environmental impact statements, environmental assessments, and tribal meeting records. Consistent with Council on Environmental Quality regulations [40 CFR 1502.16(c) and 1506.2], in addition to the assessment of potential environmental impacts, the potential conflicts with plans issued by various entities were considered to the extent they provided relevant information. Once DOE selected a transportation mode and specific transportation corridor, more definitive information could be developed on potential conflicts with land uses and various agency plans and policies and, ultimately, the mitigation measure that could be needed to resolve conflicts and impacts on a given area.

In the case of shared rail use, DOE believes that the rail lines discussed in Chapter 8 of the EIS would have benefits for the surrounding communities and industries. However, potential sharing of the rail line is speculative at this point, and including these rail lines in the cumulative impact analyses could result in a misrepresentation of those impacts.

In relation to public services, the continuation of operations for an additional 14 years would not result in an increase or decrease in emergency response services. Because the status quo would be maintained, DOE does not expect socioeconomic impacts.

Since 1992, there has been a moratorium on nuclear testing. Even though the Nevada Test Site must maintain the ability to resume testing, the Department does not believe that a resumption of testing is a reasonably foreseeable action. Therefore, it was not included in the analyses in Chapter 8 of the EIS. Nevertheless, a recent evaluation of impacts from a resumption of underground testing at the Nevada Test Site (DIRS 103273-Walck 1996) concluded that the only impact such testing would pose on the repository would be ground motion from the energy released by the detonations. DOE has determined that such effects would not exceed the seismic design criteria for the repository. In other words, the design-basis earthquake for the repository would generate stronger ground motions than would underground nuclear detonations on the Nevada Test Site. Because DOE has designed the repository to survive the design-basis earthquake with minimal damage, ground motion from the resumption of underground testing would be unlikely to result in substantial damage to the surface or underground facilities at Yucca Mountain.

DOE believes that interim storage at Yucca Mountain is not a reasonably foreseeable action, and that it is inappropriate to analyze potential impacts of that action in the EIS. As stated in Section 2.2 of the EIS, if Yucca Mountain was determined to be unsuitable or not approved by the President or Congress, DOE would prepare a report to Congress. This report, required by the NWPA, would contain DOE recommendations for further action to ensure the safe, permanent disposal of spent nuclear fuel and high-level radioactive waste, including the need for new legislative authority. Other than this action, the future course that Congress, DOE, and the commercial nuclear power utilities would take is uncertain. Several possibilities would be pursued, including centralized interim storage, for example, the Private Fuel Storage Facility proposed in northern Utah (see Section 8.1.2.3 of the EIS), or the study of another location for a deep geologic repository.

Section 8.3.2.1 describes the activities on the Nevada Test Site that could be cumulative with impacts from the proposed repository. Since issuing the Draft EIS, DOE has revised some of the analyses of impacts associated with the Test Site. For example, Sections 8.2.2.2 and 8.2.7 of the EIS now include information on radiation exposure from past nuclear weapons testing, and Section 8.3 includes updated estimates of future impacts to groundwater and air resources from activities on the Nevada Test Site.

10 (5556)
Comment - EIS001887 / 0189
Page 3-83; Section 3.1.8.2 - Radiation Environment in the Yucca Mountain Region

This section references Bechtel 1998, page 7-5, the Annual Site Environmental Report for the Nevada Test Site. All of the off-site radiological doses in this report are given as EDE, effective dose equivalents. EPA's [the Environmental Protection Agency's] Clean Air Package 1988 (CAP-88 PC) program was used to calculate the doses. The dose being calculated is actually the committed effective dose equivalent (CEDE) and should not be given as an EDE.

Response
The commenter is correct in noting that the Clean Air Package 1988 software calculates the committed effective dose equivalent. In addition, Clean Air Package 1988 calculates doses from external exposure. However, the committed effective dose equivalent is merely a designation for effective dose equivalent calculated for internal exposures. The term "committed" refers to the fact that following intake (regardless of the length of intake), the individual is committed to receive a given dose until the radioactive material is effectively removed from the tissues of the body. Therefore, the committed effective dose equivalent that results from intakes during a year (that is, an annual intake) can be compared and added to the effective dose equivalent that results from external radiation exposure. When the International Commission on Radiological Protection introduced the concept of effective dose equivalent (DIRS 101075-ICRP 1977), the concept included both internal and external exposures.

10 (5740)
Comment - EIS001887 / 0344
Page 8-12; Section 8.1.2.2 - Federal Actions - DOE Waste Management Activities

The statement in paragraph 2 of this section regarding potential short- and long-term cumulative impacts of waste management activities is not consistent with information in Table 8-1 (page 8-4) that indicates no short-term cumulative impacts from future potential waste management activities.

Response
DOE has revised Table 8-1 to indicate that there are no short-term impacts beyond those evaluated for Nevada Test Site activities.

10 (5741)
Comment - EIS001887 / 0345
Page 8-22; Table 8-5 - Summary of cumulative short-term impacts in the proposed Yucca Mountain Repository region.

Utilities: Table 8-5 states that peak electric power demand would require an upgrade of the transmission and distribution system. In order for this EIS to be complete, it should include an evaluation of impacts of a specific proposed upgrade since it is acknowledged that an upgrade would be required as part of the Proposed Action. Section 8.2.11 does not provide an evaluation of the impacts of the necessary upgrade.

Response
To the extent reasonable, DOE analyzed the impacts of upgrading the electrical transmission system in Section 4.1.11.2 of the EIS. Because this analysis identified no adverse impacts to the environment, the Department did not repeat the discussion in Chapter 8. To avoid confusion on this issue, the Department has added text to Chapter 8 that refers to the discussion in Chapter 4.

10 (5743)
Comment - EIS001887 / 0347
Page 8-31; Section 8.2.2.2.2 - Radiological Air Quality

This section incorrectly states that the 2.5 mrem per year cumulative dose is "about 40 percent" of the 10 mrem annual dose regulatory limit.

<u>Response</u>
The Department has updated Section 8.2.2.2.2 of the EIS to reflect the proper percentage for the cumulative dose in relation to the annual dose limits.

10 (5744)
<u>Comment</u> - EIS001887 / 0348
Page 8-36; Section 8.2.4 - Biological Resources

This section is deficient in two major respects. First, an ecosystem approach was not adopted for the Draft EIS and second, thermal loading impacts are not factored into cumulative effects. Therefore, this section is inadequate.

<u>Response</u>
The commenter's contention that DOE should have used an ecosystem approach in analyzing the Proposed Action is described as an opposing view in Section 3.1.5. That section also contains DOE's reasons for selecting the analytic approach used in the EIS. The Department believes that the approach used in the EIS is adequate.

10 (5745)
<u>Comment</u> - EIS001887 / 0349
Page 8-37; Section 8.2.5 - Cultural Resources

DOE should make provisions for identifying, evaluating, and treating historic properties if Inventory Module 1 or 2 is authorized.

<u>Response</u>
The Department realizes that the implementation of Inventory Modules 1 or 2 would disturb more land than was analyzed for the Proposed Action. As discussed in Section 8.2.5, if either inventory module is implemented, the Department would fulfill its obligations under Section 106 of the National Historic Preservation Act, as amended to ensure that cultural resources (including historic properties) were preserved to the extent possible.

10 (5746)
<u>Comment</u> - EIS001887 / 0350
Page 8-59; Section 8.3 - Cumulative Long-Term Impacts in the Proposed Yucca Mountain Repository Vicinity

The performance assessment results shown in tables for this section are based on a Total System Performance Assessment (TSPA) code and supporting analyses developed prior to those that will be used in the site suitability evaluation for site recommendation. The Draft EIS must include a description of the current TSPA and include its results and analyses rather than relying on an acknowledged incomplete and obsolete TSPA. In order to meet the need for a complete and accurate evaluation of the long-term impacts of the Proposed Action, DOE should issue a new Draft EIS for public review and comment that includes information and analyses consistent with the Site Recommendation Report.

<u>Response</u>
Section 8.3 of the Final EIS contains the results of the most current Total System Performance Assessment for the flexible design.

10 (5747)
<u>Comment</u> - EIS001887 / 0351
Page 8-74; Section 8.3.2.1 - Past, Present, and Reasonably Foreseeable Future Actions at the Nevada Test Site - Item Number 5. Shallow Land Radioactive Waste Disposal

There has been no demonstration of the "absence of a groundwater pathway." Section 8.3.2.1.3 does not provide any basis for this assertion.

<u>Response</u>
The commenter is correct. DOE has changed the EIS accordingly.

10 (5748)
Comment - EIS001887 / 0352
Pages 8-74 to 8-76; Section 8.3.2.1.1 - Underground Nuclear Testing

The discussion in this section of the Draft EIS addresses cumulative impacts associated with groundwater contamination within the Yucca Mountain region. The discussion covers contamination beneath the Nevada Test Site (NTS).

Between 1951 and 1992, DOE conducted more than 1,000 nuclear tests at the NTS. Nearly one third of these tests were conducted in or near the groundwater. State officials contend that as much as 300 square miles of surface and subsurface area on and off the NTS are contaminated with radionuclides. The Draft EIS states that the estimated radionuclides source term for all subsurface tests was 300 million curies.

This section of the Draft EIS concludes by stating that "...the maximum potential dose from the underground testing inventory is calculated to be 0.2 millirem per year...." The document further states that the maximum cumulative impact of the Proposed Action in 10,000 years (i.e., radionuclides released from Yucca Mountain at the proposed point of compliance (20 kilometers from the repository) would be 0.22 millirem per year. Adding this to the NTS release of 0.2 millirem per year produces a cumulative release of 0.42 millirem per year.

The State of Nevada believes it is not yet possible, with any reasonable level of confidence, to estimate the release of radionuclides through the groundwater to the biosphere in the region of influence beneath the NTS and offsite locations. In fact, DOE does not have the data required to calculate a base case scenario for determining groundwater travel time in the region, let alone to make an estimate of hydraulic conductivity (important for determining the rate of movement of contaminants in the groundwater). The State of Nevada has repeatedly documented these facts as part of the State's ongoing regulatory review of DOE's Underground Test Area program for the NTS. The State's detailed comments are available on the World Wide Web at the following addresses:

http://www.state.nv.us./ndep/boff/ndep13.htm
http://www.state.nv.us./ndep/boff/ndep11.htm

It should also be noted that DOE's current program for assessing groundwater contamination beneath the NTS was recently criticized by an independent external peer review group commissioned by DOE. Overall, the reviewers found inadequate data to support groundwater flow modeling at NTS. They noted that available groundwater level and permeability data were inadequate for the assessment of groundwater flow directions, rates, and travel times in the vicinity of the contaminated areas.(35)

Despite assumptions presented in the Draft EIS, any attempt by DOE to present a "bounding-analysis" of potential cumulative groundwater contamination caused by nuclear testing at the NTS is simply not possible. Moreover, estimates of hydraulic conductivity contained in the Draft EIS rely on only one data set obtained from only one well in a period of fifty years. Using this limited information and then extrapolating the data over a 10,000-year period to produce the estimated 0.2 millirem per year dose figure is pure fiction.

Current estimates suggest the geographic scope of existing groundwater contamination in the region may exceed 300 square miles and extend to depths ranging from 500 to 5,000 feet.

Developing believable and reasonable estimates of the potential cumulative impacts to groundwater from existing contamination beneath the NTS and future contamination that would escape from a proposed repository at Yucca Mountain is mandatory for assessing the degree to which the Proposed Action would affect public health and safety. The Draft EIS fails to make this basic, rudimentary assessment and is, therefore, deficient. The Draft EIS fails to meet the basic requirement of NEPA [National Environmental Policy Act] as defined by the Council of Environmental Quality implementing regulations, Sec. 1500.1(b).

Groundwater contamination attributable to underground nuclear weapons testing has been found off the NTS on the Nellis Air Force Range. Also, contamination has been detected within the NTS boundaries as far as 0.8 miles from a nuclear test location known to be the source of the contamination.

(35) “External Peer Review Group Report on Frenchman Flat Data Analysis and Modeling Task, Underground Test Area Project,” (ITLV/13052-077A0), prepared for U.S. Department of Energy, Nevada Operations Office under contract No DE-ACO8-97NV13052 (September, 1999).

Response
Section 8.3.2.1.1 of the EIS acknowledges that there is uncertainty in estimating potential impacts to groundwater from past weapons testing on the Nevada Test Site. For the Final EIS, the Department has refined the Nevada Test Site groundwater impact analysis to consider not only the total inventories of radionuclides, but also the relative source term radionuclide concentrations and dilution factors for the repository and the Nevada Test Site. However, some groundwater parameters are not known with certainty, and other information cannot be disseminated to the public. The Draft EIS analyzed the cumulative impacts to groundwater from the repository, as well as from past underground weapons testing and low-level radioactive waste disposal at the Nevada Test Site. The Final EIS contains additional, more detailed analyses based on more recent data.

DOE believes that the values and assumptions used in the updated analyses in the Final EIS provide a conservative estimate of cumulative impacts. DOE chose these values based on analyses in the Nevada Test Site EIS (DIRS 101811-DOE 1996) and believes it has made a reasonable estimate of the impacts. As stated in the EIS, DOE believes that its assumptions resulted in a conservative estimate of the impacts. It is true that the Department used data for hydraulic properties based on measurements from a single well, as stated in Section 8.3.2.1.1. This point is one of the sources of uncertainty in the analysis; DOE used the best available data and the professional judgment of its analysts to arrive at an estimate of the impacts.

10 (5749)
Comment - EIS001887 / 0353
Page 8-77; Section 8.3.2.1.3 - Future Nevada Test Site Low-Level Waste Disposal

Paragraph 3 under this section of the Draft EIS states that “DOE proposes to locate the Mixed Waste Disposal unit, which will be a landfill, on about 0.18 [square] kilometers (45 acres) of the Area 5 site, immediately north of the developed Radioactive Waste Management Site landfill area. The design has been completed, the unit has been included in the Resource Conservation and Recovery Act [RCRA] permit application, and the environmental assessment is being updated.”

Virtually all of the information stated above is outdated and incorrect. DOE’s permit application related to the Area 5 site is at least five years out of date. DOE’s current RCRA permit re-application was submitted to the State in October 1999. This re-submittal only requests authorization to use an existing mixed waste trench (pit 3) for disposal of defense low-level mixed waste generated on NTS [the Nevada Test Site].

Response
The Department acknowledges that the information in Section 8.3.2.1.3 of the Draft EIS contained errors. At this time, DOE is only seeking a permit for Area 5 interim status, pit 3, mixed-waste disposal unit. DOE resubmitted its permit application on November 2, 1999.

In the future, if the mixed waste volume warrants it, the Department may consider obtaining a new unit and hence a new permitted facility. However, the current projected waste volumes do not indicate that an additional mixed waste disposal unit is necessary.

Section 8.3.2.1.3 of the Final EIS reflects this updated information.

10 (5750)
Comment - EIS001887 / 0354
Page 8-89; Section 8.4.2.4 - Biological Resources and Soils

The section concerning Nevada transportation impacts appears to address only the intermodal transfer stations and not the routes to be followed through the state. For these reasons, the section is inadequate. Guidance such as that provided by Clark and Cantor (1997) should have been followed to supplement CEQ’s 1997, “Considering Cumulative Effects Under the NEPA.”

Response
Cumulative impacts from transporting waste through Nevada are described in Section 8.4.2. As indicated, the Carlin Corridor could have cumulative impacts with gold-mining activities in Crescent Valley that could require mitigation (see Section 8.1.2.3 for more information about these activities). Direct and indirect impacts from constructing and operating a branch rail line, and upgrading highways, are described in Section 6.3.

In general, the analysis of cumulative impacts in Chapter 8 followed the process recommended in the Council on Environmental Quality's handbook *Considering Cumulative Effects Under the National Environmental Policy Act* (DIRS 103162-CEQ 1997). This process included the identification, through research and consultations, of Federal, non-Federal, and private actions with possible effects that would be coincident with those of the Proposed Action on resources, ecosystems, and human communities.

10 (5964)
Comment - EIS001879 / 0054
With respect to cumulative impacts, the Yucca Mountain EIS finds that the potential impacts to groundwater would be small, limited to the immediate vicinity of the land disturbances associated with the repository, and that some minor incremental risk would occur from drinking the groundwater down gradient of the repository at some distant time in the future. These conclusions are inconsistent with statements in the Draft EIS.

Response
DOE recognizes that some radionuclides or potentially toxic chemicals would eventually enter the environment outside the repository. The regional flow model prepared by the U.S. Geological Survey (DIRS 100131-D'Agnese et al. 1997) suggests that some of the water from the Nevada Test Site flows to the south toward the Amargosa Valley in the vicinity of Yucca Mountain. However, the actual transport times and groundwater pathways from radionuclide contaminants on the Nevada Test Site are not clear at this time. Section 8.3.2.1.1 contains a qualitative calculation of the cumulative radiological impact from the Test Site and Yucca Mountain that indicates that the potential cumulative peak dose would be well below the regulatory limits established by the Environmental Protection Agency in 40 CFR Part 197. This combined peak dose would occur only if the peak concentrations from the Test Site and Yucca Mountain occurred at the same time and same location, which would be unlikely.

10 (5968)
Comment - EIS001879 / 0052
Let me briefly summarize the results of Nye County's water resource studies for the record. Our evaluations found that the direct impacts of water withdrawals for the proposed repository will be limited to a localized lowering of water levels that was not deemed to be significant. However, the evaluation did find that the predicted leakage from the repository and the cumulative impacts of the proposed repository will indeed be significant and that mitigating measures must be implemented. The Draft Yucca Mountain EIS is inadequate with regard to its evaluation of impacts on water resources and corresponding mitigation and, must be revised extensively.

The cumulative impacts on water resources will include the direct and indirect impacts of: 1) the total radiological burden that will be imposed on Nye County; 2) the impacts of federal land withdrawals on water resource availability; 3) the impacts of federal policies regarding nuclear weapons testing, waste disposal, and environmental protection; and 4) the water resource use and management practices on both private and federal lands in the County.

Response
DOE is relying on both the inherent natural geologic features of Yucca Mountain and the engineered barriers to isolate the spent nuclear fuel and high-level radioactive waste from the human environment (see Section 2.1 of the EIS). The waste packages to be emplaced in the repository are an important component of the engineered barrier system, as are other features that would be engineered into the repository. Some of these engineered features are proposed solely as mitigation measures to improve the long-term performance of the repository and decrease long-term impacts to the region's water resources. Chapter 9 of the EIS discusses these mitigation measures.

In relation to the cumulative impacts on water resources, Section 8.2.3 describes the cumulative short-term impacts to water resources, and Section 8.3 describes the cumulative long-term impacts to water resources. DOE believes that these sections contain a credible discussion of the cumulative impacts to water resources from the repository and from past, present, and reasonably foreseeable activities in the Death Valley flow system. The Final EIS contains additional information on water use by Federal activities within this region of influence. DOE's position, as stated in the EIS, is that cumulative water withdrawals would affect the region's water resources, but that land withdrawals would not be directly linked. Water users in Nye County who are potentially affected by the Proposed Action are hydraulically downgradient from Air Force and DOE users on the Nevada Test Site and Yucca Mountain. As described in Section 8.2.3.2, DOE recognizes that water use for the repository would decrease, to a limited extent and in the short term, water that would be available to downgradient users. The land that would be withdrawn for the repository would not alter the quantity of water available to downgradient users. That is, the land withdrawal itself would not affect water resources.

In relation to Federal policies, the EIS addresses the impacts that have resulted or could result from these policies in the affected area, but not the impacts of the policies themselves. In addition, the impacts that have resulted from water management practices in the affected area are described in the EIS, but not the impacts of the practices themselves. Water management practices that affect parts of Nye County but that are outside of the proposed repository's region of influence for water resources are not within the scope of the EIS.

10 (5972)
Comment - EIS001879 / 0050
In total, the United States has implemented a policy of permissible pollution upgradient of the communities of Amargosa Valley and Pahrump and absolute preservation of the groundwater quality and quantity in the areas downgradient of these communities. Nye County, in their water resource planning efforts is between the proverbial rock and a hard place. Yucca Mountain will perpetuate the policy of permissible pollution and will further reduce the quantity of water that is available to meet future water demands in the County.

Under 40 CFR 1508.18(b)(3) NEPA [National Environmental Policy Act] mandates that the impacts of federal policies must be evaluated in an EIS. The Yucca Mountain EIS must be revised to address the impacts of these contrasting federal water resource policies. The YMP [Yucca Mountain] DEIS does not evaluate the cumulative impacts of implementing these federal policies and actions, on a regional backdrop of rapid growth.

In short, Nye County has faithfully served as the nation's sandbox for almost half a century. Unfortunately, the Department of Energy and the Air Force have contaminated their portions of the sandbox and the Department of Interior demands that their portions be left pristine. These policies have had far reaching consequences for the County and greatly hamper water-planning efforts.

Response
The Nuclear Waste Policy Act of 1982 makes it the policy of the United States to dispose of the Nation's spent nuclear fuel and high-level radioactive waste permanently in a geologic repository. The performance of a repository at Yucca Mountain, if built, would have to be in compliance with groundwater protection standards established specifically for the repository by the Environmental Protection Agency (40 CFR Part 197). If the repository could not meet these standards, the site would be disqualified.

Section 8.2.3.2.2 of the Final EIS includes a more detailed discussion of water withdrawal issues, including current and projected water use for current and reasonably foreseeable activities in the region of influence.

10 (5974)
Comment - EIS001879 / 0049
The proposed repository is predicted to leak additional radioactive contamination into the aquifers in the southwestern portion of the Nevada Test Site...water that is currently potable will be contaminated if the DOE's Performance Assessment is correct. This will result in a significant adverse impact on the water resources that must be mitigated.

Response
The Environmental Protection Agency (EPA) has developed groundwater protection standards and individual protection standards for the proposed Yucca Mountain Repository (40 CFR Part 197). EPA developed the standards for a 10,000-year compliance period to protect human health and the environment, including groundwater. The impacts reported in this EIS for the first 10,000 years would be at levels well below the EPA standards.

In addition, 40 CFR Part 197 provides that the EIS report peak dose values. Therefore, the EIS reports such values for the period of geologic stability (1 million years). The mean of the peak dose would be above the EPA standard applicable to the first 10,000 years, but still below the average annual background dose to residents of the United States.

Given the EIS results for the 10,000-year period and the period after that, DOE believes it is not necessary to envision any mitigating action beyond that already provided by the design of the repository system. It is unreasonable to identify other potential mitigation needs and actions for the post-10,000-year period because of the inability to foresee what standards might be protective that far in the future, or what technologies might be available and implemented, if necessary, to achieve such standards.

10 (5980)
Comment - EIS001879 / 0010
The DOE, through their selection of a reduced region of influence, limited their analysis to only the direct impacts of their water withdrawals from a single basin while ignoring documented impacts that occur over a much broader region. Further, the Department ignored other federally prepared reports that detailed the direct, indirect, and cumulative impacts of Department of Defense, Energy, and the Interior actions over the same region. This approach is inconsistent with the CEQ [Council on Environmental Quality] guidance for considering cumulative impact assessment under NEPA [National Environmental Policy Act] and with 40 CFR 1508.25. The methods used in the Draft EIS should be revised to be consistent with CEQ guidance.

The Draft EIS states, with regard to cumulative impacts, that the potential impacts to groundwater would be small and limited to the immediate vicinity of the land disturbances associated with the action and that some minor incremental risk would occur from drinking the groundwater down gradient of the repository at some distant time in the future.

The approach used is inconsistent with statements presented in the Draft EIS. Specifically:

“The general path of water that infiltrates through Yucca Mountain is south toward Lathrop Wells, into and through the area around Death Valley Junction in the lower Amargosa Valley. Natural discharge of groundwater from beneath Yucca Mountain probably occurs farther south at Franklin Lake Playa;” Vol. I, p. 5-23.

“The implementation of the proposed action could potentially affect the water supply in Death Valley National Park, which is down gradient from Yucca Mountain;” Vol. II, Appendix C, page C-9.

The region of influence evaluated for cumulative impacts cannot be smaller than the region over which impacts are expected to occur. Thus, the Department’s approach is inconsistent with the letter and intent of NEPA, CEQ guidance, and other federal documents including the Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada (DOE, 1996) and the Special Nevada Report. The cumulative impacts on water resources will include the direct and indirect impacts of 1) the total radiological burden that will be imposed on Nye County; 2) the impacts of federal land withdrawals on water resource availability; 3) the impacts of federal policies regarding nuclear weapons testing, waste disposal, and environmental protection; and 4) the water resource use and management practices on both private and federal lands in the County.

If the DOE chooses to continue to ignore the local perspective by not evaluating the impacts identified in the Nye County document and by other federal agencies, then it is imperative that Nye County’s perspective be clearly documented in the EIS as an opposing technical viewpoint, as discussed in Section 2.5.3 of the Draft EIS.

Response
In general, the analysis of cumulative impacts in Chapter 8 followed the process recommended in the Council on Environmental Quality’s handbook *Considering Cumulative Effects Under the National Environmental Policy Act* (DIRS 103162-CEQ 1997). This process included the identification, through research and consultations, of Federal, non-Federal, and private actions with possible effects that would be coincident with those of the Proposed Action on resources, ecosystems, and human communities.

Section 4.1.3 of the EIS states that the region of influence for groundwater includes “aquifers under the areas of construction and operations that DOE could use to obtain water, and downstream aquifers that repository use or long-term releases from the repository could affect.” The affected environment for groundwater therefore includes the pathway that groundwater beneath Yucca Mountain would travel, as well as the downgradient aquifers that could be affected by water withdrawals at Yucca Mountain. As indicated in Section 3.1.4.2.1, the primary discharge point for groundwater flowing beneath Yucca Mountain is believed to be Franklin Lake Playa in Alkali Flat, but DOE recognizes that some groundwater reaching this far might bypass this playa and continue on to Death Valley. In addition, the section notes that a small amount of the groundwater that flows beneath the Amargosa Desert might travel through fractures in the relatively impermeable Precambrian rocks at the southeastern end of the Funeral Mountains toward springs in the Furnace Creek Wash area of Death Valley. For the cumulative impacts analysis in Section 8.3.2 of the EIS, areas of groundwater north of Yucca Mountain on the Nevada Test Site were included because these areas could contribute to the cumulative impacts to groundwater. DOE believes that the region of influence considered for the evaluation of cumulative impacts is appropriate.

The second paragraph of the comment identifies two statements from the Draft EIS. The first is that cumulative impacts to groundwater would be small and limited to the immediate vicinity of the repository, and the second is that there would be impacts to downgradient areas at some time in the future. DOE believes that these two comments refer to discussions of short-term and long-term cumulative impacts to groundwater in Sections 8.2 and 8.3 of the EIS, respectively. Similar to Chapter 4, short-term impacts are those associated with the construction, operation and monitoring, and closure of the repository. As in Chapter 5, long-term impacts are those associated with the performance of the repository over thousands of years after closure. The statement that describes short-term impacts as being limited to the immediate area can be found almost verbatim in Section 8.2.3.2.2; however, the sentence immediately following the statement reads, “The exception to this would be the potential impact from water demands on groundwater resources.” DOE acknowledges that impacts to water resources must be considered over a larger area and that they extend to the region of influence described in the preceding paragraph. The evaluation of long-term cumulative groundwater impacts (Section 8.3) is consistent with the methodology described in Chapter 5. That is, impacts associated with groundwater use and consumption are calculated for several different locations at increasing distances along the primary water pathway, as described in the commenter’s quote from Chapter 5. DOE believes that the approaches used to evaluate cumulative impacts are consistent with those used in Chapters 4 and 5.

The comment’s second quote [from Draft EIS Section C.2.13 (Section C.2.1.5 in the Final EIS)] deals with the potential for the Proposed Action to affect the water supply in Death Valley National Park. As described above, the Park is part of the region of influence for groundwater because it is located over “downstream aquifers that repository use or long-term releases from the repository could affect.” Neither Chapter 5 nor the cumulative impacts addressed in Chapter 8 specifically address risks at the Park as a result of groundwater use and consumption. However, it can be clearly seen in the evaluations presented in both chapters that risks would decrease with increased distance from Yucca Mountain. Accordingly, impacts to the Park, because it is far away on the groundwater flow path, would be less than those for the farthest distance specifically discussed in the text.

DOE does not agree with the comment that the region of influence for groundwater, as described here and in the EIS, is smaller than the region over which impacts are expected to occur. DOE believes that the approach used for defining this region of influence is appropriate. The region of influence is consistent with that used for the cumulative impact analysis presented in the Nevada Test Site EIS, which is referenced in the comment. The Nevada Test Site EIS states, “The extent of the region of influence can vary widely from one resource to another. For example, the region of influence for land use generally includes all impacts on land use in a broad region surrounding the area affected by the program alternatives. The region of influence for groundwater would generally be much smaller, encompassing only those groundwater-flow systems that are affected by the program alternatives, and by all past, present, and future action that have or could affect these groundwater-flow systems” (DIRS 101811-DOE 1996).

The Yucca Mountain EIS sets the Death Valley flow system as the groundwater region of influence because all groundwater in this flow system potentially contributes to the aquifers downgradient from Yucca Mountain. The EIS evaluates all past, present, and reasonably foreseeable future actions that might contribute to impacts to this flow system. It does not, however, attempt to address as cumulative actions any Federal or non-Federal actions in the State of Nevada or even Nye County that are not within the Death Valley flow system. A broader scope of analysis might have been appropriate for an effort such as the *Special Nevada Report* (DIRS 153277-SAIC 1991; described in Section 8.2 of the Final EIS), but it is not appropriate for the Yucca Mountain EIS.

Section 8.2.3.2.2 of the EIS describes Nye County's perspective on cumulative impacts with respect to groundwater impacts. This paragraph references *Nye County Perspective: Potential Impacts Associated with the Long-Term Presence of a Nuclear Repository at Yucca Mountain, Nye County Nevada* (DIRS 103099-Buqo 1999). The paragraph states that the county's position is that cumulative impacts should include additive contamination as radionuclides ultimately reached the groundwater, constraints on development of groundwater due to land withdrawal, and reduction of water available for Nye County development because of use by Federal agencies. DOE does not believe that the local perspective has been ignored, but does believe that the scope of the cumulative impacts must be defined as, or limited to, those other past, present, and future actions that could actually be cumulative to those of the Proposed Action. In the case of groundwater, this would mean those other actions that could actually affect the same flow system that would be affected by the Proposed Action.

10 (6000)
<u>Comment</u> - EIS001879 / 0027
p. C-9, Section C.2.13

The Draft EIS states "the implementation of the proposed action could potentially affect the water supply in Death Valley National Park, which is down gradient from Yucca Mountain". As such, the region of influence for the water resources impacts of Yucca Mountain clearly extends to the regional discharge point of the groundwater flow system in which it is located. The EIS section on cumulative impacts should be revised to incorporate the larger area of influence.

<u>Response</u>
Section 4.1.3 of the EIS states that the region of influence for groundwater includes "aquifers under the areas of construction and operations that DOE could use to obtain water, and downstream aquifers that repository use or long-term releases from the repository could affect." The affected environment for groundwater therefore includes the pathway that groundwater beneath Yucca Mountain would travel, as well as the downgradient aquifers that might be affected by water withdrawals at Yucca Mountain. As indicated in Section 3.1.4.2.1, the primary discharge point for groundwater flowing beneath Yucca Mountain is believed to be Alkali Flat (Franklin Lake Playa), but DOE recognizes that some groundwater reaching this far might bypass this playa and continue on to Death Valley. In addition, the section notes that a small amount of the groundwater that flows beneath the Amargosa Desert might travel through fractures in the relatively impermeable Precambrian rocks in the southeastern end of the Funeral Mountains toward springs in the Furnace Creek Wash area of Death Valley. In Chapter 5 and Section 8.3.1, potential impacts are evaluated at several distances from Yucca Mountain. The most distant is the primary discharge point at Alkali Flat. Locations farther away, such as Death Valley, would have decreased impacts. In Chapter 8, groundwater impacts from the Nevada Test Site north of Yucca Mountain are considered because these impacts could be cumulative with impacts from a repository at Yucca Mountain.

10 (6044)
<u>Comment</u> - EIS001898 / 0005
The assessment of cumulative impacts in the DEIS does not fully address the impacts associated with past, present, and reasonably foreseeable future actions relating to groundwater use, land use, and cultural and biological resources.
Basis:

A "cumulative impact" is an impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions (40 CFR 1508.7). A complete cumulative impacts assessment would provide an understanding of whether the Proposed Action might push a resource, ecosystem, or human community beyond a critical threshold and preclude sustainability (CEQ, 1997, page 7). Therefore, the FEIS should assess the additional, incremental impacts from the action at hand when added to impacts from past, present, and reasonably foreseeable future actions (40 CFR 1508.7).

Section 4.1.3 (Environmental Consequences of Repository Construction, Operation and Monitoring, and Closure - Impact to Hydrology) acknowledges that repository construction and operation will impose water demands on the available supplies at Yucca Mountain and the surrounding area. Similarly, Section 6.3.2.1 (Impacts Common to Nevada Branch Rail Line Implementing Alternatives) acknowledges that water withdrawal will be required to support construction of a branch rail line. These demands could create impacts on water resources, particularly in light of other possible future uses. Creation of a Timbisha Shoshone Tribal Homeland with agricultural water rights is a reasonably foreseeable action that could contribute to exceeding the sustainable yield in the Death Valley National Park region (Buqo, 1999, p. 25). Further, it is foreseeable that the continued growth of Clark, Nye, and Lincoln Counties and Las Vegas, Pahrump, and Beatty will impact available groundwater resources. An increased cumulative demand for water, particularly when coupled with reduced water supplies resulting from land withdrawal and Federal land acquisition, could lead to aquifer overdrafting, increased pumping costs, and associated socioeconomic impacts. The cumulative impacts on groundwater resources stemming from the Proposed Action and these other actions are not adequately considered in the DEIS.

The cumulative impacts assessment also needs to further evaluate combined impacts to other specific resources (e.g., the desert tortoise, land use, cultural resources). The cumulative impacts of a Proposed Action, coupled with other Federal actions in the area [e.g., activities at NTS (the Nevada Test Site), Nellis Air Force Range (AFR)] and impacts from extensive growth in Nye, Lincoln, and Clark Counties, on the ranges and habitats of local fauna, such as the desert tortoise, should be documented. In addition, land withdrawal by DOE in conjunction with Department of Interior limitations on land use in Ash Meadows may result in cumulative impacts related to land use that have not yet been fully assessed. Similarly, the impact that private projects such as the Cortez Gold Mine Pipeline projects and the Apex Bulk Commodities Intermodal Transfer Station have on resources (e.g., biological and cultural resources) may not have been fully considered.

Recommendation:

DOE should complete its analysis of cumulative impacts for resources, ecosystems, and human communities by augmenting analyses already performed for individual components for the proposal. The analysis should consider all past, present, and reasonably foreseeable future actions, both Federal and non-Federal, within appropriate spatial and temporal boundaries.

References:

Buqo, T.S. *Nye County Perspective: Potential Impacts Associated with Long Term Presence of a Nuclear Depository at Yucca Mountain, Nye County, Nevada*. June 1999.

Council on Environmental Quality, *Considering Cumulative Effects Under the National Environmental Policy Act*, CEQ, January 1997.

Response

Since the issuance of the Draft EIS, the Department has continued to evaluate actions in the region of influence that could pose a potential cumulative impact. As a result of these reviews, the Department identified several new actions for which information was not available for the Draft EIS. These actions come from several agencies and private companies. For instance, Section 8.1.2.2 of the Final EIS contains an expanded discussion of the Timbisha Shoshone Homeland Act, along with possible implications to groundwater rights. Chapter 8 also contains discussions of other actions by the Bureau of Land Management (e.g., the Ivanpah Cargo Airport, the Moapa Paiute Energy Center); these actions were considered when evaluating the cumulative impacts for the technical discipline areas.

As part of the updated analyses, the Department has expanded the land-use discussion in Chapter 8 to address specifically the known actions that have been identified since the publication of the Draft EIS. Where possible, the Department has identified changes in land use along with estimates of area to be disturbed and possible impacts with other actions in the area. In addition, all discipline areas (for example, biological resources and cultural resources) were reviewed to ensure that the appropriate level of discussion was included to address the potential cumulative impacts of all the actions. However, not all actions could be evaluated to the same level of detail because information was not always available to allow an in-depth evaluation.

10 (6159)
Comment - EIS001654 / 0030
Page S-59. Cumulative Impacts

We support the inclusion of additional analyses relating to cumulative impacts of the Nevada Test Site and other activities affecting the same region as the repository. That is how it must seem to many long-time community residents who have been "living with" the impacts of those other activities. Conducting such analyses and providing them to the community would show an appropriate effort to see things from their perspective rather than "having the blinders on" by looking only at the repository impacts.

We are less certain that it is appropriate to consider emplacement of additional waste beyond the NWPA [Nuclear Waste Policy Act] established maximum quantity of 70,000 tons (Inventory Modules 1 and 2.) We realize that the quantity of material to be disposed may grow to those levels, but there are many uncertainties associated with how and where that will be disposed. While it is a potential additional quantity to be brought to Yucca Mountain it may not be a real-world possibility. It seems speculative to conduct such an analysis for this document.

Response
Since the issuance of the Draft EIS, the Department has continued to evaluate actions in the region of influence that could pose a potential cumulative impact. As a result of these reviews, the Department identified several new actions for which information was not available for the Draft EIS. These actions come from several agencies and private companies.

The consideration in Section 8.2 of additional volumes of nuclear waste beyond that authorized in the Nuclear Waste Policy Act (Inventory Modules 1 and 2) does not presume that disposal of this additional waste in the repository would be approved by Congress. Comments that DOE received from the public during the scoping process for this EIS expressed the concern that more spent nuclear fuel and high-level radioactive waste would be generated than the 70,000 metric tons of heavy metal accounted for in the Proposed Action. DOE acknowledges that the emplacement of Inventory Module 1 or 2 at Yucca Mountain would require legislative action by Congress unless a second repository was in operation.

10 (6575)
Comment - EIS001632 / 0060
Page 8-27, Section 8.2.2.1.2: This section refers to 40 CFR Part 61 which contains EPA's [Environmental Protection Agency's] Clean Air Act regulations for radiological effluents from a variety of facilities; however, this rule is not applicable to Yucca Mountain. More appropriate references are 40 CFR Part 191, Subpart A (Environmental Standards for Management and Storage, 50 *FR* 38066, September 19, 1985) or proposed 40 CFR Part 197, Subpart A (Environmental Standards for Storage), both of which address airborne radiological releases and external exposures from Yucca Mountain during the operational period.

Response
DOE referenced 40 CFR Part 61 primarily because it provided a direct comparison to an air quality emission standard. Since publication of the Draft EIS, the Environmental Protection Agency promulgated *Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada,* at 40 CFR Part 197, which included an annual dose limit to a member of the public of 15 millirem (40 CFR 197.4). In accordance with requirements of the Energy Policy Act, the Nuclear Regulatory Commission subsequently promulgated Yucca Mountain licensing criteria, which includes a Preclosure Public Health and Environmental Standard at 10 CFR 63.204 of 15 millirem per year to a member of the public. The appropriate sections of the EIS (including those mentioned in Chapter 8) have been updated to reflect a comparison to the recently promulgated standard of 15 millirem.

10 (6578)
Comment - EIS001632 / 0061
Page 8-47, Table 8-22: This table and several other tables in section 8 list "MEI [maximally exposed individual] dose (millirem)", but do not indicate whether this dose occurs in one year or over the total closure period. Some of the doses are rather large compared to established radioactive waste standards, such as the 58 millirem listed for the MEI dose for Inventory Module 1 or 2. To properly judge the impact, the exposure period must be specified.

Response
The maximally exposed individual dose values in Table 8-22 of the Draft EIS are the integrated doses over the period of closure; six years each for the high and intermediate thermal-load scenarios and 15 years for the low thermal-load scenario. In Table 8-28 of the Final EIS (the table that corresponds to Table 8-22 of the Draft EIS), the closure period for the Inventory Modules ranges from 12 to 23 years for the higher-temperature and lower-temperature repository operating modes.

10 (6580)
Comment - EIS001632 / 0062
Page 8-66, Table 8-46: For Inventory Module 1, the gross alpha concentration is missing.

Response
The Department has revised the table to include the information on gross alpha concentration in Table 8-49 of the Final EIS.

10 (6581)
Comment - EIS001632 / 0063
Page 8-74, Item 7 and the final paragraph: This item, Greater Confinement Disposal (GCD), does not indicate that there is transuranic radioactive (TRU) waste at the Nevada Test Site, in addition to low-level radioactive waste (LLW). The final EIS should so note since the TRU waste has a greater potential for adding to the impact from Yucca Mountain than does the LLW.

Response
As indicated in Section 8.3.2.1, information on Greater Confinement Disposal on the Nevada Test Site is from the *Final Environmental Statement on the Nevada Test Site and Off-Site Locations in the State of Nevada* (DIRS 101811-DOE 1996). DOE included the description as it appears in the Nevada Test Site Final EIS, but DOE did not base its analysis on this description. Rather, the Department relied on the analyses in the Nevada Test Site EIS for input to Chapter 8. The Department acknowledges, however, that transuranic radionuclides are a part of the category of Greater Confinement Disposal, with americium isotopes as one example. The discussion in Section 8.3.2.1 of the Final EIS includes the presence of transuranic radionuclides in this category.

10 (6583)
Comment - EIS001632 / 0064
Page 8-75, Table 8-55: Out of the 9.3 million curies in GCD [Greater Confinement Disposal], tritium and americium are the only ones identified as "major or known isotopes." DOE needs to state the basis for determining a "major isotope."

Response
As indicated in Section 8.3.2.1, information on Greater Confinement Disposal on the Nevada Test Site is from the *Final Environmental Impact Statement on the Nevada Test Site and Off-Site Locations in the State of Nevada* (DIRS 101811-DOE 1996). The designation of "major known isotopes or wastes" is intended only to give the reader a broad sense of what would be included in the appropriate waste category and does not affect the analysis in this EIS. The Department relied on the analyses in the Nevada Test Site EIS for input to Chapter 8. As a consequence, DOE did not repeat the detailed composition of the radioactivity at the Nevada Test Site in this chapter.

A footnote to Table 8-53 in the Final EIS clarifies that the table is intended for information purposes only.

10 (6585)
Comment - EIS001632 / 0065
Page 8-77, Section 8.3.2.1.2: This section assumes that the risk of radiological impacts is directly scalable to the radiological content of the waste disposed in the GCD [Greater Confinement Disposal] facility. However, the GCD wastes are disposed in a different manner than that contemplated for the Yucca Mountain repository (namely, closer to ground surface) and the source term likely contains a different mixture of radionuclides than anticipated for disposal at Yucca Mountain; therefore, relating the risk of GCD disposal to its inventory is overly simplistic and should be re-examined.

Response
In response to this comment, DOE has reexamined the discussion of waste subject to Greater Confinement Disposal and has modified Section 8.3.2.1.2 of the EIS to indicate that there is no credible mechanism for the long-term release of materials from the Greater Confinement Disposal to the accessible environment.

The material subject to Greater Confinement Disposal is placed in boreholes that are approximately 37 meters (120 feet) deep; the waste itself is no closer than approximately 21 meters (70 feet) to the surface. DOE has reviewed previous analyses at the Nevada Test Site and has concluded that there is no credible pathway for long-term release of materials by resuspension of nonvolatile radionuclides because the material is sufficiently far below the surface. In addition, evapotranspiration exceeds precipitation in this region and this, coupled with the fact that the boreholes are sufficiently above the water table, indicates that there is no credible scenario for the Greater Confinement Disposal material to enter the groundwater.

10 (6727)
Comment - EIS001878 / 0078
Analysis of shared rail use inadequate. The analysis of the impacts of shared public/private use of DOE branch rail lines is inadequate. (pp. 8-4, -15) The analysis properly belongs in Chapter 6, Transportation Impacts. The statement that predicting increases in rail traffic from shared use would be difficult and, therefore, is not done is unacceptable. The DEIS says there will be impacts, and they must be analyzed, disclosed, and mitigated as necessary. (p. 8-87)

Analysis of impacts on public services inadequate. The DEIS does not adequately address cumulative impacts on emergency response services. The DEIS says that cumulative operations impacts would result because of the extra 14 years of shipping required for Modules 1 or 2 (p. 8-85), but that the DOE expects no cumulative socioeconomic impacts. This conclusion is contradictory and improbable since state, local, and tribal government emergency services would continue to be impacted.

Reasonably foreseeable related actions not disclosed. The DEIS fails to disclose a proposal under consideration by the Nuclear Regulatory Commission to construct an independent spent fuel storage installation at the Skull Valley Indian Reservation in Tooele County, Utah, as described in the *Federal Register* on February 9, 2000. The DOE knew, or should have known, that this project, if approved, would add to the cumulative environmental impacts of the proposed action. Eureka County is especially concerned about this proposal due to its immediate proximity to Nevada and the potential for increased transportation-related impacts on Eureka County and neighboring counties from shipments of SNF [spent nuclear fuel] and HLW [high-level radioactive waste] to and from Tooele County.

The DEIS also fails to disclose the cumulative impacts on Nevada from the proposed action and the Fallon Range Training Complex Requirements, NAS [Naval Air Station] Fallon, as described in the FEIS prepared for that project by the Navy and the BLM [Bureau of Land Management] (January 2000). For example, the DEIS does not disclose that the proposed Carlin corridor would pass through an area at the north end of Big Smoky Valley, southeast of Austin, NV, where the Navy plans to install up to five fixed or mobile electronic warfare sites and a tracking instrumentation subsystem site. Nor does the DEIS disclose that staging areas for training aircraft and enemy aircraft, and air-to-air/electronic warfare training areas associated with NAS Fallon are presently located over portions of the proposed Carlin corridor. (See Exhibit K.) The DOE knew, or should have known, that activities associated with NAS Fallon would add to the cumulative environmental impacts of the proposed action.

Other comments. The failure of Congress to ratify the Nuclear Test Ban Treaty makes the future resumption of nuclear weapons tests more likely. (pp. 8-3, -11, -12) The statement that interim storage was not analyzed for cumulative impacts because it is uncertain is inappropriate; it is reasonably foreseeable and must be included. (p. 8-5) The inadequacies of the air pollution analysis are similar to those in Chapter 4: the discussion is vague and the conclusions unsupported by the evidence, particularly the statement that there will be no effect on the Las Vegas Valley air basin. (pp. 8-24 to 8-30) The statement that the final EIS will review new information from the Pipeline Southeast Expansion Project for cumulative impacts is unacceptable, since the public will not have the opportunity to comment (p. 8-85).

Response
In the case of shared use of a branch rail line in Nevada, the Department believes that the rail line would have benefits for nearby industries and communities in Nevada, as discussed in Section 8.1.2.3 of the EIS. Sharing of the

rail line is, however, speculative at this point, and including these rail lines in the cumulative impact analyses could result in a misrepresentation of those impacts.

With regard to public services, the continuation of operations for an additional 14 years is not expected to result in an increase or decrease in emergency response services. Because the status quo would be expected to be maintained, the Department does not expect socioeconomic impacts to occur. Since issuing the Draft EIS, the Department has reviewed several activities that have become better defined. For example, a discussion of the Private Fuel Storage facility at the Skull Valley Reservation has been added to Chapter 8 of the Final EIS. Other projects/facilities were reviewed but were not included if cumulative impacts were unlikely.

Since 1992, there has been a moratorium on nuclear testing. Even though the Nevada Test Site must maintain the ability to resume testing, the Department does not believe that a resumption of testing is a reasonably foreseeable action. Therefore, it was not included in the analyses in Chapter 8 of the EIS. Nevertheless, a recent evaluation of impacts from a resumption of underground testing at the Nevada Test Site (DIRS 103273-Walck 1996) concluded that the only impact such testing would pose on the repository would be ground motion from the energy released by the detonations. DOE has determined that such effects would not exceed the seismic design criteria for the repository. In other words, the design-basis earthquake for the repository would generate stronger ground motions than would underground nuclear detonations on the Nevada Test Site. Because DOE has designed the repository to survive the design-basis earthquake with minimal damage, ground motion from the resumption of underground testing would be unlikely to result in substantial damage to the surface or underground facilities at Yucca Mountain.

The analysis of air impacts used the best available data. Standard analytical techniques were used to obtain a reasonable estimate of air concentrations and consequent impacts. With no further detail from the commenter, addressing specific concerns about the analysis is not possible.

10 (7115)
Comment - EIS001106 / 0010
Section 8.2.4, page 8-36, on Biological Resources is deficient in two major respects. First, an ecosystem approach was not adopted for the DEIS, and second, thermal loading impacts are not factored into the cumulative effects. Section 8.4.2.4, page 8-89, on Biological Resources and Soils concerning transportation impacts in Nevada appears to address only the intermodal transfer stations and not the routes to be followed through the state. For these various reasons, the section is inadequate. Guidance such as that provided by Clark and Cantor (1977) should have been followed for this section to supplement CEQ’s 1997, “Considering Cumulative Effects Under the NEPA.”

Response
DOE did not adopt an ecosystem approach for biological analysis in this EIS. An “ecosystem” approach is one method for analyzing potential impacts on biological resources. DOE discusses its evaluation of the ecosystem approach and its reasons for choosing other analytical tools in Section 3.1.5 of the EIS.

The EIS analysis describes the affected environment and potential impacts to the regional ecosystems surrounding Yucca Mountain in Sections 3.1.5.1 and 4.1.4 of the EIS, respectively. The assessment of cumulative biological impacts in Sections 8.2.4 and 8.4.2.4 considered resource management plans and other planning documents for the region, not just the immediate ecosystem surrounding Yucca Mountain. This assessment included the regional ecosystems affected by the other major actions described in Section 8.1. The transportation analysis relied on earlier analyses in National Environmental Policy Act documents and on new analyses specific to this EIS. Appendix J discusses the analysis methods.

10 (7123)
Comment - EIS001106 / 0015
There has been no effort on the DOE’s part to integrate environmental documentation for the YMP [Yucca Mountain Project] with other anticipated or ongoing federal activities. In this context, the DOE should address relationships between short-term uses of environmental resources and long-term productivity into the future.

Response
Chapter 8 of the EIS analyzes a range of past, present, and reasonably foreseeable future actions that, along with the repository, could contribute to cumulative impacts. In preparing this chapter, DOE reviewed many documents to

determine where there was potential for cumulative impacts. These documents included resource plans, EISs, environmental assessments, tribal meeting records, and other documents prepared by Federal, local, and private organizations. Section 10.2 addresses the relationship between short-term uses of the environment and long-term environmental productivity.

10 (7152)

Comment - EIS001337 / 0049

In comments to the scope of the EIS, Lincoln County and the City of Caliente urged DOE to consider the cumulative effects which may result from the incremental impact of the proposed action and alternatives thereto when added to other past, present, and reasonably foreseeable future actions. Of particular concern to the County and City was the cumulative effects of exposure to various source terms for radiation within the region. As a component to their comments, the County and City referenced research they had sponsored which determined that consideration of cumulative exposures to radiation is a scientifically defensible undertaking.(14) The County and City recommended that the repository EIS consider the cumulative exposure risk associated with previous DOE weapons testing activities, on-going DOE weapons activities, on-going DOE low-level radioactive waste (LLRW) management activities, potential future LLRW management activities at NTS [Nevada Test Site], potential LLRW transportation activities through Lincoln County, proposed high-level waste transport and disposal in Nevada, and natural and other human-induced sources of background radiation. While the DEIS provides a generic assessment of cumulative risks, the analysis is not transportation corridor, county, or community specific. As a consequence, the assessment of cumulative risk is not useful in discriminating between routing alternatives. Nor does the analysis prove useful in determining where and in what manner risks might best be mitigated.

Consistent with requirements of NEPA [National Environmental Policy Act], the County and City recommended that the repository EIS consider how construction and operation of repository system components within Lincoln County will conflict with existing federal, state and local land use plans, policies, or controls. In particular, the County and City felt that conflicts with the Lincoln County Masterplan and the City of Caliente Masterplan should be evaluated. The DEIS does not consider conflicts with plans developed by Lincoln County or the City of Caliente.

(14) Goble, Robert, Perspectives on Risks from the Nevada Test Site: Feasibility and Methods for Assessing Cumulative Radiological Exposure Risks Associated with Department of Energy Activities at the Nevada Test Site, Center for Technology, Environment and Development of the George Perkins Marsh Institute on the Human Dimensions of Global Environmental Change, Clark University, Worcester, MA. June 1994.

Response

Consistent with Council on Environmental Quality regulations (40 CFR 1508.7), DOE considered past, present, and reasonably foreseeable actions in its assessment of cumulative impacts and has reviewed a number of current and proposed actions to determine relevance. The expression “reasonably foreseeable” refers to future actions for which there is reasonable expectation that the action could occur, such as a proposed action under analysis, a project that has already started, or a future action that has obligated funding.

DOE structured the cumulative impact assessments presented in Chapter 8 of the EIS by identifying actions the effects of which could coincide in time and space with the effects from the proposed repository and associated transportation activities. The actions evaluated in Chapter 8 include some of those recommended by the commenter such as previous underground testing at the Nevada Test Site, low-level radioactive waste disposal at the Nevada Test Site and Beatty, and high-level radioactive waste shipments in Nevada.

The identification of the relevant actions was based on reviews of resource, policy, development, and land-use plans prepared by agencies at all levels of government and from private organizations, other environmental impact statements, environmental assessments, and Native American tribal meeting records. Pursuant to Council on Environmental Quality regulations at 40 CFR 1502.16(c) and 1506.2, in addition to the assessment of potential environmental impacts, the potential conflicts with plans issued by various governmental entities were considered to the extent they provided relevant information. Of particular interest to the commenter, DOE reviewed and considered a number of documents submitted by or prepared for Lincoln County and communities within Lincoln County. Two of the documents reviewed were the City of Caliente Master Plan (prepared by Intertech Consultants and Sweetwater Consulting Services in 1990) and the Alamo Land Use Plan (prepared by Sweetwater Consulting Services and R.O. Anderson Engineering in 1992). While the Alamo plan deals primarily with zoning issues for the town, the Caliente plan discusses actions for dealing with potential population growth generated by the construction and operation of a repository at Yucca Mountain. The document generally expresses a need to annex lands that are contiguous to and south of the city within Meadow Valley Wash. The Caliente intermodal transfer station would be in Meadow Valley Wash (see Figure 6-17 of the EIS). The commenter is also referred to Sections 6.3.2 and 6.3.3 of the EIS, which provide estimates of changes in population and other economic measures for each relevant implementing alternative. The transportation analysis in the Final EIS includes a sensitivity analysis that assigns all potential impacts to Caliente. The analysis conservatively estimates the potential transportation actions on a community level. However, definitive information is not available on specific tracts of land that could be required for a specific transportation mode or route. Once DOE selected a transportation mode and specific transportation corridor, more definitive information would be developed on potential conflicts with land uses and various agency plans and policies and ultimately the mitigation measures that could resolve conflicts and impacts on a given area.

DOE agrees with the commenter that the cumulative impacts of radiological exposures can be scientifically based. Section 3.1.8.2 of the EIS estimates the annual radiation dose to a hypothetical individual in Springdale, Nevada, from airborne radioactive materials from past nuclear weapons testing at the Nevada Test Site, and indicates that DOE had made quantitative estimates of the offsite doses from releases from past weapons testing at the Nevada Test Site (DIRS 146592-Black and Townsend 1998). Section 6.3 of the EIS describes the potential impacts of each transportation alternative in Nevada, including estimates of impacts to health and safety in Nevada from incident-free waste transport to Yucca Mountain and from transportation accidents, as well as regional socioeconomic impacts to potentially affected counties (see Figures 6-5 through 6-8).

Section 8.4 of the EIS analyzes potential cumulative impacts in Nevada from the Proposed Action and other past, present, and reasonably foreseeable future actions by Federal agencies and private groups. The analyses include transportation impacts from the Expanded Use Alternative (Alternative 3) for the Nevada Test Site. This alternative includes the shipment of low-level radioactive waste to the Nevada Test Site from offsite locations [based on the *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DIRS 101811-DOE 1996)]. Section 8.2.12.2 of the Yucca Mountain EIS discusses the cumulative impacts from storage of low-level waste and includes as a reasonably foreseeable action of the potential that the Nevada Test Site would be selected as a regional DOE low-level waste disposal site. Table 8-58 of the EIS summarizes cumulative transportation-related radiological impacts from the Proposed Action, Inventory Modules 1 and 2, and other Federal, non-Federal, and private actions nationwide from 1943 to 2047. The table lists potential impacts from past, current, and projected Federal waste transport activities, including shipments of low-level waste to the Nevada Test Site, shipments of transuranic waste to the Waste Isolation Pilot Plant in New Mexico, and shipments of spent nuclear fuel and high-level radioactive waste to various storage and disposal sites throughout the Nation. In response to public comments, Appendix J of the EIS now contains maps showing routes used in analyzing impacts and provides estimates of radiological and nonradiological impacts for each state. This is in addition to the route maps that were included in the Draft EIS (see Section 2.1.3.2 of the EIS for national routes and Section 2.1.3.3 for Nevada maps). Based on this information, DOE has concluded that the cumulative impacts of future transportation activities, past nuclear-weapons testing, and other Federal and private programs involving transportation of radioactive materials in the State of Nevada would be small.

10 (7362)
Comment - EIS001106 / 0029
The Yucca Mountain DEIS is deficient in terms of best professional practice for EIA [environmental impact assessment] because natural ecosystem and landscape boundaries were not adopted. Programs as important as the YMP [Yucca Mountain Project] is in terms of long-lived contaminants and future human generations require regional planning and execution in the context of ecosystems and regional landscape boundaries. Otherwise, long-term and cumulative impacts cannot be addressed adequately. In terms of holistic environmental quality and EIA, the YMP DEIS is deficient as a NEPA [National Environmental Policy Act] document.

Response
The EIS considered the regional ecosystems surrounding Yucca Mountain based on resource management plans and other planning documents for the region (see Sections 3.1.5.1 and 4.1.4). The assessment of cumulative impacts in Chapter 8 considered not only the immediate ecosystem surrounding the proposed repository, but also the regional ecosystems affected by the other major actions described in Section 8.1.

10 (7369)

Comment - EIS001106 / 0032

In programs such as the YMP [Yucca Mountain Project] it is necessary that potential conflicts between future projects be addressed in a reasonably foreseeable manner. The Yucca Mountain region in particular is susceptible to such long-term impacts that have to be addressed in a context of ecosystem management. Such is among the intents of the existing Five-Party Cooperative Agreement for the region that the DOE has refused to adopt for the YMP.

Response

The five-party Cooperative Agreement coordinates and enhances management of natural resources in the Great Basin and Mojave Desert ecosystems on the Nellis Air Force Range, Desert National Wildlife Range, and the Nevada Test Site. The five agencies are DOE's Nevada Operations Office (operator of the Nevada Test Site), the U.S. Air Force (operator of the Nellis Air Force Base), the Bureau of Land Management's Las Vegas Field Office, the U.S. Fish and Wildlife Service, and the State of Nevada.

DOE agrees that it is important to interact with other agencies to minimize conflicting programs or actions. Appendix C of the EIS describes DOE's agency interactions. One of the purposes of these interactions is to discuss issues of concern with organizations that have an interest in or authority over land that repository-related actions could affect or with some other interest the Yucca Mountain Project could affect. In addition, DOE has solicited and documented input from stakeholder groups through the EIS scoping process, comments on the Draft EIS, and other means. These interactions are described in the *Summary of Public Scoping Comments Related to the Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nevada* (DIRS 104630-YMP 1997) and in this Comment-Response Document.

Chapter 8 of the EIS estimates the potential cumulative impacts associated with various agency actions in the defined region of influence. The actions identified were based on documents issued by, and discussions with, DOE's Nevada Test Site, the U.S. Air Force, the Bureau of Land Management, the U.S. Fish and Wildlife Service, and the State of Nevada. The documents include resource management plans, EISs, environmental assessments, strategic plans, consultation documents, and tribal meeting records.

If the repository was recommended and approved for development, DOE would consider including the Yucca Mountain Project in the Cooperative Agreement, and would reevaluate the need for a site-specific land-use plan to ensure compliance with all applicable requirements. That plan, based on the principles of ecosystem management and sustainable development, would formally synthesize the Yucca Mountain Project policies and procedures already in place; draw on the successes of the Resource Management Plan for the Nevada Test Site; and solicit input from Federal and State agencies, stakeholders, and the general public.

10 (7374)

Comment - EIS001106 / 0035

The intent of NEPA [National Environmental Policy Act] is that contributions to global environmental problems be avoided. Global environmental "commons" such as the atmosphere applies to the YMP [Yucca Mountain Project] in the context of radioactivity and must be addressed by competent EIA [environmental impact assessment] in the DEIS. This in particular is an issue regarding future cumulative impacts and future generations.

Response

The repository EIS does not report global adverse impacts because such impacts would be negligible. As stated by the National Academy of Sciences "..the most likely pathway for global distribution are gaseous releases of carbon dioxide containing the radioactive isotope of carbon-14, that eventually will escape from the waste containers, or by widespread distribution of foodstuffs grown with contaminated water." However, the Academy stated, "In general, the risks of radiation produced by such wide dispersion are likely to be several orders of magnitude below those to a critical group." For example, the Academy estimated that the average dose to members of the global population, based on the release of 91,000 curies of carbon-14, is 0.0003 millirem per year, and equated that to an annual risk of fatal cancer of 1.5 in 10 billion (DIRS 100018-National Research Council 1995). For comparison, the individual dose standard set by the Environmental Protection Agency in 40 CFR Part 197 of 15 millirem per year for the maximally exposed individual is 50,000 times that dose.

Because of large uncertainties, DOE considers estimates of global health effects to be highly speculative and, therefore, did not estimate global collective doses or health effects in the EIS. However, DOE agrees with the Environmental Protection Agency (64 *FR* 46976, August 27, 1999) and the National Council on Radiation Protection and Measurements (DIRS 101858-NCRP 1995) that optimizing the protectiveness of design alternatives merits the estimation of population doses. The Department believes it can obtain information important to design optimization by estimating collective dose to the regional populations within 80 kilometers (50 miles) of the repository, thereby precluding the need to perform the more speculative global health risk calculations. For these reasons, the EIS evaluated in detail potential radiological exposures to the maximally exposed individual and regional populations (80 kilometers) from both groundwater and atmospheric pathways. Sections 5.4 and 5.5 of the EIS describe the results of these evaluations for waterborne and atmospheric releases, respectively.

10 (7413)
Comment - EIS001912 / 0008
The DEIS does not consider the impact of underground weapons testing on regional groundwater resources. Additionally, the impact assessment does not consider the collective impact of all actions added together. Instead the analysis only looks at the proposed action added to a single cumulative action. The approach taken in the DEIS is inconsistent with the Council on Environmental Quality regulations.

Response
Section 3.1.8 of the Final EIS discusses estimates of radiation doses to individuals from past weapons testing on the Nevada Test Site. DOE has included this information in Sections 8.2.2.2.2 and 8.2.4.7 as contributing to short-term cumulative radiological impacts. Sections 8.2.2.2.2 and 8.2.4.7 now include information on radiation exposure from past nuclear weapons testing, and Section 8.3 includes updated estimates of future impacts to groundwater and air resources from activities on the Nevada Test Site. Section 8.2.4.7 incorporates the human health impacts from transportation discussed in Section 8.4. In addition, DOE has revised Chapter 8 to present the information more clearly and to clarify that it did consider the cumulative effects of all actions taken together.

In addition to the foregoing, the assessment of impacts of past nuclear weapons testing is part of an ongoing effort by several organizations, including the National Cancer Institute and the Centers for Disease Control. Readers interested in further information about the effects of past testing of nuclear weapons should refer to the *National Cancer Institute Study Estimating Thyroid Doses of I-131 Received by Americans From Nevada Atmospheric Nuclear Bomb Tests* (DIRS 152469-Institute of Medicine and National Research Council 1999).

10 (7443)
Comment - EIS001969 / 0004
Cumulative environmental effects from the future operation of the Yucca Mountain repository and past activities at the NTS [Nevada Test Site] are also of concern. Possible impacts to groundwater and spring discharges resulting from activities at NTS, approximately 25 miles north of Ash Meadows NWR [National Wildlife Refuge], are being evaluated by DOE, the Service and the U.S. Geological Survey (USGS). Activities at the NTS which may have resulted in contamination of the region include both atmospheric and subterranean tests of nuclear devices and other tests involving radioactive materials, controlled atmospheric releases of numerous gaseous materials, and disposal and destruction of various types of solid and liquid wastes. The extent to which these activities have placed wildlife resources at risk is still under investigation. DOE’s Environmental Management Program is focused on identifying the nature and extent of contamination from the nuclear weapons programs at DOE facilities. This process is underway at the NTS with ongoing environmental restoration and waste management activities.

Response
This comment accurately summarizes some of the issues involving the potential cumulative impacts associated with the Proposed Action and some of the ongoing evaluations being conducted by the Department and other agencies, including the U.S. Fish and Wildlife Service. In preparing Chapter 8 of the EIS, the Department reviewed many past, present, and reasonably foreseeable future actions to determine where there was potential for cumulative impacts. Chapter 8 of the EIS describes both the short-term and long-term impacts of the proposed repository, along with transportation and manufacturing cumulative impacts.

10 (7582)
Comment - EIS001909 / 0004
Section 8.1.2.1

"Inventory Modules 1 and 2 represent the reasonably foreseeable future actions of disposing of all projected commercial and DOE spent nuclear fuel and all high-level radioactive waste as well as Greater-Than-Class-C waste and Special-Performance-Assessment-Required waste in the proposed repository (see Figure 8-1)."

The DEIS fails to account for the cumulative impacts of HLW [high-level radioactive waste] and DOE SNF [spent nuclear fuel] depicted in Inventory Module 1 and Inventory Module 2 (Figure 8-1) which are not disposed of in the proposed Yucca Mountain repository. These cumulative impacts should be addressed in the DEIS.

Response
The EIS analyzes a Proposed Action to construct, operate and monitor, and eventually close a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain. The cumulative impacts are limited to those that would overlap in space and time with impacts from the repository. Therefore, the impacts of materials not disposed of at Yucca Mountain would not contribute to the cumulative impacts of the repository. For the No-Action Alternative, DOE evaluated the impacts of retaining spent nuclear fuel and high-level radioactive waste at existing sites or at sites where Records of Decision would move these materials. For example, in the Record of Decision for the *Final Supplemental Environmental Impact Statement, Defense Waste Processing Facility* (60 *FR* 18589, April 12, 1995), DOE decided to complete construction and operate the Defense Waste Processing Facility at the Savannah River Site to pretreat, immobilize, and store high-level radioactive waste. Similarly, the preferred alternative of the *Hanford Site Final Environmental Impact Statement for the Tank Waste Remediation System* (DIRS 103214-DOE 1996) was to vitrify high-level radioactive waste and store it onsite until final disposition in a geologic repository. In the Record of Decision (60 *FR* 28680, June 1, 1995) for the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement*, DOE decided to keep production reactor fuel at the Hanford Site, consolidate aluminum-clad fuel at the Savannah River Site, and transfer non-aluminum-clad fuels (including spent nuclear fuel from the Fort St. Vrain reactor and naval spent nuclear fuel) to the Idaho National Engineering and Environmental Laboratory.

DOE will continue to make decisions on the types and quantities of materials it will move, as well as the timing of these activities, in programmatic documents. The EISs on these actions contain evaluations of impacts related to these decisions.

10 (7594)
Comment - EIS001912 / 0072
The cumulative impact analysis considers a repository with much higher volumes of waste. This scenario should be included in Chapter 5 and not the cumulative impact section. Congress did limit the amount of waste which could be stored in the repository. However, by including a high waste volume scenario in the cumulative impact section assumes that laws will be changed to accommodate a greater amount of waste. If such an assumption is made for the cumulative impact analysis why couldn't it be made for the proposed action? Furthermore, an EIS can consider other alternatives not specifically authorized by Congress.

Response
The Proposed Action described in this EIS considers a volume of spent nuclear fuel and high-level radioactive waste (70,000 MTHM) that could be disposed of in accordance with the NWPA.

The analysis of cumulative impacts must include past, present, and reasonably foreseeable future actions. Future actions include reasonably foreseeable actions, even though these actions are not certain to occur. After considering public scoping comments, the Department determined that the disposal of additional, compatible wastes in the repository to be reasonably foreseeable and has considered the impacts of this action in Chapter 8.

The consideration in Section 8.2 of additional volumes of nuclear waste beyond that authorized in the Nuclear Waste Policy Act (Inventory Modules 1 and 2) does not presume that disposal of this additional waste in the repository would be approved by Congress. Comments that DOE received from the public during the scoping process for this EIS expressed the concern that more spent nuclear fuel and high-level radioactive waste would be generated than the 70,000 metric tons of heavy metal accounted for in the Proposed Action. DOE acknowledges that the emplacement of Inventory Module 1 or 2 at Yucca Mountain would require legislative action by Congress unless a second repository was in operation.

10 (7629)
Comment - EIS001912 / 0104
The cumulative analysis must assume loss of institutional control to be parallel with the analysis in the no-action alternative.

Response
The institutional control assumptions in the cumulative impact evaluation are essentially the same as those for the impact evaluations of the Proposed Action and the No-Action Alternative. Scenario 1 of the No-Action Alternative includes an analysis of impacts under effective institutional control for at least 10,000 years and is consistent with the portion of the analysis of the Proposed Action that includes an analysis of effective institutional control for the first 100 years after closure. The Scenario 2 analysis of the No-Action Alternative does not consider effective institutional control after approximately 100 years and is parallel to the portion of the Proposed Action analysis in which long-term performance after 100 years also does not include institutional control. The cumulative impact analyses for Modules 1 and 2 used these same assumptions (see Chapter 8 of the EIS).

In the evaluation of cumulative impacts from other Federal, non-Federal, and private actions, such as underground testing at the Nevada Test Site and low-level radioactive waste disposal at the Nevada Test Site and Beatty, assumptions related to the loss of institutional control were based on the best available information. For these actions, in general, credit was not taken for future institutional controls past the point in time when remediation activities would be complete. In all cases identified, planned remediation actions would be complete within 100 years.

10 (7803)
Comment - EIS001227 / 0002
In reference to the Nellis range renewal Legislative EIS a statement appears at the top of page 8-10. This statement includes “[t]he Air Force is proposing no substantial new activities in the future…” I suggest that the change of hands for approximately 144,640 acres, that the Air Force has proposed in the LEIS, is potentially substantial and this issue should be fully covered in the Yucca Mountain Final EIS.

Adjacent Nuclear Testing Effects Poorly Understood and Poorly Reported

In the last paragraph of Section 8.3.2.1 (Page 8-74) was the suggestion that the cumulative effects from surface radioactive contamination at the Nevada Test Site was unimportant due to a less-than-40-curie source term. This needs some closer examination, especially in the light that much of the contamination debris resulting from nuclear explosives testing is still shrouded in secrecy, ostensibly to prevent the proliferation of nuclear weapons.

First, [it’s] helpful to understand that each nuclear explosive is essentially a miniature nuclear reactor that is designed to “burn” a portion of its nuclear fuel in less than one microsecond, rather than in the two to three year time period common to nuclear power reactors. As with nuclear power reactors, the “burn” or fission process results in the production of spent fuel debris containing fission products such as cesium-137 and strontium-90 along with substantial quantities of unfissioned fuel debris. One significant difference in the composition of most nuclear explosion debris is that it almost always contains between one to three kilograms of plutonium-239. The spent nuclear fuel that may end up at Yucca Mountain would contain plutonium-239 concentrations of only around 1/2%. The spent fuel that may be brought to Yucca Mountain is subject to strict engineered containment standards. The spent nuclear fuel that was generated by approximately 1,021 nuclear detonations at the Nevada Test Site was not subject to anything like the power reactor and Yucca Mountain containment standards. It was blasted into the environment, be that the atmosphere or the underground environment. Effectively, the Nevada Test Site was the location of over one-thousand nuclear reactor explosions. At the Nevada Test Site 100 nuclear test explosions were conducted in the atmosphere.

Underground, 921 detonations were conducted.

One estimate is that approximately 260 of those detonations were conducted below the local water table or within 100 meters above it.

Since the vast majority of these explosions had high-energy-yields, much of the radioactive debris generated and released by the above groundwater explosions, ended up below or just above the existing water table. Unlike the Yucca Mountain site, no research has gone into looking at the possible rise of groundwater in the underground nuclear testing areas of the Nevada Test Site. The blown-up nuclear reactors in these areas will not be analyzed to see how many thousands of years it will take before their containers have corroded through. The radioactive debris has already been scattered. Most of it is contained in a highly heterogeneous glassy matrix, a material is quite different from the laboratory grade borosilicate glass that high-level nuclear waste is required to be encased in.

The nuclear explosives that were detonated in the atmosphere were not significantly different from those detonated underground and one result is that the radioactive debris released by each of those explosions was similar. Notice on page 8-75 that the radionuclide release estimate for the 921 detonations conducted underground is 300 million curies. The estimated source term amount left on the surface by 100 atmospheric tests, a couple of dozen shallow underground tests, plutonium dispersal tests ("safety tests"), and rocket and jet tests, was less-than-40-curies. It is worth asking the question, if approximately 15% of the tests were conducted in the atmosphere, then why isn't the surface source term closer to 45 million curies rather than 40 curies? What happened to approximately 45 million curies of radioactive debris? I believe a part of the answer lies in inaccurate surface radiation surveys and a failure to look for, or detect, plutonium that now lies slightly below the surface. Still, a goodly portion of the nuclear explosion debris drifted down-wind to fall out all over our nation.

This section of the Yucca Mountain Draft EIS mentions the lack of contamination data associated with the underground nuclear test areas. I believe that part of the dearth of information is due to the fact that much information on the vast majority of the underground nuclear tests still remains classified. In addition, the DOE has limited access to the sources of contamination so little external analysis of this subject can be performed. NEPA [National Environmental Policy Act] analysis of the Yucca Mountain potential repository situation should not be hindered by information restrictions associated with adjacent past and on-going DOE nuclear weapons programs. Each and every time an analysis is hindered by such programs the public and the public's elected representatives should be duly informed via open media presentations. The public has a right to know when governmental agencies are withholding information from them. The recently reported incidents at the uranium enrichment plant at Paducah, Kentucky are not unusual. The AEC [Atomic Energy Commission] and DOE have a lengthy record of putting production missions ahead of local health and safety. Deceiving workers and local residents with vague and deceptive terms has become second-nature to generation after generation of DOE functionaries. The draft EIS failed to mention that the DOE continues to explosively disperse small quantities of plutonium-239 in underground rooms at the Nevada Test Site as part of its subcritical test program. Nor did it mention that the DOE has no firm plan in place to remediate that contamination upon the conclusion of the test series.

The Cumulative Impacts section should have also mentioned that the nuclear debris produced and dispersed by underground nuclear explosions is not covered by the U.S. Environmental Protection Agency's regulations that are associated with Spent Nuclear Fuel, High-Level and Transuranic Radioactive Waste.

The Code of Federal Regulations, Title 40, Section 191.3, involving containment requirements, does not apply to this form of spent nuclear fuel. In addition, the Section 191.14 containment assurance requirements do not apply. This includes the strict requirements to mark the debris sites and prevent human intrusion.

Draft EIS, Section 8, on the cumulative impacts, largely treated the nuclear explosion tests impacts as something that happened in the past. It failed to mention that since the remaining debris contains large quantities of plutonium-239 the hazard from the dispersed debris will continue for a longer period than for the power reactor spent fuel material that is proposed for burial at Yucca Mountain. This section barely mentioned the fact that the Nevada Test Site is being kept ready so that the underground nuclear explosive testing program can be resumed in the event that such a need is deemed necessary. This is an issue which was given only very minor coverage in the 1996 Nevada Test Site EIS. It is an issue that certainly should have been covered in some detail in the Yucca Mountain Draft EIS. Surely, this issue deserves substantial coverage in the Final EIS for the proposed Yucca Mountain repository.

In 1987, the President's Council on Environmental Quality (CEQ) issued a guidance handbook that described how to analyze cumulative impacts and prepare the necessary NEPA reports on this issue.

This guidance should have been used in the preparation of the Yucca Mountain Draft EIS. NEPA cumulative impact review guidance was recently issued by the U.S. Environmental Protection Agency (EPA).

Both these documents should have been utilized in reviewing the adequacy of the Cumulative Impacts section of the Yucca Mountain Draft EIS.

Response

This comment expresses four general concerns: (1) the effect of a land transfer discussed in the *Renewal of the Nellis Air Force Range Land Withdrawal: Legislative Environmental Impact Statement* (DIRS 103472-USAF 1999), (2) the adequacy of the inventories used to assess the contribution of nuclear testing to cumulative impacts, (3) the applicability of regulations and standards to the contents of the repository, (4) compliance of the cumulative impact analysis with the requirements of the National Environmental Policy Act.

DOE has made several changes to Chapter 8 of the EIS. These changes deal in particular with concerns 2 and 4 listed in the preceding paragraph. The following paragraphs discuss the four concerns.

1. Transfer of Land Discussed in the Nellis Air Force Base Legislative EIS

The comment apparently refers to two parcels of land with a total size of approximately 580 square kilometers (225 square miles). The first parcel, known as Pahute Mesa, is part of Public Land Order 99606, which was withdrawn for the use of Nellis Air Force Base but has been used historically by the Nevada Test Site for underground testing under a Memorandum of Understanding. This parcel is in the upper northwest corner of the Nevada Test Site. The second parcel, known as the Groom Range, is part of Public Land Order 01662, which provided land for nuclear testing activities by the Atomic Energy Commission (a DOE predecessor agency). This parcel has been used historically by Nellis Air Force Base for flight operations under an understanding with the Nevada Test Site. The land transfer referred to in the Air Force's Legislative EIS (accomplished by recent legislation) was merely a transfer of jurisdiction to match actual use with ownership. That is, Pahute Mesa was transferred to the Nevada Test Site and the Groom Range was transferred to the Air Force. Because this entails no change in activities from those evaluated in this EIS, there would be no effect on cumulative impacts.

2. Inventories from Testing

Section 8.3.2.1 of the EIS describes the activities on the Nevada Test Site that could contribute to cumulative impacts with the proposed repository. Since issuing the Draft EIS, DOE has revised some of the analyses of impacts associated with the Nevada Test Site. Sections 8.2.2.2 and 8.2.7 now include additional information on radiation exposure from past nuclear weapons testing. These revisions include consideration of the subcritical tests mentioned in the comment. In relation to atmospheric testing inventories, most of the material probably dispersed as fallout over the entire world. This was a major reason for the use of underground testing. In relation to the form of contamination, the analysis assumed that the radioactive material had no containment and was readily available for transport. The revised groundwater transport calculations took credit for immobilization. The analysis also assumed that the dissolution rate of the glass matrix in underground detonation points on the Nevada Test Site is not remarkably different than that of commercial spent nuclear fuel analyzed in the *Viability Assessment of a Repository at Yucca Mountain* (DIRS 101779-DOE 1998).

The National Environmental Policy Act requires that an agency use the best available data and methods to prepare an EIS. DOE used the best available data for the Draft EIS and for the revised analysis in the Final EIS. Where these data were incomplete or highly uncertain, the Department used conservative assumptions.

3. Applicability of Regulations and Standards

The commenter says that the EIS should acknowledge that radioactive materials on the Nevada Test Site, unlike repository materials, are not subject to the provisions of 40 CFR Part 191. In fact, neither site is subject to this standard. In 1985, the Environmental Protection Agency issued 40 CFR Part 191 as the performance standard for high-level radioactive waste repositories. The Federal courts subsequently remanded the regulation to the Environmental Protection Agency for reconsideration. Further, the Energy Policy Act of 1992 required the Environmental Protection Agency to develop radiation protection standards specific to Yucca Mountain. In response to these events, the Environmental Protection Agency promulgated regulations at 40 CFR Part 197 (*Environmental Radiation Protection Standards for Yucca Mountain, Nevada*). The protection standards in 40 CFR Part 197 provide the same level of protection as those in 40 CFR Part 191. However, in other ways, the new rule is quite different from 40 CFR Part 191. A key difference is that the new rule does not contain a release standard based on cumulative curie amounts of specific radionuclides, relying instead on the individual protection and groundwater protection standards.

In dealing with cumulative impacts, the analysis in the Draft EIS did not consider the standards for other past, present, and future activities. Rather, it assessed the actual impacts and combined them with the projected impacts of the Proposed Action. For the sake of perspective, the EIS discusses standards (such as 40 CFR Part 197) to enable informed judgment of the magnitude of potential impacts. If the Yucca Mountain site was recommended and approved, the repository License Application and its supporting compliance analysis would make direct comparisons to the standard. The analysis combined the effects of nuclear testing with projected releases from the repository, analyzed those effects for the same performance measures, and assumed the effects would arrive at the same time (for maximally conservative results) and would migrate to the biosphere in the same manner. Thus, comparisons of the cumulative impacts probably would be made to the same standard. The EIS compares nuclear test debris to the same standard used for the repository. However, demonstration of compliance with the standard would consider only material released from the repository. Section 8.3 of the Final EIS now discusses this issue.

4. Analysis of Cumulative Impacts under the National Environmental Policy Requirements

In general, the analysis of cumulative impacts in Chapter 8 followed the process recommended in the Council on Environmental Quality's handbook *Considering Cumulative Effects Under the National Environmental Policy Act* (DIRS 103162-CEQ 1997). This process included the identification, through research and consultations, of Federal, non-Federal, and private actions with possible effects that would be coincident with those of the Proposed Action on resources, ecosystems, and human communities. DOE believes the analysis of cumulative impacts meets all National Environmental Policy Act provisions and implementing regulations (40 CFR Part 1500 *et seq.* and 10 CFR Part 1021). The documents mentioned in the comment contain guidance rather than regulations. However, DOE has revised Chapter 8 of the Final EIS to provide a clearer presentation of cumulative impacts consistent with established regulations. The presentation contains a more detailed analysis of activities at the Nevada Test Site, as discussed above.

10 (7805)
Comment - EIS001653 / 0007
The DEIS does not consider the impact of underground weapons testing on regional groundwater resources. Additionally, the impact assessment does not consider the collective impact of all actions added together. Instead the analysis only looks at the proposed action added to a single cumulative action. The approach taken in the DEIS is inconsistent with Council on Environmental Quality (CEQ) regulations.

Response
Section 8.3.2 discusses the impacts of underground weapons testing on regional groundwater resources. In Chapter 8 of the Final EIS, DOE clarified the discussion in the Draft EIS on the additive effects of past, present, and future actions.

10 (7853)
Comment - EIS001227 / 0004
Include Conceptual Plans

Conceptual plans for the remediation of the underground test areas should have been included in the Cumulative Impacts section.

For example, one remedial cost estimate was put at $7.29 trillion dollars and would involve the largest open-pit mining operation in the world. Certainly this would represent more than a insignificant cumulative impact. The plan included a conceptual proposal to pipe massive quantities of groundwater through the proposed Yucca Mountain repository area. That certainly should have been in the Draft EIS and should be explained, in detail, in the Final Yucca Mountain EIS.

Response
DOE has not proposed to proceed with the kind of major remediation project such as that described by the commenter. Should DOE propose to pursue a specific goal for remediation of the underground test area at the Nevada Test Site, the Department would undertake appropriate environmental review for such a proposal including analysis of alternative means for accomplishing that remediation. At this time, however, an evaluation of the environmental impacts (including cumulative impacts) of undefined, potential management approaches at the underground test area would be largely speculative. This EIS does analyze cumulative impacts from potential future releases from the Nevada Test Site, assuming no remediation (see Section 8.3.2.1). Remediation of the Nevada Test Site would further reduce these small cumulative impacts.

10 (8113)
Comment - EIS001653 / 0071
The cumulative impact analysis considers a repository with much higher volumes of waste. This scenario should be included in Chapter 5 and not the cumulative impact section. Congress did limit the amount of waste that could be stored in the repository. However, by including a high waste volume scenario in the cumulative impact section assumes that laws will be changed to accommodate a greater amount of waste. If such an assumption is made for the cumulative impact analysis why couldn't it be made for the proposed action?

Response
The consideration in Section 8.2 of additional volumes of nuclear waste beyond that authorized in the Nuclear Waste Policy Act (Inventory Modules 1 and 2) does not presume that disposal of this additional waste in the repository would be approved by Congress. However, DOE considers the possibility to be reasonably foreseeable. Therefore, it is appropriate to examine the impacts of this additional waste under cumulative impacts, rather than under the Proposed Action.

10 (8176)
Comment - EIS001653 / 0102
The cumulative impact analysis does not consider the collective impact of all actions taken together. Instead it looks at only the proposed action with one other action at a time. This approach does not comply with CEQ [Council on Environmental Quality] regulations. Please explain.

Response
While DOE analyzed the collective impact of all actions together, it acknowledges that the presentation in Chapter 8 of the Draft EIS should have been clearer. Therefore, DOE has revised Chapter 8 to include summary sections that clearly indicate the contribution (or lack of contribution) from each activity to the cumulative impacts.

10 (8189)
Comment - EIS001873 / 0012
The proposal to ship low-level nuclear waste via an intermodal station at Caliente is directly linked to the similar proposal for high-level waste in that establishment of the former facility, primarily as an alternative to avoid shipment through Las Vegas, could weigh heavily in the eventual choice of a Caliente high-level waste corridor. For this reason the cumulative impacts of both projects need more than the slight attention they receive in the DEIS. Caliente will likely receive either all or none of the combined impacts, and more information is needed on transportation risks, especially under socioeconomic impacts. All of the above issues are examples of the factors that DOE must set forth for the decisionmakers. Lincoln County and Caliente are representative of communities, not just in Nevada but in 43 states, whose concerns must be addressed. It is no surprise that DOE has deferred considering the transportation issue. A decision to designate Yucca Mountain will impact millions of people. Failure to face the transportation issue will not make it go away.

Response
The potential impacts of each transportation alternative in Nevada are described in Section 6.3 of the EIS. Included are estimates of impacts to health and safety in Nevada, as well as regional socioeconomic impacts to potentially

affected counties, including Lincoln County. Section 8.4.2 analyzes potential cumulative impacts in Lincoln County and elsewhere in Nevada from the Proposed Action and other past, present, and reasonably foreseeable future actions by Federal agencies and private groups. Table 8-58 summarizes cumulative transportation-related radiological impacts from the Proposed Action, Inventory Modules 1 and 2, and other Federal, non-Federal, and private actions nationwide. The table considers potential impacts from current Federal waste-transport activities. These include shipments of low-level waste to the Nevada Test Site, shipments of transuranic waste to the Waste Isolation Pilot Project in New Mexico, and shipments of spent nuclear fuel and high-level radioactive waste to various storage and disposal sites throughout the nation from 1943 to 2047. The Final EIS includes maps of each state showing the routes DOE used in its analysis of impacts in the Draft EIS.

10 (8446)
Comment - EIS001397 / 0014
Over 1,000 nuclear bombs have been detonated at the Nevada Test Site [NTS], above, below and directly within existing water sources. The cumulative effect of NTS radiation contamination in conjunction with Yucca Mountain contamination on the regional aquifers is not addressed in the DEIS at all. Use of potentially contaminated waters to form concrete barriers is not addressed at all. Excessive pumping of aquifers and how this might affect water flow [or] contaminate waters to surrounding communities and ranches and farms is not addressed. This must be rectified completely within the final document.

Response
Chapter 8 of the EIS discusses the impacts to groundwater from past activities on the Nevada Test Site. Sections 8.2 and 8.3 describe short- and long-term cumulative impacts from the repository and other past, present, and reasonably foreseeable actions. Section 8.2.3.2 addresses cumulative short-term impacts to groundwater, including impacts from other Federal and non-Federal actions. These impacts relate primarily to the cumulative consumption of groundwater. Section 8.3 describes the cumulative long-term impacts from contaminant migration from the proposed repository, the Test Site, and the Beatty low-level waste site.

DOE recognizes that some radionuclides or potentially toxic chemicals would eventually enter the environment outside the repository. The regional flow model prepared by the U.S. Geological Survey (DIRS 100131-D'Agnese et al. 1997) suggests that some of the water from the Nevada Test Site flows to the south toward the Amargosa Desert in the vicinity of Yucca Mountain, but the actual transport times and the groundwater pathways from radionuclide contaminants on the Test Site are not clear at this time. Section 8.3.2.1.1 contains a qualitative calculation of the cumulative radiological impact from the Test Site and Yucca Mountain. As indicated, the potential cumulative peak dose for 10,000 years would be well below the regulatory limits established by the Environmental Protection Agency in 40 CFR Part 197. This combined peak dose would occur only if the peak concentrations from the Nevada Test Site and Yucca Mountain occurred at the same time and same location, which would be unlikely.

With regard to the current quality of the groundwater at Yucca Mountain, there is no evidence to suggest that this water has been contaminated by past activities on the Nevada Test Site. See Section 3.1.4.2.2 of the EIS for more information.

Section 4.1.3 discusses water for the repository and the resulting impacts to water availability. In brief, water consumption for the repository could lower the local water table. Additional water consumption in upgradient groundwater areas on the Nevada Test Site could, to some extent, decrease the availability of water in the Amargosa Desert. The amount of water needed for the repository, however, would be small compared to current water consumption in the Amargosa Desert. Therefore, the Proposed Action would have little impact on the availability of water in the region.

Section 5.4 describes the long-term migration of contaminants from the repository.

10 (8499)
Comment - EIS000817 / 0162
P. 8-10. Two spaceports? VentureStar? Kistler Aerospace Satellite Launch? And recovery? So how does all this activity relate to airplane crash analysis into dry cask storage? What could possibly crash into a full cask array on several pads of casks at Yucca Mountain? What all flies over that area from the test site or Nellis Air Force Range?

Is a lot of it secret? Does the right hand know what the left hand is doing here??? Great! A possible vehicle launch or recovery accident from the VentureStar/Kistler project. All we need! This is a risk that should not be taken. There are unknowns here. This just gets worse and worse.

Response
Transportation casks arriving at the repository would be moved into the Waste Handling Building and the contents unloaded and stored in 50-foot-deep water pools inside the building. The Waste Handling Building would be made of concrete and this material would protect the waste stored in pools inside the building from external phenomena such as aircraft crashes. In the unlikely event that a space vehicle launched from the Nevada Test Site crashed into the Waste Handling Building, the impact from the crash would probably not exceed the impacts from the maximum seismic event considered in Appendix H of the EIS. This seismic event is assumed to cause a total collapse of the Waste Handling Building and damage all of the 294 fuel assemblies stored inside (DIRS 152579-Montague 2000). Therefore, DOE believes the impacts from highly unlikely events, such as the crash of a space vehicle, have been adequately considered (see Section H.2.1.5). As noted in Chapter 8 of the Final EIS, the Kistler activity described by the commenter is currently on hold.

10 (8500)
Comment - EIS000817 / 0163
P. 8-13. This Timbisha Shoshone Reservation creation possibility is of great interest. Why? Seems to me we probably owe it to them, right? For some broken treaty of the past? In any case, I'm all for it, but not if they get contaminated land. We are always "dumping" on Native Americans.

Response
The Department of the Interior has issued the *Final Legislative Environmental Impact Statement: Timbisha Shoshone Homeland* (DIRS 154121-DOI 2000). Chapter 8 of the repository EIS discusses the potential cumulative impacts of the proposed repository and the Timbisha Shoshone Homeland.

10 (8501)
Comment - EIS000817 / 0164
P. 8-14. Wow! And here you have gold and copper mining transport further complicating things. -- More traffic congestion and possible pollution.

Response
Section 8.4.2 of the EIS discusses the cumulative impacts from waste transport to the repository and other transportation activities in Nevada, including impacts from the Cortez Gold Mine. As discussed in that section, operation of the mine could have impacts on rail traffic and land use.

10 (8553)
Comment - EIS000817 / 0168
P. 8-78. Is American Ecology the one with all the controversy?

Response
As discussed in Section 8.3.2 of the EIS, American Ecology, through its subsidiary, U.S. Ecology, currently operates a hazardous waste treatment, storage, and disposal facility near Beatty, Nevada. The adjacent low-level radioactive waste disposal facility was closed in 1993 and is now under custody and control of the State of Nevada.

10 (8683)
Comment - EIS001816 / 0003
The existing radionuclide contamination from NTS [Nevada Test Site] testing is the closest, real world analogous, field laboratory for study by Yucca Mountain. YM [the Yucca Mountain Project] has done an exhaustive search in the literature and in the field to understand the geochemistry of radionuclides in groundwater like that of the NTS region. If the NTS UGTA [Underground Testing Area] program were to characterize the near-field area (plume) of groundwater contamination around a number of limited sites at Pahute Mesa, YM must evaluate the benefit to the DEIS analysis that a direct exchange of this type of information would provide, and how it would reduce major uncertainties in the cumulative hydrologic analysis section.

Response
Interactions with the Nevada Test Site Underground Test Area program have been an integral part of the ongoing multiyear effort to produce the combined Yucca Mountain/Nevada Test Site regional groundwater flow model of the Death Valley hydrologic system. Examples of data from the Underground Test Area program, which incorporates data gathered from the Pahute Mesa region and other areas, include results from tracer transport tests, water table elevations, water temperature measurements, hydrologic parameters, geologic data (structural and stratigraphic), hydrochemistry and isotopic data, evapotranspiration parameters, and colloid chemistry. The series of Underground Test Area boreholes in the Oasis Valley sub-basin are providing many types of basic hydrogeologic data on this important part of the Death Valley hydrologic system.

The incorporation of these various types of data refines the existing flow models and so reduces uncertainty in regional and site-scale groundwater flow processes and directions. The long-term performance analysis in Chapter 5 of the EIS benefits from the Underground Test Area data through the use of improved regional and site-scale flow models.

10 (8690)
Comment - EIS001816 / 0005
Section 8.3 Cumulative Long Term Impacts (page 8-76): the statement regarding the maximum potential dose from the underground testing inventory is calculated to be 0.2 millirem per year at 20 kilometers. Using the entire estimated source term, and a number of other assumptions about flow path processes for NTS [Nevada Test Site] water to migrate to a downgradient receptor for a dose of 0.2 millirem is a possible scenario. The YM [Yucca Mountain] DEIS must define how they intend to incorporate new information from the UGTA [Underground Testing Area] program about radionuclide migration in groundwater to adjust the cumulative dose at a downgradient receptor.

Response
The Department used the best available information to prepare the Draft EIS. Since issuing the Draft, DOE has revised some of the analyses of impacts associated with the Nevada Test Site. Section 8.3 now includes updated estimates of the potential dose from the underground testing.

The Yucca Mountain Project has a working relationship with the Nevada Test Site's Underground Test Area program to produce a regional groundwater flow model of the Death Valley hydrologic system. DOE will continue to foster this relationship to plan for future groundwater studies and groundwater monitoring. DOE continues to evaluate the extent of contamination from past underground testing and to refine the groundwater monitoring network based on the results of ongoing evaluations. As new information becomes available, DOE will use it to update impact estimates as appropriate.

10 (8695)
Comment - EIS001816 / 0007
Section 8.3 Cumulative Long Term Impacts (page 8-73): This section must include an analysis of the cumulative federal impact of siting a CERCLA [Comprehensive Environmental Response, Compensation, and Liability Act of 1980] type (Superfund) site like YM [Yucca Mountain] down gradient of an existing Superfund-qualifying site like the NTS [Nevada Test Site] and particularly Pahute Mesa. The NTS Federal Facility Agreement and Consent Order (FFACO, 1996) was negotiated and signed to be a CERCLA-like cleanup agreement for the NTS. Although the NTS does more than qualify to be ranked as a CERCLA site, it was deliberately not put on the national priority list (NPL) CERCLA program. The YM DEIS should do an analysis of this federal action as it pertains to the cumulative impact of the repository program because it too someday will be a CERCLA site. After all, YM is basically a very sophisticated and highly engineered form of underground injection of waste. It too will qualify for the NPL in the years 3,000 or 12,000 or when who knows. Based on DOE modeling YM will contaminate at least one square mile of the subsurface.

Response
Chapter 8 of the EIS describes the cumulative impacts from the repository, along with past, present, and reasonably foreseeable future actions at the Nevada Test Site, Nellis Air Force Base, the Beatty low-level radioactive waste disposal site, and other non-Federal actions in the affected area (see Table 8-1). The cumulative impact assessment considered all past, present, and reasonably foreseeable activities on the Nevada Test Site rather than the Test Site's

regulatory classification. The fact that the Test Site has not been designated as a Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) site was not a barrier to this cumulative impact assessment. Whether or not CERCLA standards would apply thousands of years in the future, and whether the Test Site would eventually be designated as a CERCLA site, would not affect the Department's assessment of potential cumulative impacts in the repository area.

10 (8699)
Comment - EIS001816 / 0009
Section 8.3 Cumulative Long Term Impacts (page 8-76): The utilization of computer modeling to predict groundwater velocities and radioactive transport is an approximation that cannot be validated. In fact, many parameters incorporated into the modeling of all systems eventually contributing to the groundwater source term and subsequent estimation of dose are sophisticated estimates. If the NTS UGTA [Nevada Test Site Underground Testing Area] program were to characterize contaminant plumes (near field) from underground testing within the aquifer, the DEIS must describe how valuable this information would be toward reducing many of the great uncertainties in the repository modeling program.

Response
DOE will continue to evaluate data gathered from the Underground Test Area program at the Nevada Test Site. As advances are made in characterizing contaminant plumes on the Test Site, the Yucca Mountain Project will use the results of these analyses to reduce the uncertainties of computer modeling associated with the long-term performance of the repository and cumulative impacts. Section 5.2.4 of the EIS discusses these uncertainties. It also discusses the possible effects that these uncertainties could have on the impacts estimated for the repository. The summary in Section 5.2.4 describes the assessment of repository performance as a "snapshot in time" that will be refined with additional work. DOE believes the performance assessment results reported in the EIS are conservative, and that additional work will increase confidence in these estimates.

10 (8724)
Comment - EIS002119 / 0009
There is also inadequate analysis of cumulative effects because of planned or present shipments of low-level waste, through waste to and from the NTS and present movement of hazardous material. There may be severe economic impacts within that context. The only cumulative effects we see, although there was some -- there's some lip service provided, is cumulative effects based upon this campaign only. However, we are operating in a context of a number of shipments and of a number of different materials.

Response
Section 8.4 of the EIS describes the cumulative impacts of past, present, and reasonably foreseeable shipments of radioactive materials throughout the Nation and through Nevada. Table 8-58 lists the collective worker-dose and general population dose (in person-rem), and traffic fatalities, from these actions from 1943 to 2047.

10 (8741)
Comment - EIS001816 / 0011
Section 8.3 Cumulative Long Term Impacts: Although the DOE estimates of groundwater basin perennial yield in the vicinity of YM [Yucca Mountain] far exceed the anticipated consumption from operation of the repository and usage in the Amargosa Valley, the DEIS must do further analysis to assess the cumulative impacts of possible increases in groundwater consumption in the next 50 years from: the Nevada Science, Technology, and Museum Corridor; NTS [Nevada Test Site] Development Corporation activities in Area 25; Interim Storage in Area 25; and water importation from Area 25; to augment the Las Vegas Valley Colorado River supply.

Response
Consistent with Council on Environmental Quality regulations (40 CFR 1508.7), DOE considered past, present, and reasonably foreseeable actions in its assessment of cumulative impacts and has reviewed a number of actions both current and proposed to determine relevance. The expression "reasonably foreseeable" refers to future actions for which there is reasonable expectation that the action could occur, such as a proposed action under analysis, a project that has already started, or a future action that has obligated funding. DOE believes that the analyses described in Chapter 8 adequately account for reasonably foreseeable future actions that could have a cumulative impact with the repository.

10 (8747)
Comment - EIS001816 / 0013
Section 3.1.13 (page 3-94) and Section 8.2.13 and 8.3.2.1.3 (page 8-77): Although E.O. [Executive Order] 12898 defines Environmental Justice with respect to minority populations of color and income only, the DEIS must go further and analyze the environmental justice or equity of operating and siting the YM [Yucca Mountain] repository in Southern Nevada where there is already substantial, existing radioactive contamination prior to what Yucca Mountain may bring to the region. The NTS [Nevada Test Site] is predicted to possibly dispose of 7.7 million cubic feet of low-level waste through 2070. In a cumulative impact analysis of these two major federal programs, YM appears to unfairly burden and stigmatize the southern Nevada region with additional radioactive source term material compared to other waste disposal sites. For the year 2050 it is recommended that the DEIS analyze the estimated, cumulative number of curies and nuclear waste volumes in Southern Nevada combined from all federal programs and discuss a broader concept of environmental justice.

Response
As discussed in Sections 8.2.13 and 8.4.12 of the EIS, environmental justice concerns would exist (1) if an activity would have significant environmental impacts and (2) if such impacts would have disproportionately high and adverse human health or environmental effects on minority or low-income populations. Analyses for the EIS indicated that there would be no significant impacts with regard to environmental justice.

An analysis of the cumulative number of curies and waste volumes, as suggested by the commenter, would not address the impact of the activity. DOE used the number of curies and waste volumes as input to the calculations, but not as a sole indicator of an effect. To estimate the impacts, the analysis accounted for the amount of radioactivity at the Nevada Test Site and the repository thousands of years into the future.

10 (8814)
Comment - EIS000869 / 0004
I am aware of the continuing possibility of nuclear contamination of air, land, table and surface water in and around the Nevada Test Site. There are also continuing questions as to land and earth fracture stability secondary to nuclear testing near existing fault lines.

Response
Section 8.3.2.1 of the EIS describes the activities on the Nevada Test Site that could contribute to cumulative impacts with the proposed repository. Since issuing the Draft EIS, DOE has revised some of the analyses of impacts associated with the Test Site. Sections 8.2.2.2 and 8.2.7 now include information on radiation exposure from past nuclear weapons testing, and Section 8.3 includes updated estimates of future impacts to groundwater and air resources from activities on the Test Site. There is no evidence that past testing of nuclear weapons at the Nevada Test Site has fractured the rock at Yucca Mountain or otherwise affected the stability of Yucca Mountain.

10 (8860)
Comment - EIS000869 / 0028
S.6, Cumulative Impacts of the Proposed Action, states that the "DOE could not reasonably predict future actions for the indefinite future. For that reason DOE did not attempt to estimate cumulative impacts beyond about 100 years...." I am not familiar with any person or agency that would have the ability to predict any future 10,000 years away. It is this extraordinary time period that is a major issue with all the alternatives presented in the Draft Environmental Impact Statement.

Response
The complete statement from Section S.6 of the EIS is, "DOE could not reasonably predict future actions for the indefinite future. For that reason DOE did not attempt to estimate cumulative impacts beyond about 100 years with the exception of impacts of radioactive materials reaching the groundwater or atmosphere and resulting in potential impacts to the public." DOE estimated cumulative impacts to groundwater for longer periods, including 1 million years in some cases (for example, see Table 8-48).

The projections included in the EIS are for the undisturbed case in which there is some ability to produce statistical projections of future ranges of climate patterns, geologic features and changes, behavior of engineered components, and other features, events, and processes. DOE made similar evaluations of long-term atmospheric impacts. The most difficult problem with impact forecasts is predicting the future behavior of people and institutions, which is speculative. This is why the EIS analysis did not project many cumulative impacts beyond 100 years.

DOE acknowledges that 10,000 years (and even more so, 1 million years) is an extraordinary period over which to predict the behavior of the system. However, it is possible in many cases to describe this behavior in a way to determine with reasonable assurance that the repository would meet applicable regulatory standards set by Federal agencies (that is, the Nuclear Regulatory Commission and the Environmental Protection Agency). DOE and the Nuclear Regulatory Commission would apply these regulatory standards to judge the adequacy of the predicted behavior of the system. Environmental Protection Agency standards (40 CFR Part 197) require the analysis for the 10,000-year period and, in some cases (for example, the requirement to Caliente Peak dose and assess during the refining period of geologic stability), for considerably longer (1 million years).

10 (8862)
<u>Comment</u> - EIS000869 / 0029
S.6.1., Occupational and Public Health and Safety. Radiological Impacts to Workers compares fatalities under Module 1 or 2 to fatalities under the Proposed Action. There is not a timeframe mentioned in this paragraph. Considering that the previous paragraph has half the deaths mentioned in paragraph two, occurring in the first 100 years of repository operations, I am led to assume that the second paragraph is addressing the first 200 years. The Long-Term Radiological Impacts to public health occur from radionuclides ultimately from Yucca Mountain, past weapons testing on the Nevada Test Site, and past, present, and future disposal of radioactive waste on the Nevada Test Site and near Beatty, Nevada. The cumulative impacts from radionuclides released to groundwater are estimated at less than about 0.003 latent cancer fatality over 10,000 years. Again, I must assume that this is an ideal scenario without earthquakes, flooding, heavy rains, or other natural disasters which have been known to occur in this area. It also does not address nonfatal radiological effects. Radionuclides released to the air, land, dust, or other exposures are not addressed as long-term radiological impacts. Perhaps this was an oversight or perhaps it was intentionally omitted. It is an aspect that required due diligence as the down-winders in Southern Utah can attest.

<u>Response</u>
The EIS analyses assumed that the timeframe is 100 years, the expected period the repository would remain open. The “previous paragraph” referred to in the comment refers to impacts to workers from industrial (that is, non-nuclear) hazards and is unrelated to the paragraph on radiological impacts to workers.

10 (8864)
<u>Comment</u> - EIS000869 / 0030
S.6.3, Transportation, estimates implementation of the Proposed Action, and transportation of radioactive nuclear materials to result in 310-354 latent cancer fatalities. This emplacement period is an approximate 25-year time span. So this is estimating over 12 latent cancer fatalities, to worker and the public populations, per year just from transportation of radioactive nuclear materials. This is an unbelievably high number just from transportation and it is unrealistic to assume that the storage would result in less injuries, deaths, and latent cancer fatalities.

<u>Response</u>
The 310 to 354 latent cancer fatalities cited in the comment is a highly conservative estimate of the cumulative impact of all past, present, and reasonably foreseeable nationwide transport of all types of radioactive materials over a period of 90 years. This category includes shipments of radiopharmaceuticals for nuclear medicine and shipments of low-level radioactive waste to commercial disposal facilities. As shown in Table 8-58 of the EIS, the Proposed Action represents less than 5 percent of the total estimated cumulative impact. Section 8.2.7 of the EIS shows that the cumulative impacts from the operation and monitoring phase would be no greater than those from transportation, and the long-term impacts shown in Section 8.3.2.1.1 for the repository would be lower still.

10 (8881)
<u>Comment</u> - EIS001834 / 0022
A major flaw of the DEIS is that readers cannot determine their total risk in regard to the Yucca Mountain Project. The DEIS’s lack of clarity and disjointedness make it difficult if not impossible to see how more than one risk factor could combine in order to get a picture of the total risk. The DEIS should provide some way for readers to determine “personal cumulative risk.”

<u>Response</u>
As part of its analysis of Proposed Action impacts, the Department attempted to quantify, where possible, the total radiation dose that local residents could have received. The Department calculated the total risk to the population based on the assumption that radiation risks from different exposures are additive. However, the Department cannot in this analysis account for each individual resident's past radiation exposure. To do so would require accounting for lifestyle habits such as the frequency of airline flights, past residence in locations that receive substantially higher or lower cosmic radiation, the type and frequency of medical diagnostic tests and treatments, and a myriad of other factors. Therefore, the Department provided an estimate of the exposure of affected individuals in Chapter 4. Then the Department identified those actions that are imminent or reasonably foreseeable to add to the estimates from Chapter 4 to determine the overall cumulative impact estimates.

10 (8889)
<u>Comment</u> - EIS001834 / 0030
The DEIS does not adequately address the cumulative impacts associated with a nuclear waste repository at Yucca Mountain combined with the past, present, and future activities in the region, such as the Nevada Test Site [NTS], Nellis Air Force Range, and Beatty Low Level Waste Dump.

For example, the groundwater is already contaminated at the Nevada Test Site, and the aquifer that flows beneath the NTS is the same aquifer that is beneath Yucca Mountain. Therefore, contamination from Yucca Mountain would add to an already existing problem and make matters worse for the environment and the people who are dependent upon that aquifer for drinking, farming, and washing. Further, if current trends continue, a significantly higher number of people will be dependent upon that aquifer for water in the future. This increased population coupled with the cumulative effects of radioactive contamination would lead to higher doses and more cancer for the people in the Yucca Mountain and Amargosa Valley area.

Also, the above named sites also have effects on the desert environment, and these impacts must be considered in conjunction with the impacts that a nuclear dump at Yucca Mountain would add.

Finally, as the Nuclear Regulatory Commission has noted, the cumulative effects of water usage, land use, and biological resources. We request that the DOE calculate these cumulative effects and factor them into the DEIS. In order to ensure that all of these considerations are included, the DOE should rewrite the Cumulative Impacts section to more clearly and accurately characterize the total impacts from all of the environmental disaster areas in the Yucca Mountain regional area.

<u>Response</u>
Chapter 8 of the EIS analyzes a range of past, present, and reasonably foreseeable future actions that could contribute to cumulative impacts. In preparing this chapter, DOE reviewed many documents to determine where there was potential for cumulative impacts. These documents included resource plans, EISs, environmental assessments, tribal meeting records, and other documents prepared by Federal, state, local, and private organizations.

Since publication of the Draft EIS, new information on cumulative impacts has become available. DOE has made every effort to include this new information in the Final EIS. For example, Sections 8.3.2.1 and 8.3.2.2 of the Final EIS contain a more complete assessment of the potential dose from past underground weapons testing and low-level radioactive waste disposal inventories on the Test Site. These new assessments used updated data from the Test Site and revised population projections. This information was then used to reexamine cumulative impacts to future populations who could reside in the Amargosa Desert.

Based on its method of analysis, the Department believes that it has accounted for those actions that would cumulatively affect Nye County and surrounding areas and has addressed those areas of impacts cited by the commenter. However, in response to this and other comments, the Department has revised the discussion in Chapter 8 to better present its methodology in estimating potential cumulative impacts.

Chapter 8 discusses cumulative impacts to land use, water resources, cultural resources, biological resources, socioeconomics, and environmental justice. The Department has revised some of the analyses since publication of the Draft EIS and believes that the Final EIS presents a reasonable estimate of the cumulative impacts to the region.

Finally, the Department acknowledges that Chapter 8 of the Draft EIS could have been clearer. Therefore, the Department has revised Chapter 8 to include summary sections that clearly indicate the contribution (or lack thereof) of each activity to cumulative impacts.

10 (8906)

Comment - EIS000869 / 0033

Groundwater contamination has already occurred at the Nevada Test Site and is reaching the borders of the Test Site. It is possible that it may have already contaminated groundwater in Beatty, Western Shoshone land, and in smaller communities surrounding the Nevada Test Site. It needs to be kept from progressing and the contaminated areas from becoming larger.

Response

The quality of the groundwater in the saturated zone at Yucca Mountain is described at the end of Section 3.1.4.2.2 of the EIS. Water samples from wells in the area exceeded the secondary standard for fluoride, as well as a proposed standard for radon. Fluoride and radon occur naturally in the rock through which the groundwater flows. Overall, groundwater quality at Yucca Mountain is good. There is no evidence that activities on the Nevada Test Site have contaminated the groundwater beneath Yucca Mountain. The last paragraph of Section 3.1.4.2.2 describes the results of groundwater monitoring at the Nevada Test Site and the nature and extent of contaminant migration.

Section 8.2.3.2 addresses cumulative short-term impacts on groundwater including those that could be additive to the Proposed Action from other Federal and non-Federal actions. These impacts relate primarily to water consumption and the resultant impacts on the availability of water resources in the area. Section 8.3 discusses cumulative long-term impacts including contaminant migration, and Sections 8.3.2.1 and 8.3.2.2 address cumulative impacts from activities on the Nevada Test Site and the Beatty low-level radioactive waste site, respectively.

DOE recognizes that some radionuclides or potentially toxic chemicals would eventually enter the environment outside the repository. The regional flow model prepared by the U.S. Geological Survey (DIRS 100131-D'Agnese et al. 1997) suggests that some of the water from the Nevada Test Site flows to the south toward the Amargosa Valley in the vicinity of Yucca Mountain, but the actual transport times and groundwater pathways from radionuclide contaminants on the Test Site are not clear at this time. Section 8.3.2.1.1 contains a qualitative calculation of the cumulative radiological impact from the Test Site and Yucca Mountain. As indicated, the potential cumulative peak dose for 10,000 years would be well below the regulatory limits established by the Environmental Protection Agency in 40 CFR Part 197. This combined peak dose would occur only in the unlikely event that the peak concentrations from the Nevada Test Site and Yucca Mountain occurred at the same time and at the same location.

10 (9353)

Comment - EIS001888 / 0066

Cumulative [impacts] throughout the DEIS are not readily identified given that the procedures used to define impacts are not sufficiently sensitive to isolate impacts among subgroups. With the methodologies available today to analyze data, and given the unprecedented nature of DOE's proposal to ship large volumes of nuclear waste across the nation, it is reasonable to expect DOE to analyze potential impacts at a variety of scales. Without such detail, neither Clark County nor communities along the transportation routes will be able to effectively assess impacts and design appropriate mitigation strategies. NEPA [National Environmental Policy Act] Regulation: Sec. 1502.14 Alternatives including the proposed action; Sec. 1502.16 Environmental consequences: Sec. 1502.22 Incomplete or unavailable information. Forty Most Asked Questions Concerning CEQs [the Council on Environmental Quality] NEPA Regulations. l9a. Mitigation Measures.

Response

The Department acknowledges at the beginning of Chapter 6 of the EIS that it is uncertain at this time when DOE would make any transportation-related decisions. The Department continues by saying it believes that the EIS provides the information necessary to make decisions regarding the basic approaches to waste transport (that is, mostly rail or mostly truck shipments), as well as the choice among alternative transportation corridors. DOE identified mostly rail in the Final EIS as its preferred mode of transportation both nationally and in the State of Nevada. DOE has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was recommended and approved, DOE would issue, at some future date, a Record of Decision to select a mode of transportation. Thereafter, for example, if mostly rail was selected (both nationally and in Nevada), DOE would then identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in the State of Nevada.

10 (9354)
Comment - EIS001888 / 0067
In Chapter 8, the DEIS has understated the scale and complexity of the cumulative impacts of DOE programs for the simultaneous disposal of low-level and high-level radioactive waste. According to DOE's Draft Waste Management Programmatic EIS* and later documents, the Nevada Test Site (NTS) is a preferred regional disposal site for low-level radioactive waste. This program will occur over a number of years, and would greatly increase the total number of truck shipments of radioactive waste through southern Nevada. Under present regulation, these shipments may be routed on the same highway system through Clark County as the shipments to a Yucca Mountain repository.

Despite assurances in the programmatic EIS, the Yucca Mountain DEIS did not contain an authoritative examination of the cumulative impacts of both DOE disposal programs on Nevada and Clark County. According to some estimates, the shipment of low-level radioactive waste from DOE defense sites across the nation to the NTS will last for approximately 70 years. The waste will be shipped by truck, conceivably through the most densely populated and sensitive parts of Clark County. The low-level radioactive waste (LLW) shipping campaign could result in the transport of up to 12 truckloads per day for more than 70 years.

*U.S. Department of Energy. *Draft Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage and Disposal of Radioactive and Hazardous Waste*, DOE/EIS-0200-D, 1995.

Response
Section 8.4 of the EIS discusses the cumulative impacts of transportation in the region. This discussion includes the impacts of transporting low-level radioactive waste to the Nevada Test Site from offsite locations [the "Expanded Use Alternative" for the Nevada Test Site (DIRS 101811-DOE 1996)]. Table 8-58 shows that the radiological impacts of waste transport for the Proposed Action along with other past, present, and reasonably foreseeable shipments of radioactive material would be minor. To arrive at a conservative estimate of the collective radiation dose, the Department assumed that the same population of people (public and workers) would be exposed to each action that involved the transport of radioactive material.

The duration of shipments of low-level waste to the Nevada Test Site was assumed to be 10 years, based on Section E.7.2 of the Final Programmatic Waste Management EIS (DIRS 101816-DOE 1997). Routing details have not been determined. However, routing decisions would be in accordance with regulations of the U.S. Department of Transportation.

10 (9355)
Comment - EIS001888 / 0068
The DOE has already established a poor record for managing and transporting LLW [low-level radioactive waste] in Clark County. For example, after an incident with a LLW highway shipment from Ohio to the NTS that was found to be leaking non-radioactive water, the shipping campaign was suspended for over eighteen months as an internal investigation* was conducted. The two major findings were that DOE had not enforced its own requirements regarding the fabrication and deployment of the containers, and that institutional processes between and among DOE facilities, the State of Nevada, local governments and others had failed to provide effective control of this and similar situations.

Another example is regarding DOE's statements and subsequent efforts to minimize risk and impacts of LLW shipments on Clark County. In this case, representatives of DOE Nevada acknowledged that there are administrative means that may be used by DOE to assure that LLW shipments avoid high-risk areas. However, later inaction by DOE resulted in the continuation of shipments through the areas of concern in the Las Vegas Valley, except for truckers that voluntarily used other routes.

*U.S. Department of Energy Fernald Environmental Management Project. *Type B Accident Investigation Board Report of the December 15, 1997, Leakage of Waste Containers Near Kingman, Arizona*, February 1998.

Response
The incident to which the commenter refers occurred in December 1997 and involved the shipment of low-level waste from the Fernald Site in Ohio to the Nevada Test Site. The driver of the truck noticed that liquid was leaking from the container and followed the proper steps to notify local authorities and DOE. Subsequent investigation revealed that the liquid was not contaminated. Steps have been taken to prevent such an incident from occurring again. There was no harm to workers or the environment from the incident in question. With regard to Yucca Mountain, all waste (spent nuclear fuel and high-level radioactive waste) would be in solid form (that is, no liquid or other material that could leak).

With regard to shipping routes for specific shipments, the Department acknowledged in the Programmatic Waste Management EIS (DIRS 101802-DOE 1995) that "DOE proactively works with states, regional entities, and carriers during large shipping campaigns to ensure that safe routing alternatives and safe havens are utilized." However, the selection of any route will pose a risk to some portion of the public; the avoidance of one area would affect other areas through which the shipment was routed. Regulations by the U.S. Department of Transportation govern the routing of radioactive materials, and carriers are responsible to the U.S. Department of Transportation for routes that are used.

10 (9356)
Comment - EIS001888 / 0069
The DEIS analysis of cumulative impacts shows no consideration of the context in which spent nuclear fuel (SNF) will be transported to Yucca Mountain. There is also no information about other hazardous commodities on the roads and railways. There is no discussion of the substantial impacts of the DOE's LLW [low-level radioactive waste] disposal program on Clark County and the likely relationship between the LLW and SNF disposal programs.

The DEIS also does not present a description of the impacts of these programs on the infrastructure (e.g., highways, roadside facilities) of Clark County, nor does it provide sufficient information about the necessary emergency management requirements to respond to the DOE's programs. To rectify the substantial omissions in the DEIS, the DOE must prepare a supplemental evaluation of cumulative impacts that describes the current context in which SNF will be transported. This additional analysis must address the current hazardous materials shipments in urban Clark County and rural Nevada for both rail and truck modes, it must describe the process used to identify and measure cumulative impacts and it must measure those impacts.

Response
Section 8.4 of the EIS discusses the cumulative impacts from the transport of radioactive materials in the region. It includes the impacts of transporting waste to the Nevada Test Site under the Expanded Use Alternative (Alternative 3) described in the *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DIRS 101811-DOE 1996). This alternative includes shipments of low-level radioactive waste to the Test Site from offsite locations. Section 8.2.12.2 discusses the cumulative impacts of storing low-level waste, including the reasonably foreseeable action that the Nevada Test Site is selected as a regional DOE low-level waste disposal site. Impacts to people and the environment from shipments of nonradioactive hazardous materials on the Nation's roads and railways are not examined because such shipments are unrelated to the Proposed Action, which is to transport and dispose of radioactive materials at Yucca Mountain.

Section 8.4.1.2 and Table 8-58 of the EIS summarize cumulative transportation-related radiological impacts from the Proposed Action, Inventory Modules 1 and 2, and other Federal, non-Federal, and private actions nationwide. The table summarizes potential impacts from current Federal waste transport activities. These include shipments of low-level waste to the Nevada Test Site, shipments of transuranic waste to the Waste Isolation Pilot Plant in New Mexico, and shipments of spent nuclear fuel and high-level radioactive waste to various storage and disposal sites throughout the Nation. DOE believes that these impacts would be minor.

10 (9357)
Comment - EIS001888 / 0070
In the paragraph below, citations are provided from the DEIS regarding its analysis of cumulative impacts on cultural resources and socioeconomic conditions. These are included to demonstrate that, in non-compliance with NEPA [National Environmental Policy Act] Regulation, Section 1502.22, DOE has not provided sufficient detail to analyze potential cumulative impacts resulting from the proposed repository at Yucca Mountain. Because of this deficiency, the DEIS inadequately addressed potential mitigation needs.

DEIS Statement, p. 8-37: Cumulative Impacts on Cultural Resources. "...the emplacement of either module would require small additional disturbances to land in areas already surveyed during site characterization activities. Because repository construction, operation and monitoring, and closure would be Federal actions, DOE would identify and evaluate cultural resources, as required by Section 106 of the National Historic Preservation Act, and would take appropriate measures to avoid or mitigate adverse impacts to such resources. As a consequence, archaeological information gathered from artifact retrieval during land disturbance would contribute additional cultural resources information to the regional database for understanding past human occupation and use of the land. However, there would be a potential for illicit or incidental vandalism of archaeological or historic sites and artifacts as a result of increased activities in the repository area, which would be extended for Module 1 or 2, and this could contribute to an overall loss of regional cultural resources information.

"The Native American view of resource management and preservation is holistic in the definition of cultural resources, incorporating all elements of the natural and physical environment in an interrelated context (AIWS 1998, all). The Native American perspective on cultural resources is further discussed in Chapter 3, Section 3.1.6. Potential impacts resulting from the Proposed Action described in Chapter 4, Section 4.1.5, would also apply to Inventory Module 1 or 2."

DEIS Statement, p. 8-39: Cumulative Impacts on Socioeconomic Conditions. "The Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada (DOE 1996f, all) presents various scenarios for Nevada Test Site actions. The Record of Decision for that EIS states that DOE would implement a combination of three alternatives: Expanded Use, No Action (continue operations at current levels) regarding mixed and low-level radioactive waste management, and Alternate Use of Withdrawn Lands regarding public education (61 *FR* 65551, December 13, 1996). Under this combination of alternatives, the Nevada Test Site could generate an increase of approximately 4,550 direct jobs, and most of these workers would be likely to live in Clark County (Department of Energy 1996f, page 5-17)."

Response
DOE believes that the analytical approach used in Chapter 8 of the EIS to examine cumulative impacts is consistent with all applicable requirements including regulations implementing the National Environmental Policy Act promulgated by the Council on Environmental Quality, including 40 CFR 1502.22. Chapter 8 provides the appropriate amount of information for understanding cumulative impacts that could be associated with a repository at Yucca Mountain, including cumulative impacts to cultural resources and socioeconomic conditions. In addition, the Department believes that the mitigation measures described in Chapter 9 are responsive to the potential impacts from the repository identified by the analysis (see Section 9.2.4).

In general, the analysis of cumulative impacts in Chapter 8 followed the process recommended in the Council on Environmental Quality's handbook *Considering Cumulative Effects Under the National Environmental Policy Act* (DIRS 103162-CEQ 1997). This process included the identification, through research and consultations, of Federal, non-Federal, and private actions with possible effects that would be coincident with those of the Proposed Action on resources, ecosystems, and human communities.

10 (9467)
Comment - EIS001888 / 0138
Further, if DOE is planning to piggyback rail shipments, then the cumulative impacts from this activity should be identified in the DEIS.

Response
In the Final EIS, DOE identifies mostly rail as its preferred mode of transportation both nationally and in the State of Nevada. Possible sharing of a branch rail line is speculative at this time. Therefore, analyzing the cumulative impacts of shared use at a rail line could result in a misrepresentation of those impacts.

10 (9485)
Comment - EIS001888 / 0150
[Summary of comments noted by Clark County Nuclear Waste Divisions staff at various citizens' meetings.]

Concern that DOE is not taking into account that Nevada is already impacted by the Low-Level Waste shipments that are going to NTS [Nevada Test Site] and the continuing effects of the nuclear tests that were performed there.

Concern that DOE is not considering all the impacts Southern Nevada has already received from operations at the NTS.

Response
Table 8-58 of the EIS summarizes cumulative transportation-related radiological impacts from the Proposed Action, Inventory Modules 1 and 2, and other Federal, non-Federal, and private actions nationwide. The table considers potential impacts from current Federal waste-transport activities. These include shipments of low-level waste to the Nevada Test Site, shipments of transuranic waste to the Waste Isolation Pilot Project in New Mexico, and shipments of spent nuclear fuel and high-level radioactive waste to various storage and disposal sites throughout the nation from 1943 to 2047.

Impacts from operation of the Nevada Test Site are described in Section 8.2.7 of the EIS. Future impacts to groundwater from past weapons testing are described in Section 8.3.2.1.1. Section 3.1.8 of the Final EIS discusses estimates of radiation doses to individuals from past weapons testing on the Nevada Test Site. This information has been included in Sections 8.2.2.2.2 and 8.2.7 as contributing to short-term cumulative radiological impacts. Readers interested in further information about the effects of past testing of nuclear weapons should refer to the *National Cancer Institute Study Estimating Thyroid Doses of I-131 Received by Americans From Nevada Atmospheric Nuclear Bomb Tests* (DIRS 152469-Institute of Medicine and National Research Council 1999).

10 (9660)
Comment - EIS001888 / 0319
The cumulative effects portion of the DEIS understates the scale and complexity of the cumulative impacts of the DOE's waste disposal program. Despite assurances in the Waste Management Programmatic Environmental Impact Statement, the DEIS does not contain an authoritative examination of the cumulative impacts of both DOE disposal programs on Nevada and Clark County. According to some estimates, the shipment of Low Level Radioactive Waste [LLW] from DOE defense [sites] across the nation to the Nevada test Site will last for approximately 70 years. The waste will be shipped by truck, and may be shipped through the most densely populated and sensitive parts of Clark County. The LLW shipping campaign will require up 12 trucks per day for the entire 70 years of the program. The chart in Figure 11 depicts the recent LLW shipments through Clark County to the Nevada Test Site.

Response
Section 8.4 of the EIS describes the cumulative impacts of past, present, and reasonably foreseeable shipments of radioactive materials throughout the nation and in Nevada. Table 8-58 lists the collective worker dose and general population dose (in person-rem), and traffic fatalities, from these actions between 1943 and 2047.

10 (9663)
Comment - EIS001888 / 0321
The DEIS provides no information about the context in which SNF [spent nuclear fuel] will be transported. There is no information about other hazardous commodities on the roads and railways. There is no discussion of the substantial impacts of the DOE's LLW [low-level radioactive waste] disposal program on Clark County and the likely relationship between the LLW and SNF disposal programs.

To rectify the substantial omissions in the DEIS, the DOE prepare a supplemental statement of cumulative impacts that describes the current context in which SNF will be transported. This additional statement must address: the current hazardous materials shipments in urban Clark County and rural Nevada for both rail and truck modes, it must describe the process used to identify and measure cumulative impacts and it must measure those impacts.

Response
Section 8.4 of the EIS discusses the cumulative impacts from the transport of radioactive materials in the region (see Appendix M). It includes the impacts of transporting waste to the Nevada Test Site under the Expanded Use Alternative (Alternative 3) described in the *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DIRS 101811-DOE 1996). This alternative includes shipments of low-level radioactive waste to the Test Site from offsite locations. Section 8.2.12.2 discusses the cumulative impacts of storing low-level waste, including the reasonably foreseeable action that the Nevada Test Site is selected as a regional DOE low-level waste disposal site. Impacts to people and the environment from shipments of nonradioactive hazardous materials on the nation's roads and railways are not examined because such shipments are unrelated to the Proposed Action, which is to transport and dispose of radioactive materials at Yucca Mountain.

Section 8.4.1.2 and Table 8-58 of the EIS summarize cumulative transportation-related radiological impacts from the Proposed Action, Inventory Modules 1 and 2, and other Federal, non-Federal, and private actions nationwide. The table summarizes potential impacts from current Federal waste transport activities. These include shipments of low-level waste to the Nevada Test Site, shipments of transuranic waste to the Waste Isolation Pilot Project in New Mexico, and shipments of spent nuclear fuel and high-level radioactive waste to various storage and disposal sites throughout the nation. DOE believes that the impacts from these shipments has been and will continue to be minor.

10 (9716)
Comment - EIS002151 / 0006
The most serious environmental disaster in the project is the soil and groundwater from nuclear testing. That deadly soil and water is moving off the Nevada Test Site. It doesn't stay contained on the test site. That's something that the workers have even talked about, the scientists have talked about, Corbin Harney has talked about, the Western Shoshone National Council has talked about, so it's important that we listen to that. The U.S. Government has already proven they will contaminate the land over a thousand times. We believe that test site has had over a thousand bombs. It's not even under a thousand.

Response
DOE describes the effects of weapons testing at the Nevada Test Site in Section 8.3.2 of the EIS.

10 (9740)
Comment - EIS001888 / 0324
[Clark County summary of comments it has received from the public.]

Requests for a review of the effects of past DOE (and predecessor) activities in Southern Nevada have not been addressed in the DEIS.

Response
Section 8.3.2.1 of the EIS describes the activities on the Nevada Test Site that could contribute to cumulative impacts with the proposed repository. Since issuing the Draft EIS, DOE has revised some of the analyses of impacts associated with the Nevada Test Site. Sections 8.2.2.2 and 8.2.7 now include information on radiation exposure from past nuclear weapons testing, and Section 8.3 now includes updated estimates of future impacts to groundwater and air resources from activities on the Nevada Test Site. Section 8.4 discusses the cumulative impacts of transportation in the region, including impacts from the Expanded Use Alternative (Alternative 3) described in the Nevada Test Site EIS (DIRS 101811-DOE 1996). This alternative includes the shipment of low-level radioactive waste to the Nevada Test Site from offsite locations. Section 8.2.12.2 of this EIS discusses the cumulative impacts from storing low-level waste, including the reasonably foreseeable action of the Test Site as a regional DOE low-level waste disposal site.

10 (9749)
Comment - EIS001888 / 0333
[Clark County summary of comments it has received from the public.]

Commenters expected the EIS to analyze the cumulative environmental and radiological risks and hazards from all past, current and proposed radioactive waste and special nuclear materials activities at Yucca Mountain, the NTS [Nevada Test Site], and surrounding environs. Commenters identified commercial and DOE-owned SNF [spent nuclear fuel], foreign research reactor SNF, HLW [high-level radioactive waste], Greater than Class C waste, special case waste, LLW [low-level radioactive waste], TRU [transuranic] waste, and special nuclear materials that should be included in these analyses. These analyses are also expected to consider transportation (all communities and Indian Nations, all routes, all modes, all rail spurs storage and/or disposal, and treatment. More specifically, commenters requested that the EIS address: (1) both the 70,000 MTHM [metric tons of heavy metal] limit and the total estimated 85,000 MTHM of SNF, (2) all DOE-owned SNF, (3) all foreign research reactor SNF (~19.2 MTHM), (4) ~28,372 canisters of HLW (to be modified to reflect decisions from Hanford's tank waste EIS), (5) ~70,000 cubic feet of Greater than Class C, and (6) ~2.6 million cubic feet of special case waste. Commenters requested that the cumulative impact analyses assess the significance of direct and indirect long-term effects on the human and natural environment, such as impacts to human health (to "downwinders," local communities, and workers), ecosystems (with reliance on the NTS resource management plan), air quality, soils, socioeconomics, and local and regional groundwater resources. Impacts should be developed in consideration of: (1) contaminant levels from past weapons testing and associated research and development activities at NTS, (2) waste disposed of or planned for disposal at the NTS, (3) waste disposed of at the Beatty low-level waste site, (4) ongoing waste management, environmental restoration, and decontamination and decommissioning activities at NTS, (5) military operations, and (6) discharge of toxic metals from abandoned mines. Cumulative impacts must be assessed in time frames that range from 1,000 to 1,000,000 years. Commenters requested that the cumulative impact analyses be supported by credible scientific data, including the development of baseline health data, which have undergone peer review. In addition, the way in which equity and fairness issues are involved should be considered.

Response
The Department believes that the Draft EIS adequately analyzed the cumulative environmental and radiological impacts of the repository. As shown in Figure 8-1 and Appendix A, the EIS analyzed several categories of nuclear materials to be placed in the repository, as follows: up to 105,000 metric tons of heavy metal of commercial and DOE spent nuclear fuel, including foreign research reactor fuel in the 15 categories of fuel analyzed (see Table A-16); over 22,000 canisters of high-level radioactive waste using the calculation method described in Appendix A; about 2,000 cubic meters (70,000 cubic feet) of Greater-than-Class-C waste; and about 4,000 cubic meters (140,000 cubic feet) of Special-Performance-Assessment-Required waste. These materials represent the currently proposed and reasonably foreseeable inventories that could be placed in the repository.

In relation to the impact assessment, Chapter 8 of the Final EIS discusses the short- and long-term cumulative effects on human health (Sections 8.2.7, 8.3.1.2, 8.3.2, 8.2.8, and 8.4.2.7); ecosystems (Sections 8.2.4 and 8.4.2.4); air quality (Sections 8.2.2, 8.3.1.2.3, 8.3.1.3.3, and 8.4.2.2); soils (Sections 8.2.4 and 8.4.4); socioeconomics (Sections 8.2.6 and 8.4.2.6); and local and regional groundwater (Sections 8.2.3, 8.3.1.2.1, and 8.4.2.3).

In the analyses described in the sections cited above, the Department considered past weapons testing and waste management activities at the Nevada Test Site (Sections 8.3.2.1.1 and 8.3.2.1.3), as well as activities at the Beatty low-level radioactive waste disposal facility (Section 8.3.2.2). The analysis did not include environmental restoration and decontamination and decommissioning activities at the Nevada Test Site. However, DOE updated Table 8-58 of the EIS to include analysis of the Expanded Use Alternative from the Nevada Test Site EIS (DIRS 101811-DOE 1996).

The Department did not include an analysis of the discharge of metals from abandoned mines for several reasons. First, older abandoned mines have been present in the area for decades, and the Department believes the impacts are captured in the baseline information discussed in Chapter 3. Second, any discharges would not result in a short-term cumulative impact with the Proposed Action because the repository would have no waterborne releases for at least 10,000 years. Third, long-term impacts of the mines are speculative because of continuing efforts to clean up the abandoned mines. This issue is being addressed not only by the State of Nevada but also by the U.S. Congress. In March 2000, Congressman Jim Gibbons (Nevada) introduced House Resolution 2753, Abandoned Mine Restoration

Act of 1999. This legislation, and other similar legislation, could provide the means to restore the environment of mines, removing any toxic metals that could cause further harm to the environment in the future. The number of mines that would be included in this effort is still unknown, as are the cleanup criteria that might be applied.

10 (9752)
Comment - EIS001888 / 0335
[Clark County summary of comments it has received from the public.]

Several commenters requested that the EIS reveal and otherwise evaluate the effect of past DOE activities in southern Nevada. More specifically, commenters requested (1) a history of decisions by DOE (and DOE-predecessors the Energy Research and Development Administration and the Atomic Energy Commission) that have affected the health and safety of organisms within a 700-mile radius of Yucca Mountain, (2) a summary of Research conducted on the effects on health and safety from radiation exposure, (3) a list and summary of past and pending litigation on radiation exposure, (4) that the EIS examine the global risks from nuclear-related activities, and environmental restoration and waste management at the NTS [Nevada Test Site], including the transportation of wastes, and (5) that the repository EIS be coordinated with the EIS on the NTS.

Response
In response to item 1 of the comment, Chapter 8 of the EIS describes the cumulative impacts from the repository, along with past, present, and reasonably foreseeable future actions at the Nevada Test Site, Nellis Air Force Base, the Beatty low-level radioactive waste disposal site, and other non-Federal actions in the affected area (see Table 8-1). With the exception of some factual changes and clarifications in the Final EIS, DOE believes that the Draft EIS adequately characterized the cumulative impacts associated with the proposed repository, which includes activities at the Nevada Test Site.

In relation to item 2, the effects of radiation on health and safety have been studied extensively over the past century and are better known than those of most toxins. Our current knowledge about the health effects of radiation is based in large part on exposures of individuals to large doses of radiation that exceed any U.S. public or worker dose limit. Appendix F of the EIS contains more information about the current state of knowledge about the health effects of radiation.

In response to item 3 of the comment, DOE did not include a summary of past and pending litigation on radiation exposure because this information would not aid decisionmakers to evaluate the potential impacts of the repository. Worker protection and the long-term performance of the repository are governed by established radiation protection standards. It is against these standards that the radiological impacts of the repository will be judged.

In relation to item 4, the EIS did not report potential global impacts to environmental "commons," such as surface waters, because there would be no release of radioactive material to major rivers, and thus no releases to the oceans. As stated by the National Academy of Sciences (DIRS 100018-National Research Council 1995), "…the most likely pathway for global distribution are gaseous releases of carbon dioxide containing the radioactive isotope of carbon-14, that eventually will escape from the waste containers, or by widespread distribution of foodstuffs grown with contaminated water." However, the National Academy of Sciences also stated, "In general, the risks of radiation produced by such wide dispersion are likely to be several orders of magnitude below those to a critical group." For example, the Academy estimated that the average dose to members of the global population, based on the release of 91,000 curies of carbon-14, to be 0.003 microsievert per year (0.0003 millirem per year). The Academy equated that to an annual risk of fatal cancer of 1.5 in 10 billion (1.5×10^{-10}). For comparison, the standard set by the Environmental Protection Agency in 40 CFR Part 197 of 15 millirem per year for the reasonably maximally exposed individual is a factor of 50,000 times higher.

Because of large uncertainties, the Department considers estimates of global health effects highly speculative and, therefore, did not estimate global collective doses or health effects in the EIS. However, the Department agrees with the Environmental Protection Agency (64 *FR* 46976, August 27, 1999) and the National Council on Radiation Protection and Measurements (DIRS 101858-NCRP 1995) that, for purposes of optimizing protectiveness of design alternatives, estimation of population doses is merited. However, the Department believes that information important to design optimization can be obtained by estimating collective dose to the regional populations within 80 kilometers [50 miles] of the repository, thereby precluding the need to perform the more speculative, global health risk calculations. For these reasons, the EIS evaluated in detail potential radiological exposures to the reasonably maximally exposed individual and regional populations (80 kilometers) from both groundwater and atmospheric pathways. Sections 5.4 and 5.5 present the results of these evaluations for waterborne and atmospheric releases, respectively.

In relation to item 5 of the comment, the repository EIS is consistent with information and analyses in the Nevada Test Site EIS (DIRS 101811-DOE 1996). As indicated in Section 8.3.2.1.1 of the repository EIS, the Nevada Test Site EIS was used as a source of information for cumulative long-term impacts. Furthermore, the Nevada Test Site EIS was a source document for the transportation impacts described in Section 8.4.1.2 of the repository EIS. In addition, representatives of the Yucca Mountain Project and the Nevada Test Site continue to maintain an open dialogue to ensure that decisions made at either facility support the common goals of both facilities and protect the environment and the health and safety of workers and the public.

10 (9887)
Comment - EIS001888 / 0435
In general, the EIS should estimate the "long-term cumulative impacts to the environment and therefore to humans."

Response
Chapter 8 describes the cumulative long-term impacts of the repository, along with the impacts of past, present, and reasonably foreseeable activities in the affected region. Geologic and hydrologic studies and computer modeling conducted by DOE, the U.S. Geological Survey, and other organizations indicate that the repository would perform in compliance with 40 CFR Part 197.

10 (10006)
Comment - EIS001888 / 0502
[Clark County summary of comments it has received from the public.]

Cumulative impacts are not being adequately measured.

Response
Chapter 8 of the EIS describes the cumulative impacts from a repository at Yucca Mountain, along with past, present, and reasonably foreseeable future actions at the Nevada Test Site, Nellis Air Force Base, the Beatty low-level radioactive waste disposal site, and other non-Federal actions in the affected area (see Table 8-1). In preparing Chapter 8, DOE reviewed many documents to determine the potential for cumulative impacts. These documents included resource management plans, EISs, environmental assessments, and records of tribal meetings prepared by Federal, state, local, and private organizations. DOE believes that the EIS adequately characterizes the cumulative impacts associated with the proposed repository.

10 (10259)
Comment - EIS002216 / 0001
Well, I'd like to pose the question about the existing contamination, the ongoing low-level waste disposal and the existing contamination that's at the Nevada Test Site [NTS] right now, especially those of you folks that are in Amargosa.

We don't have a monitoring network out there for you folks yet. We don't know where the source term is going. It's not protected by engineered barrier.

So this is more directed toward people who are working on the Yucca Mountain Project because with the advisory board and the existing citizen interest, we don't address the existing contamination very well at all, and that program is moving forward without much public scrutiny, with a lack of oversight.

The governor's requested 40 million more dollars to throw at the program, and like Yucca Mountain, you just don't just solve a problem by throwing more money at it.

You've got to have some oversight, some technical strategy. You've got to have a plan.

The NTS is on the stage of becoming the nation's premier low-level waste disposal facility, and there's not much the State of Nevada can do to stop that.

And the existing contamination has been in the groundwater for years and we don't know the extent or the duration and the magnitude of that contamination.

Response
As a result of monitoring concerns expressed by many commenters, DOE has supported Nye County in its program (called the *Early Warning Drilling Program*) to characterize further the saturated zone along possible groundwater pathways from Yucca Mountain as well as the relationships among the volcanic, alluvial, and carbonate aquifers. Information from the ongoing site characterization program (and possible Testing and Performance Confirmation Program, which is described below) would be used in conjunction with that of the Early Warning Drilling Program to refine the Department's understanding of the flow and transport mechanics of the saturated alluvium and valley-fill material south of the proposed repository site, and to update conceptual and numerical models used to estimate waste isolation performance of the repository. When DOE published the Draft EIS, only limited information from the Early Warning Drilling Program was available. Since then, however, this program has gathered additional information, which DOE has incorporated in the EIS.

In addition, DOE has installed a series of test wells along the groundwater flow path between the Yucca Mountain site and the Town of Amargosa Valley as part of an alluvial testing complex. The objective of this program is to better characterize the alluvial deposits beneath Fortymile Wash along the east side of Yucca Mountain. Single- and multiwell tracer tests have begun and the results thus far have strengthened the basis of the site-scale saturated flow and transport model. Information from this program has been incorporated in the EIS.

If the site was approved, DOE would institute a Testing and Performance Confirmation program, elements of which would address the hydrologic system. The purpose of this program would be to further evaluate the accuracy and adequacy of the information used to determine whether the repository would meet long-term performance objectives. The Testing and Performance Confirmation program, which would continue through closure of the repository (possibly as long as 300 years), would offer a means to further understanding of the hydrologic system and reduce uncertainties.

10 (10691)
Comment - EIS002141 / 0002
It is almost absurd that an Environmental Impact Statement is being done for the Nevada Test Site when you consider that there are almost 1,000 repositories already there. I understand that you have to prepare [an] Environmental Impact Statement, but the truth is the nuclear weapons program has already created all of those repositories.

The Environmental Impact Statement should consider the environmental impact of Yucca Mountain in the context of the fact that these repositories are already there. The additional impact of a well designed, highly controlled repository will be zero and the Environmental Impact Statement should reflect that.

Response
The Draft EIS contained results of a cumulative groundwater impact analysis which included potential impacts from past weapons testing and low-level radioactive waste disposal at the Nevada Test Site. However, for the Final EIS, DOE completed additional, more detailed analyses based on the most recent data available. Section 8.3.2.1.1 contains the results.

10 (10878)
Comment - EIS000053 / 0001
The Military Lands Withdrawal Act of 1986 required the preparation of the Special Nevada Report. This report, finalized in September 1991, contains a description of current and proposed defense-related activities in the State of Nevada, an analysis of their impacts, and possible actions that could be taken to mitigate those impacts. The report was prepared jointly by the Departments of the Air Force, Navy, and Interior with the Department of Army and Department of Energy listed as cooperating agencies. Per Section 6(b)(1)(D) of The Act, the Special Nevada Report

was mandated to include the lands withdrawn or being considered for withdrawal for use by the Department of Energy.

With respect to water resources, a number of impacts were found to result from the cumulative land withdrawals including the lack of access to potentially developable water resources, water quality impairment resource

consumption by federal agencies, and resource competition with non-federal water users. Page 8-97 of the Special Nevada Report states that:

"The withdrawal of land from public access and/or the purchase of water rights by DOD and DOE has the greatest potential for effects on Nevada....The water resources associated with these lands could, if they exist and were available, play an important role in the continued growth of southern Nevada."

The Special Nevada Report is not referenced in the Draft EIS for Yucca Mountain nor are the direct, indirect, or cumulative impacts of federal land withdrawals and water use considered and evaluated. These impacts are significant. The failure of the Draft EIS for Yucca Mountain to incorporate the findings of the Special Nevada Report is a serious inadequacy in the document. The Draft EIS must be revised to include these findings of the Special Nevada Report and must include an evaluation of the cumulative consequences of the land withdrawal for the proposed repository at Yucca Mountain.

Response
DOE has revised Section 8.2 of the EIS to include a discussion of the *Special Nevada Report* (DIRS 153277-SAIC 1991). It should be noted, however, that the *Special Nevada Report* is more than 10 years old and many changes have occurred since the report was prepared. In its analysis of cumulative impacts in the Draft EIS, the Department was obligated to consider past, present, and reasonably foreseeable future actions based on the current understanding of these actions. For that reason, the *Special Nevada Report* was not referenced in the Draft EIS. Instead, the Department reviewed current resource plans prepared by Federal agencies, EISs and environmental assessments, tribal meeting records, and other documents representing Federal, State, local, and private organizations to determine past, present, and reasonably foreseeable actions that, combined with the proposed repository, could contribute to cumulative impacts. For example, recent National Environmental Policy Act documents for the Nevada Test Site and the Nevada Test and Training Range (formerly known as the Nellis Air Force Range) describe past, present, and future activities for those areas. DOE considered those activities in the cumulative impacts analyses in Chapter 8 of the EIS.

10 (11101)
Comment - EIS002135 / 0007
But in my written statement which I will present, I will attempt to show why the DEIS fails to adequately address the cumulative impacts of the entire nuclear chain for mining nuclear weapons and nuclear waste production, which I believe that this DEIS should show; not just Yucca Mountain, but it should show the cumulative impacts of the entire nuclear chain.

Response
Chapter 8 of the EIS discusses the impacts of the repository along with past, present, and reasonably foreseeable future actions that could be spatially and temporally related to impacts of the repository. Activities and impacts that are outside the affected area, including the mining of uranium, are not within the scope of the EIS.

For information about the impacts of mining uranium, see the Nuclear Regulatory Commission's analyses in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (DIRS 101899-NRC 1996).

10 (11178)
Comment - EIS000466 / 0010
The draft EIS does not consider cumulative impact.

Response
Chapter 8 of the EIS is devoted entirely to cumulative impacts.

10 (11407)
Comment - EIS002251 / 0005
The EIS is national in scope, but I think we have a world-wide problem here. We all know that radiation is spread throughout the world from numerous events from the Nevada Test Site. And I think that the DOE needs to consider the whole world in its comments on this, because the whole world and all animal life and plant life are being affected now as we see higher and higher rates of cancer and the declining species in this world.

Response
The repository EIS does not report global adverse impacts because such impacts would be negligible. As stated by the National Academy of Sciences "..the most likely pathway for global distribution are gaseous releases of carbon dioxide containing the radioactive isotope of carbon-14, that eventually will escape from the waste containers, or by widespread distribution of foodstuffs grown with contaminated water." However, the Academy stated, "In general, the risks of radiation produced by such wide dispersion are likely to be several orders of magnitude below those to a critical group." For example, the Academy estimated that the average dose to members of the global population, based on the release of 91,000 curies of carbon-14, is 0.0003 millirem per year, and equated that to an annual risk of fatal cancer of 1.5 in 10 billion (DIRS 100018-National Research Council 1995). For comparison, the individual dose standard set by the Environmental Protection Agency in 40 CFR Part 197 of 15 millirem per year for the maximally exposed individual is 50,000 times that dose.

Because of large uncertainties, DOE considers estimates of global health effects to be highly speculative and, therefore, did not estimate global collective doses or health effects in the EIS. However, DOE agrees with the Environmental Protection Agency (64 *FR* 46976, August 27, 1999) and the National Council on Radiation Protection and Measurements (DIRS 101858-NCRP 1995, Report 121) that optimizing the protectiveness of design alternatives merits the estimation of population doses. The Department believes it can obtain information important to design optimization by estimating collective dose to the regional populations within 80 kilometers (50 miles) of the repository, thereby precluding the need to perform the more speculative global health risk calculations. For these reasons, the EIS evaluated in detail potential radiological exposures to the maximally exposed individual and regional populations (80 kilometers) from both groundwater and atmospheric pathways. Sections 5.4 and 5.5 of the EIS describe the results of these evaluations for waterborne and atmospheric releases, respectively.

10 (11490)
Comment - EIS002254 / 0003
What will it take to stop ongoing contamination?

Response
Assuming the commenter's reference to "ongoing contamination" means the Nevada Test Site, DOE is conducting widespread monitoring and remediation of selected sites that were contaminated by past activities on the Nevada Test Site. With regard to the repository, the NWPA requires DOE to study Yucca Mountain to determine its suitability for use as a repository, and to prepare an EIS that describes the impacts of such a repository. Modeling of the long-term performance of the repository shows that the combination of natural and engineered barriers at the site would keep releases below the limits established for the repository by the Environmental Protection Agency in 40 CFR Part 197.

10 (11505)
Comment - EIS002137 / 0006
Alternate routes. I'll give you an alternate route: To Carlin, the railroad system. Out of the -- out of the county called Clark right through the geographical center of the State of Nevada. Once the waste is hauled, what do we have? We have a railroad system for the economic development and issues of geographical center for the State of Nevada.

Response
In the Final EIS DOE identifies mostly rail as its preferred mode of transportation both nationally and in the State of Nevada. DOE has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was recommended and approved, DOE would issue, at some future date, a Record of Decision to select a mode of transportation. Thereafter, for example, if mostly rail was selected (both nationally and in Nevada), DOE would then identify a preference for one of the rail corridors in consultation with affected stakeholders,

particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in the State of Nevada. If rail was selected in Nevada, DOE has committed to preparing additional National Environmental Policy Act studies and documentation for the specific alignment of a rail route within the selected rail corridor.

10 (11522)
Comment - EIS002252 / 0008
The Draft Environmental Impact Statement fails to adequately address cumulative impacts for the entire nuclear chain for mining, nuclear weapons, and waste production.

Response
The cumulative impact assessment in Chapter 8 of the EIS includes past, present, and reasonably foreseeable actions in the affected area. Many studies have addressed, in quantifiable terms, the radiation levels in the environment from the nuclear fuel cycle. DOE believes that the baseline descriptions of the affected environment in Chapter 3 capture background levels of radiation that persist in the environment from nuclear facilities such as uranium mines, mills, fuel-processing plants, nuclear powerplants, and waste transport. According to the *Final EIS for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Components* (DIRS 103218-DOE 1996), the estimated dose to individuals from the nuclear fuel cycle is less than 1 millirem per year. That is, radioactive fallout from atmospheric weapons tests, emissions of radioactive material from DOE facilities, emissions from mineral extraction facilities, and transportation of radioactive materials combined contribute less than 1 millirem per year to the average dose to an individual.

10 (12092)
Comment - EIS002307 / 0006
Section 6 of the DEIS is incorrect about the transportation risks involved because the DEIS uses highway conditions that do not reflect actual highway conditions that would be present in transporting the spent nuclear fuel.

Response
The transportation analysis in Chapter 6 of the EIS used the best available information concerning the condition of highways being considered for waste transport. In addition, highway conditions, including accident and fatality rates, would be unlikely to change much between now and the time when waste shipments could begin.

10 (12123)
Comment - EIS001887 / 0422
Integration of policies within and among government agencies is necessary to prevent wasteful duplication. The NEPA [National Environmental Policy Act] process is meant to minimize conflicting goals by integrating related activities, legislation, and policies to avoid internal and interagency conflicts. Often, threats to the environment can be traced to unintended effects of conflicting federal efforts. Avoidance of this by integrating government activities is a direct purpose of NEPA for encouraging productive harmony between humans and their environment. Thus, the EIA [environmental impact assessment] process should reveal the need for integrated federal public works planning to minimize conflicting programs. However, much federal activity and related legislation is in response to particular considerations with little effort given to inadvertent consequences, environmental effects, socioeconomic impacts, or other consequences. In a pluralistic democratic society, each stakeholder group pushes its agenda with indifference to the values of other groups, and often federal agencies make no effort to avoid the shortcoming. Once again, in programs such as the YMP [Yucca Mountain Project], it is necessary that potential conflicts between future projects be addressed in a reasonably foreseeable manner. The Yucca Mountain region in particular is susceptible to such long-term impacts that have to be addressed in a context of ecosystem management. Such is among the intents of the existing Five-Party Cooperative Agreement for the region that DOE has refused to adopt for the YMP.

Response
The five-party Cooperative Agreement coordinates and enhances management of natural resources in the Great Basin and Mojave Desert ecosystems on the Nellis Air Force Range, Desert National Wildlife Range, and the Nevada Test Site. The five agencies are DOE's Nevada Operations Office (operator of the Nevada Test Site), the U.S. Air Force (operator of the Nellis Air Force Base), the Bureau of Land Management's Las Vegas Field Office,

the U.S. Fish and Wildlife Service, and the State of Nevada. If the repository was recommended and approved for development, DOE would consider including the Yucca Mountain Project in the Cooperative Agreement, and would reevaluate the need for a site-specific land-use plan to ensure compliance with all applicable requirements. That plan, based on the principles of ecosystem management and sustainable development, would formally synthesize the Yucca Mountain Project policies and procedures already in place; draw on the successes of the Resource Management Plan for the Nevada Test Site; and solicit input from Federal and State agencies, stakeholders, and the general public.

DOE agrees it is important to interact with other agencies to minimize conflicting programs or actions. Appendix C of the EIS describes agency interactions. One of the purposes of these interactions is to discuss issues of concern with organizations that have an interest in or authority over land that repository-related actions could affect or with some other interest the Yucca Mountain Project could affect. In addition, DOE has solicited and documented input from stakeholder groups through the EIS scoping process, comments on the Draft EIS, and other means. These interactions are described in the *Summary of Public Scoping Comments Related to the Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nevada* (DIRS 104630-YMP 1997) and in this Comment-Response Document.

Chapter 8 of the EIS estimates the potential cumulative impacts associated with various agency actions in the defined region of influence. The actions identified were based on documents issued by, and discussions with, DOE's Nevada Test Site, the U.S. Air Force, the Bureau of Land Management, the U.S. Fish and Wildlife Service, and the State of Nevada. The documents include resource management plans, EISs, environmental assessments, strategic plans, consultation documents, and tribal meeting records prepared by Federal, state, local, and private organizations.

10 (12247)
Comment - EIS001816 / 0027
Cumulative Impacts: In the year 2010 it is possible that on the roads in Lincoln and especially Nye County, there could be nuclear waste transportation by truck from three sources: 1) Yucca Mountain HLW/SNF [high-level radioactive waste/spent nuclear fuel]; 2) DOE NTS [Nevada Test Site] LLW [low-level radioactive waste] disposal; and 3) DOE NTS Plutonium soil cleanup. The DEIS must analyze for the estimated number of trucks that would move on Nevada roads each day under this possible scenario. The DEIS must analyze for how much emergency response training and other mitigation effort would be required to adequately manage this much potential nuclear waste transportation in Southern Nevada.

Response
DOE has expanded Section 8.4.2 of the Final EIS to include an assessment of the cumulative impacts in Nevada of transporting transuranic radioactive materials from high- and low-level radioactive sites to the Nevada Test Site. Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions the Department would transport spent nuclear fuel and high-level radioactive waste. The training shall cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. If there was a decision to proceed with the development of a repository at Yucca Mountain, shipping routes would be identified approximately 5 years before shipments began and Section 180(c) assistance would be made available approximately 4 years prior to shipments through a jurisdiction. See Section M.6 of the EIS for a discussion of the DOE Section 180(c) policy and procedures.

The Price-Anderson Act establishes a system of financial protection (compensation for personal injury and property damage, including loss of use of property) for the public in a nuclear accident, regardless of who causes the damage. See Section M.8 of the EIS for a discussion of the Price-Anderson Act.

10 (12248)
Comment - EIS001816 / 0010
Section 8.3 Cumulative Long Term Impacts (page 8-73): It has reported that Area 25 will eventually come under the administrative control and responsibility of the DOE-YM [Yucca Mountain] program. It has also been reported that the radioactive contamination in parts of Area 25 particularly to support the nuclear rocket program will come under the stewardship of the entity responsible for managing Area 25. If the NTS EM [Environmental Restoration

and Waste Management] program eventually completes its mission in the next decade and DOE-YM is the designated steward for Area 25, the DEIS must analyze the DOE-YM requirement to negotiate a FFACO [Federal Facility Agreement and Consent Order]-like agreement with the State of Nevada to become the legal steward and subsequent environmental manager for all Area 25 sites.

Response
DOE has not determined future responsibilities for the management of Area 25. There are no known sites in Area 25 where spent nuclear fuel has been buried. Parts from the old nuclear rocket program, and perhaps some fuel from this program, might be buried somewhere in Area 25, but nothing definite is known about the nature of the material or where it might be buried. This material was not accounted for in the cumulative impacts analysis because its existence, location, amount, and characteristics are not known.

10 (12271)
Comment - EIS001879 / 0023
p. 8-59 through 8-73, Section 8.3.1

The EIS should state that chromium groundwater concentrations would exceed the Maximum Contaminant Level at the 95th percentile for the Inventory Module 1 high thermal load scenario at 5 and 20 kilometers.

Response
DOE has revised Section 8.3.1 to include appropriate comparisons of chromium groundwater concentrations with Maximum Contaminant Level Goals. The estimated peak concentration of chromium in well water during the 10,000-year postclosure period from the Proposed Action or from Inventory Module 2 would be far below the Maximum Contaminant Level Goals listed in Table 8-52 of the Final EIS.

10 (12319)
Comment - EIS010242 / 0030
Page 3-22: Section 3.3 - Cumulative Impacts

Cumulative impacts should be re-evaluated based on responses to the comments provided above, [additional truck shipments, hazardous metals, etc.] as some will result in potentially significant changes in the assessment.

Response
Since the issuance of the Supplement to the Draft EIS, the Department has continued to evaluate actions in the region of influence that could pose a potential cumulative impact. As a result of these reviews, the Department identified several new actions for which information was not available for the Draft EIS. These actions come from several agencies and private companies. For instance, Chapter 8 of the Final EIS contains an expanded discussion of the Timbisha Shoshone Homeland Act, along with possible implications to groundwater rights. Chapter 8 also contains discussions of other actions by the Bureau of Land Management (such as the Ivanpah Cargo Airport and the Moapa Paiute Energy Center), and these actions were considered when evaluating the cumulative impacts for the technical discipline areas.

As part of the updated analyses, the Department has expanded the land-use discussion of Section 8.2.1 to specifically address the known actions that have been identified since the publication of the Draft EIS. Where possible, the Department has identified changes in land use along with estimates of acres to be disturbed and possible impacts with other actions in the area. In addition, all discipline areas (for example, biological resources and cultural resources) were reviewed to ensure that the appropriate level of discussion was included to address the potential cumulative impacts of all the actions. Not all actions could be evaluated to the same level of detail because information was not always available to allow an in-depth evaluation.

10 (12338)
Comment - EIS001879 / 0009
The Military Lands Withdrawal Act of 1986 required the preparation of the Special Nevada Report. This report, finalized in September 1991, contains a description of current and proposed defense-related activities in the State of Nevada, an analysis of their impacts, and possible actions that could be taken to mitigate those impacts. The report was prepared jointly by the Departments of the Air Force, Navy, and Interior with the Department of Army and

DOE listed as cooperating agencies. Per Section 6(b)(1)(D) of the Act, the Special Nevada Report was mandated to include the lands withdrawn or being considered for withdrawal for use by the DOE.

With respect to water resources, a number of impacts were found to result from the cumulative land withdrawals including the lack of access to potentially developable water resources, water quality impairment, resource consumption by federal agencies, and resource competition with non-federal water users. Page 8-97 of the Special Nevada Report states that:

“The withdrawal of land from public access and/or the purchase of water rights by DOD [the Department of Defense] and DOE has the greatest potential for effects on Nevada... The water resources associated with these lands could, if they exist and were available, play an important role in the continued growth of southern Nevada.”

The Special Nevada Report is not referenced in the Draft EIS for Yucca Mountain. Neither are the direct, indirect, or cumulative impacts of federal land withdrawals and water use considered and evaluated. These impacts are significant. The failure of the Draft EIS to incorporate the findings of the Special Nevada Report is a serious inadequacy in the document. These impacts continue to occur, have never been mitigated, and will be exacerbated by the additional land withdrawal and subsequent constraints on water availability. The EIS must be revised to include the findings of the Special Nevada Report and must include an evaluation of the cumulative consequences of the land withdrawal for the proposed repository at Yucca Mountain.

It is not acceptable for the DOE to assert that the Special Nevada Report has been superseded by recent NEPA [National Environmental Policy Act] documents prepared by the Departments of Energy, Defense, or the Interior as the Special Nevada Report is not a NEPA document but rather an independent evaluation of impacts. That recent NEPA documents prepared by these Departments did not take into account the findings of the Special Nevada Report represents the continued failure of federal agencies to perform adequate impact evaluations in the preparation of those documents, and is not a valid basis for the DOE to also ignore the findings of this important Congressionally mandated report.

Response
Chapter 8 of the Final EIS has been revised to include a discussion of the *Special Nevada Report* (DIRS 153277-SAIC 1991). It should be noted, however, that the *Special Nevada Report* is more than 10 years old, and many changes have occurred since the report was prepared. For instance, in December 1998 the Navy decided to reduce sharply its request to withdraw airspace over central Nevada, even though the impacts of a larger withdrawal were discussed in the *Special Nevada Report* (for information about the Navy’s current airspace requirements in Nevada. The Department is obligated to provide technical analyses based on the current state of knowledge. For that reason, the Department did not reference the *Special Nevada Report* in the Draft EIS. Instead, the Department reviewed current resource plans, EISs, environmental assessments, tribal meeting records, and other documents prepared by Federal, state, local, and private organizations as a means to determine past, present, and reasonably foreseeable actions that, combined with the repository, could contribute to cumulative impacts.

10 (12381)
Comment - EIS001888 / 0389
[Clark County summary of comments it has received from the public.]

Commenters suggested that the analyses address cumulative impacts considering both (1) critical habitats for threatened, endangered, and sensitive species, including impacts from radiation exposure during accident-free operations and from accidents, and (2) impacts to wildlife habitat and migration (wild horses, bald eagles), and big game populations along transport corridors/corridor improvements/borrow areas (Big Smoky Valley, Lincoln County, Clark County, Elko region) and the loss of hunter-generated revenue.

Response
Section 8.2.4 of the EIS describes short-term cumulative impacts to biological resources from the construction and operation of the proposed repository. DOE expects such impacts to be negligible during incident-free operations and from accidents. Section 5.9 addresses impacts to biological resources after repository closure. Because radiological impacts to humans would be small (within the regulatory limits established by 40 CFR Part 197), DOE did not quantify impacts to biological resources from exposure to contaminated groundwater.

Section 6.1.2.4 of the EIS summarizes impacts to biological resources from waste transport through Nevada, and Sections 6.3.1.1, 6.3.2, and 6.3.3 describe these impacts in more detail for legal-weight truck, rail, and heavy-haul truck and associated intermodal transfer stations, respectively. Loss of wildlife habitat from construction of a branch rail line would be the greatest potential impact to biological resources, potentially affecting the desert tortoise, a threatened species. Loss of desert tortoise habitat would amount to approximately 2.4 square kilometers (590 acres) for the Caliente-Chalk Mountain Corridor, 3 square kilometers (740 acres) for the Caliente and Carlin Corridors, 5 square kilometers (1,200 acres) for the Valley Modified Corridor, and more than 11 square kilometers (2,700 acres) for the Jean Corridor. All the corridors have a low abundance of desert tortoises with the exception of limited areas along the Jean Corridor where abundance is higher.

The potential for impacts from upgrading Nevada highways for heavy-haul truck use would be small because road modifications would occur in previously disturbed rights-of-way. The construction of an intermodal transfer station could disturb about 0.2 square kilometer (50 acres) of desert tortoise habitat. Other special-status species could be affected, depending on the route. Impacts from Nevada transportation operations, with the exception of infrequent wildlife kills by vehicles, would be unlikely. As with heavy-haul trucks, legal-weight truck shipments would have negligible impacts on biological resources because they would use existing highways.

Economic impacts from the loss of hunting revenues would be negligible from the construction and operation of a branch rail line or an intermodal transfer station. DOE bases this conclusion on the analyses in Chapter 6 of the EIS that show impacts to wildlife from any of the transportation implementing alternatives would be small.

In the Final EIS, DOE identifies mostly rail as its preferred mode of transportation both nationally and in the State of Nevada. DOE has not identified a preference among the five candidate rail corridors in Nevada. If the Yucca Mountain site was recommended and approved, DOE would issue, at some future date, a Record of Decision to select a mode of transportation. Thereafter, for example, if mostly rail was selected (both nationally and in Nevada), DOE would then identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in the State of Nevada. If rail was selected in Nevada, DOE has committed to preparing additional National Environmental Policy Act studies and documentation for the specific alignment of a rail route within the selected rail corridor.

10 (12589)
Comment - EIS001816 / 0008
Section 8.3 Cumulative Long Term Impacts (page 8-76): The Federal Facility Agreement and Consent Order (FFACO) requires the DOE-NV [the DOE Nevada Operations Office] to determine the contaminant boundary for underground testing radioactive water at the NTS [Nevada Test Site] for a 1,000 year period. The contaminant boundary will be based on the 4 millirem/year standard for groundwater. Yucca Mountain must explain why it prefers the groundwater standard of the EPA [Environmental Protection Agency] over the NRC [Nuclear Regulatory Commission] to set this performance standard for the repository. If the NTS UGTA [Underground Test Area] program has to define groundwater contaminant boundaries at 4 millirem/year, and the State of Nevada has to define compliance boundaries at 4 millirem/year, Yucca Mountain should adhere to the same standard just in case existing plumes migrate closer to and beneath the repository footprint. Existing NTS radioactive contamination occurs in the same hydrologic units as those predicted to be contaminated by leakage from the repository over time, therefore, the DEIS must analyze for the 4 millirem/year standard and the reasons for regul [sentence cut off].

Response
The Nuclear Waste Policy Act, as amended, directed the Environmental Protection Agency and the Nuclear Regulatory Commission to develop standards for the performance of the proposed repository at Yucca Mountain and these agencies have done so. The Environmental Protection Agency's standards are at 40 CFR Part 197 and the Nuclear Regulatory Commission's standards are at 10 CFR Part 63.

The 10,000-year peak dose reported in the EIS at the 95th percentile for the Proposed Action would be 0.58 millirem per year at 18 kilometers (11 miles). The dose would decrease to 0.28 millirem per year at 30 kilometers (19 miles), which is the distance to most of the population that could be affected by groundwater transport (see Table 5-4).

Even with the addition of radiological contaminants from past weapons testing on the Nevada Test Site, and the possibility of additional wastes at the repository (Inventory Modules 1 and 2), the cumulative dose at 18 kilometers would be about 2.6 millirem per year. Even though not legally bound by the Federal Facility Agreement and Settlement Order standard, the performance of the repository would be compatible with that Order.

10 (12599)
Comment - EIS010279 / 0019
The description of *Cumulative Impacts (p. 3-22)* is completely inadequate. Stating that cumulative impact changes between the DEIS designs and the proposed designs in the SDEIS would be "proportional" or a "20-percent increase" does not explain anything. Cumulative impacts of the present designs of the proposed project need to be evaluated in plain language.

Response
DOE regrets the confusion. As described at the end of Section 3.3 of the Supplement to the Draft EIS, DOE expected the cumulative impacts associated with the flexible design to be essentially the same as the cumulative impacts described in Chapter 8 of the Draft EIS. DOE has continued to evaluate actions since the Supplement was issued and has updated Chapter 8 accordingly.

10 (12697)
Comment - EIS001816 / 0006
Section 8.3 Cumulative Long Term Impacts (page 8-76): the statement regarding no radioactive contamination attributable to underground tests has been detected in monitoring wells off the Nevada Test Site [NTS]. There is a saying that goes, "Absence of evidence is not evidence of absence." There is no state of the art monitoring system on or off of the NTS, because the federal government hasn't constructed one based on where [contaminants] are know to migrate. It is highly likely that underground test contamination is past the NTS boundary because the phenomenon of prompt injection has probably blown the radionuclides past the NTS boundary the same way it probably blew Europium 0.8 miles at the Benham test site with some assistance from colloids. Yucca Mountain must analyze how to establish a joint effort with the UGTA [Underground Testing Area] program to establish a state of the art monitoring network in Nye County to monitor both existing and future radionuclide contamination in the groundwater system.

Response
The Yucca Mountain Project has a working relationship with the Nevada Test Site's Underground Test Area Program to produce a regional groundwater flow model of the Death Valley hydrologic system. DOE will continue to foster this relationship to plan for future groundwater studies and groundwater monitoring.

As a result of monitoring concerns expressed by many commenters, DOE has supported Nye County in its program (called the *Early Warning Drilling Program*) to characterize further the saturated zone along possible groundwater pathways from Yucca Mountain as well as the relationships among the volcanic, alluvial, and carbonate aquifers. Information from the ongoing site characterization program (and possible performance confirmation program, which is described below) would be used in conjunction with that of the Early Warning Drilling Program to refine the Department's understanding of the flow and transport mechanics of the saturated alluvium and valley-fill material south of the proposed repository site, and to update conceptual and numerical models used to estimate waste isolation performance of the repository. When DOE published the Draft EIS, only limited information from the Early Warning Drilling Program was available. Since then, however, this program has gathered additional information, which DOE has incorporated in the EIS.

In addition, DOE has installed a series of test wells along the groundwater flow path between the Yucca Mountain site and the Town of Amargosa Valley as part of an alluvial testing complex. The objective of this program is to better characterize the alluvial deposits beneath Fortymile Wash along the east side of Yucca Mountain. Single- and multiwell tracer tests have begun and the results thus far have strengthened the basis of the site-scale saturated flow and transport model. Information from this program has been incorporated in the EIS.

If the site was approved, DOE would institute a Testing and Performance Confirmation Program, elements of which would address the hydrologic system. The purpose of this program would be to evaluate the accuracy and adequacy of the information used to determine whether the repository would meet long-term performance objectives. The

Testing and Performance Confirmation Program, which would continue through closure of the repository (possibly as long as 300 years), would offer a means to further understanding of the hydrologic system and reduce uncertainties.

10 (13310)

Comment - EIS010317 / 0006

Section 3.3 of the DEIS-S is titled "Cumulative Impacts." This section consist of just two short paragraphs. The FEIS should devote far more space to this section. For example, the new proposals for installing titanium shields over the waste package will require the mining of large quantities of titanium ore, frequently in other parts of the world. It would be appropriate to examine the cumulative environmental impact of extracting, processing and transporting such large amounts of titanium. Also, an evaluation should be made to assess the possible impact on other users of titanium such as the U.S. aerospace industry and the U.S. submarine construction industry. Since the proposals include the use of large quantities of other expensive metals, such as nickel and molybdenum and chromium, and environmental examination of the environmental impacts of their extraction, production and transport would be in order.

Response

The Supplement to the Draft EIS addressed the requirements for, and the availability of, titanium, and compared these requirements to U.S. production (see Section 3.1.15 of the Supplement). Section 4.1.15.5.4 of the Final EIS also addresses titanium requirements. The Department recognizes that a substantial amount of titanium would be required for the drip shields. The impacts of acquiring titanium were not examined in the Supplement or in the Final EIS because this material would not be required for almost 100 years.

The Draft EIS addressed the requirements for, and the availability of, nickel, molybdenum, and chromium, and compared these requirements to U.S. production. Section 4.1.15.5.4 of the Final EIS also addresses these requirements. As stated, the annual demand for nickel by the Yucca Mountain Project would be less than 1 percent of U.S. consumption and about 0.1 percent of world production. Because the Project's demand for these materials would not be expected to affect U.S. or world markets, the impacts of acquiring these materials were not examined in the EIS.

10 (13311)

Comment - EIS010317 / 0007

Another cumulative impact that was not mentioned in the DEIS-S, and only hinted at in the DEIS, involves the nearly one thousand underground nuclear detonations conducted at the adjacent Nevada Test Site. These, explosively blasted spent-fuel like debris into the underground formations that lay "up-stream" from the Yucca Mountain Study site. The testers were exempt from the waste containment regulations that a Yucca Mountain repository must meet. In fact, about a third of the tests were conducted below, or just above, the water table, often leaving nuclear debris in regions with flowing water. In 1997 the DOE's Nevada Operations Office released a report, largely generated by its contractors, that estimated that a partial cleanup of the NTS underground test areas could cost as much as $7.3 trillion ("Focused Evaluation of Selected Remedial Alternatives for the Underground Test Area (DOE/NV--465, April 1997). The Cumulative Impacts section of the FEIS should mention that $7.3 trillion figure as a point of reference.

Response

Section 8.3.2.1 of the Draft EIS discussed the activities at the Nevada Test Site and acknowledged the potential for large amounts of radioactivity as a potential long-term impact. In the Final EIS the department has updated the information based on more recent analyses of the potential long-term impacts from these activities.

With regard to remediation estimates for the underground test areas, the 1997 report cited by the commenter does list a cost that could be as high as $7.3 trillion. However, it is important to realize that this report was prepared for the purpose of evaluating technologies that could be used to aid in remediation, not as a planning document for cleanup of the Nevada Test Site.

In 1998, the Department published *Accelerating Cleanup: Paths to Closure* (DIRS 107294-DOE 1998) and has continued to update that report with supplemental information to present the status of cleanup efforts in the DOE complex. The report estimated a total cost of less than $3 billion for all projects at the Nevada Test Site. In addition to cleanup and remediation activities, this estimate includes subsurface monitoring and surveillance of the sites for up to 100 years (DIRS 107294-DOE 1998).

The Department is continuing environmental restoration at the Nevada Test Site and is studying and monitoring groundwater contamination of the underground test areas. No long-term plans for remediating the underground test areas have been developed, and the wide range of costs, technical issues, and health and safety considerations in the report cited by the commenter make it premature to project an impact on the region from these activities.

10 (13452)
Comment - EIS010296 / 0038
On page 3-7, it is noted that the range of water demand for lower-temperature operations, combined with ongoing NTS [Nevada Test Site] water demand would be slightly below the lowest estimate of sustained yield for the hydrographic area (western two thirds of the Jackass Flats Groundwater basin, see p. 4-29 of the Draft EIS), but the addition of an aging facility could lead to water use of 100 percent of the lowest estimated perennial yield. It would be as low as 16 percent of the maximum estimated perennial yield. Buqo (1999) notes on p. 14 that "Localized water-level declines and changes in flow directions in the vicinity of DOE water supply wells has occurred and will continue to occur in proportion to the level of water needed to support the Test Site Operations. Overdraft has historically occurred on the NTS in the Yucca Flat hydrographic basin because of its perennial yield (700 acre feet per year). Future DOE water withdrawals on the NTS are not expected to exceed the perennial yields of any of the source basins." The estimates of perennial yield are exactly that - estimates. The estimated use might greatly exceed actual perennial yield.

Response
The Department used estimates of perennial yield that were prepared by the Nevada State Engineer. The Department recognizes that these are estimates, but they represent the best estimates available.

10 (13527)
Comment - EIS010392 / 0010
In light, of the effects on transportation, the cumulative impacts analysis should be re-evaluated. As it is now, the cumulative impacts analysis is not sufficient.

Response
The design evaluated in the Supplement to the Draft EIS (the flexible design) does not substantially affect the results of the cumulative-impacts evaluation described in Chapter 8 of the Draft EIS. The basic elements of the Proposed Action described in the Draft EIS are identical to the Proposed Action described in the Supplement; that is, to construct, operate and monitor, and eventually close, a geologic repository at Yucca Mountain. Because the design enhancements described in the Supplement had little effect on other elements of the repository program, the scope of the Supplement was limited to a discussion of the new design and its associated impacts. The transport of spent nuclear fuel and high-level radioactive waste to the repository would not be affected by the repository design described in the Supplement or how this design might evolve further. The amount of waste that could be transported to the repository is fixed. Therefore, the impacts of waste transport to the repository, including cumulative impacts, were not evaluated in the Supplement. In Chapter 6 of the Final EIS, DOE has modified and updated several analyses related to the transport of spent nuclear fuel and high-level radioactive waste to Yucca Mountain in response to public comments. Many of these changes are based on updated population data, and projections of future populations, near possible transport routes.

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11

Impact Mitigation and Compensation

11. IMPACTS MITIGATION AND COMPENSATION

11.1 Impacts Mitigation

11.1 (6)
Comment - 11 comments summarized
Constructing, operating and monitoring, and closing the proposed repository would require the use of water. DOE proposes to take this water from an aquifer that underlies both the repository site and the Amargosa Valley, which underlies a portion of Nye County, Nevada, and might also provide water in eastern portions of Inyo County, California. The placement of waste in the repository would position a large radionuclide burden upgradient from the Amargosa Valley, although the repository design would contain radionuclides for thousands of years, with substantial isotopic decay during containment.

Commenters stated that DOE should provide Nye County users a safe and adequate water supply to replace water the repository would take for activities during construction, operations and monitoring, and closure. Commenters also stated that DOE should guarantee Nye County users a safe and adequate supply to replace water that radionuclides from the repository could contaminate. Commenters stated further that DOE should provide long-term monitoring after repository closure to detect any radionuclides reaching the Amargosa Valley aquifer to provide warning to Nye County and Inyo County users. Some commenters compared the requested provision of water to the provision of water to residents living near failed hazardous waste sites.

Response
The EIS evaluates the potential for repository activities to affect both water availability and water quality. The updated analysis in this Final EIS projected that the Proposed Action would result in extremely small releases of radioactive contamination to the environment in the first 10,000 years after repository closure (more than 10,000 times less than the individual protection standard set by 40 CFR Part 197.)

In addition to the 10,000-year compliance period, DOE evaluated potential impacts for the period of geologic stability at the repository (that is, 1 million years). DOE performed this evaluation, in accordance with 40 CFR Part 197, to gain insight into the very-long-term performance of the repository and thus provide information for making both design and licensing decisions. These results show a mean peak dose rate that would be much lower than background levels. As a consequence, DOE does not anticipate impacts to water supplies that would require mitigation.

However, Section 116(c) of the Nuclear Waste Policy Act, as amended (the EIS calls the amended act the NWPA), establishes a procedure outside the EIS process by which affected units of local government, such as Nye County, could request assistance to mitigate impacts on affected units of local government if the repository was developed. Section 116(c) commits DOE to participate in this process and to provide assistance consistent with direction from Congress.

11.1 (45)
Comment - 6 comments summarized
Commenters stated that DOE should propose to continue state and local government oversight functions through the performance confirmation period as a mitigation measure.

Response
The Testing and Performance Confirmation Program is designed to meet specific Nuclear Regulatory Commission requirements (defined at 10 CFR 63.102(M) and 10 CFR Part 63 Subpart F). The program allows for continued oversight through tests, experiments, and analyses to evaluate the accuracy and adequacy used to determine with reasonable expectation that the repository would meet postclosure performance requirements. This could be a lengthy program of monitoring and testing that could last as long as 300 years after the end of waste emplacement. It would provide data to future decisionmakers who would make the choices on closing the repository or retrieving the wastes. DOE is not able to determine what its commitment to oversight funding would be at this time because of dependence on Congressional funding and other factors.

11.1 (48)

<u>Comment</u> - 4 comments summarized

Commenters stated that the Draft EIS does not include any real mitigation measures and that repository design features should not be part of mitigation. Commenters asked for long-term groundwater monitoring plans and contingency plans as mitigation measures. Commenters asked DOE to propose mitigation measures for transportation-related impacts.

<u>Response</u>

Under the Council on Environmental Quality regulations implementing the National Environmental Policy Act (40 CFR 1508.20) mitigation includes those activities that:

- Avoid the impact altogether by not taking a certain action or parts of an action
- Minimize impacts by limiting the degree or magnitude of the action and its implementation
- Repair, rehabilitate, or restore the affected environment
- Reduce or eliminate the impact over time by preservation or maintenance operations during the life of the action
- Compensate for the impact by replacing or providing substitute resources or environments

In its Forty Most Asked Questions, the Council on Environmental Quality states that mitigation "measures must include such things as design alternatives that would decrease pollution emissions, construction impacts . . ." (46 *FR* 18026, March 21, 1981). Alternative design measures to reduce impacts are properly included as mitigation measures. Chapter 9 of the EIS describes management actions that DOE could use to reduce or mitigate adverse impacts to the environment that could occur if the Department implemented the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste.

As described in this Final EIS, DOE has established a cooperative agreement with Nye County to install a series of groundwater monitoring wells in the Amargosa Desert and the southern portion of the Nevada Test Site. The purpose of this program, called the Early Warning Drilling Program, is to characterize and monitor the saturated zone along potential transport pathways from Yucca Mountain. In addition to the flow and transport characterization data DOE will gain, the program will provide Nye County with its own independent monitoring and testing capability. In addition, DOE would design and implement a postclosure monitoring program in compliance with Nuclear Regulatory Commission regulations (10 CFR Part 63). Before closure, DOE would submit a license amendment application to the Commission, which would describe DOE's proposal for continued oversight to prevent any activity that would pose an unreasonable risk of breaching the repository's engineered barriers. DOE has modified the EIS to include the types of monitoring and other institutional controls it would contemplate.

Section 9.3 of the EIS discusses some mitigation measures DOE has identified that could reduce potential impacts from the national transportation of spent nuclear fuel and high-level radioactive waste. These measures address the possible impacts from the construction of a branch rail line or an intermodal transfer station in Nevada; construction of other transportation routes; upgrading of existing Nevada highways to accommodate heavy-haul vehicles; transportation of spent nuclear fuel and high-level radioactive waste from existing storage sites to the proposed repository; and fabrication of casks and canisters.

Section 180(c) of the NWPA requires DOE to provide technical assistance and funds to states and affected units of local government through which it plans to transport spent nuclear fuel or high-level radioactive waste.

Section 116(c) of the NWPA provides that an affected unit of local government or the State of Nevada can request financial and technical assistance from DOE and that such assistance can be designed to mitigate the impacts on affected units of local government from the development of the proposed repository and the characterization of the Yucca Mountain site. DOE would base any decision to provide assistance under Section 116 on an evaluation of a report submitted by an affected unit of local government or the State of Nevada to document likely economic, social, public health or safety, and environmental impacts.

11.1 (76)
Comment - 5 comments summarized
Commenters said that the United States needs to mitigate, through equity offsets and compensation, the cumulative impacts from the repository and from other Federal activities that have adversely affected Nye County's ability to plan and grow. Among the agencies mentioned were the Department of Defense (Air Force and Navy), Department of the Interior (Bureau of Land Management, National Park Service, and Fish and Wildlife Service), the Department of Agriculture (Forest Service), as well as continuing activities at the Nevada Test Site by DOE. Commenters contend that Nye County has been disproportionately affected by these activities.

Response
Impacts of past, present, and reasonably foreseeable future actions and their relationship to the Proposed Action and Inventory Modules are discussed throughout Chapter 8 of the EIS. While preparing this chapter, analysts reviewed numerous documents to determine where there was potential for cumulative impacts. Only those activities with a potential for cumulative impacts on environmental resources (including such things as land use and water) potentially affected by the repository were included in the discussion [for example, the Nevada Test Site, waste disposal sites, Nellis Air Force Range (now called the Nevada Test and Training Range), DOE waste management activities]. DOE reviewed resource plans, environmental impact statements, environmental assessments, strategic plans, consultation documents, Native American tribal meeting records, and other documents representing Federal, local, and private agencies and plans for public development and documented the potential for activities described in those documents or plans to present cumulative impacts.

DOE has examined the potential for the proposal to cause socioeconomic impacts in Nye County, including the potential for cumulative impacts. Based on its method of analysis, the Department believes that it has accounted for those reasonably foreseeable actions that could affect Nye County.

After DOE issued the Draft EIS, it again reviewed impacts from the proposed project and potential cumulative activities in the region of influence and has updated information where appropriate. This Final EIS includes a more detailed discussion of cumulative impacts including projected water use for the proposed Yucca Mountain Repository and water availability and water rights issues in Nye and surrounding counties.

Section 116(c) of the NWPA establishes a procedure outside the EIS process by which affected units of local government, such as Nye County, can report effects from the proposed repository to DOE and receive impact assistance upon agreement with DOE on matters raised in the report. Section 116(c) commits DOE to participate in this process and to provide assistance consistent with direction from Congress.

11.1 (97)
Comment - 3 comments summarized
Commenters stated that DOE should document all mitigation commitments in a Record of Decision and should not issue a separate or standalone Mitigation Action Plan. They quoted the Council on Environmental Quality National Environmental Policy Act implementing regulations (40 CFR 1505.2) as saying the Record of Decision must include the following: a statement explaining the decision; an explanation of alternatives DOE considered and those that were environmentally preferable; factors DOE considered in making its decision; an explanation of mitigation measures, if any, that DOE adopted or, if there were no mitigation measures, an explanation; and a monitoring and enforcement program for any adopted mitigation measures. Commenters further stated that a Mitigation Action Plan would not fulfill the requirements of and would be outside the legal framework of the National Environmental Policy Act governing minimization of the effects of major Federal actions. Commenters placed great significance on the institutional and legal stature of the Record of Decision and contended that commitments to mitigation not contained in a Record of Decision would not be commitments at all.

Response
Section 114(a)(1) of the NWPA authorizes the Secretary of Energy to decide whether to recommend approval of the Yucca Mountain site to the President for development as a repository for the disposal of spent nuclear fuel and high-level radioactive waste. A comprehensive statement of the basis for the recommendation, including a Final EIS, must accompany such a recommendation. However, the decision to approve the site rests not with the Secretary, but with the President. Because the President would make this decision, DOE does not anticipate issuing a Record of Decision if the Secretary recommends the site to the President.

DOE regulations (10 CFR 1021.331) require preparation of a Mitigation Action Plan when mitigation measures are identified in a Record of Decision. At this time DOE has not decided whether or not it would prepare a Mitigation Action Plan. However, the Yucca Mountain site, if approved in accordance with the NWPA, would be subject to licensing by the Nuclear Regulatory Commission. DOE, in submitting an application to construct and operate a repository would identify relevant mitigation measures to the Commission for its consideration, and could reasonably expect a comprehensive set of mitigation measures or conditions of approval to be part of the licensing process.

DOE anticipates that the repository design would continue to evolve, creating additional opportunities for mitigation and potentially eliminating the need for some mitigation measures currently under consideration. Chapter 9 of the EIS, which provides DOE's initial list of possible mitigation measures available at this time, identifies DOE-determined impact reduction features, procedures, and safeguards; and mitigation measures under consideration for inclusion in the project plan and design. Section 9.1.3 identifies ongoing studies that could eventually influence mitigation measures related to the repository.

11.1 (102)
Comment - 12 comments summarized
Commenters said that the Final EIS should identify which mitigation measures DOE is committed to and which it is considering. Specifically, commenters asked for guarantees on what mitigation DOE would perform, asserting that the Federal Government has a history of claiming sovereign immunity and of not compensating victims of radiation "damage" from Federal activities. One commenter said the Draft EIS did not establish a basis for mitigation negotiations because it did not assign specific roles and responsibilities for actions that cause impacts or ameliorate impacts. Several commenters stated that the EIS must, but the Draft EIS did not, identify and evaluate all feasible alternatives and specific measures for mitigating all potential impacts of the repository system and potential accidents that are identified in the EIS, whether or not they would be "significant." Similarly, a commenter stated that DOE needs to identify the specific measures required to minimize the impacts associated with the flexible design. A commenter said that mitigation measures should not be eliminated from consideration in the EIS because they are outside the jurisdiction of DOE or because they are not likely to be accepted or enforced. One commenter said a Record of Decision and a Mitigation Action Plan should include a comprehensive identification and evaluation of measures to mitigate each repository system impact. Some commenters stated that monitoring, avoidance, minimization, rectification, and reduction or elimination must be considered, as well as consultation with other appropriate agencies, as opposed to promises to consult, conduct further studies, only monitor, and request outside reviews. Further, commenters said the EIS must demonstrate that the mitigation measures would be sufficient to offset or otherwise minimize negative effects on the States of California and Nevada, local communities, and other states and communities along transportation routes. One commenter said that the EIS should present the full costs of remediation for a transportation accident and that DOE should establish an escrow fund to pay for such remediation and for compensation of affected parties.

Response
Chapter 9 of the EIS discusses mitigation measures DOE could implement or has identified for consideration. However, DOE has not yet made commitments to any specific mitigation measures. Section 116(c) of the NWPA provides for financial and technical assistance to mitigate likely economic, social, public health and safety, and environmental impacts. Within that broad framework, neither Section 116 nor any other provision of the NWPA limits the impacts that are subject to assistance to the environmental impacts considered in this EIS. Any decision to provide assistance under Section 116 would be based on an evaluation of any reports submitted by an affected unit of local government or the State of Nevada that documented the potential impacts for which mitigation assistance might be required.

DOE regulations (10 CFR 1021.331) require preparation of a Mitigation Action Plan when mitigation commitments are defined in a Record of Decision. At this time DOE has not decided whether or not to prepare a Mitigation Action Plan. However, the Yucca Mountain site, if approved in accordance with provisions of the NWPA, would be subject to licensing by the Nuclear Regulatory Commission. DOE, in submitting an application to construct and operate a repository would identify relevant mitigation measures to the Commission for its consideration, and could reasonably expect a comprehensive set of mitigation measures or conditions of approval to be part of the licensing process.

In its Forty Most Asked Questions, the Council on Environmental Quality states that mitigation measures must include such things as design alternatives that would decrease pollution emission and construction impacts (46 *FR* 18026, March 21, 1981). The evolved repository design described in the Supplement to the Draft EIS and this Final EIS would reduce impacts of, and the uncertainties involved with, long-term repository performance.

Regarding compensation and remediation in the event of an accident, the Price-Anderson Act establishes a system of financial protection (compensation for damages, loss, or injury suffered) for the public in a nuclear accident. The Act provides liability coverage for commercial activities operating under a license from the Nuclear Regulatory Commission and DOE activities by establishing a system of private insurance and Federal indemnification that generally ensures that up to $9.43 billion is available to compensate for damages suffered. Payment would be from Federal funds, or, if public liability arose out of nuclear waste activities funded by the Nuclear Waste Fund, from that Fund. As of November 2001, Congress was working on legislation associated with Price-Anderson Act Reauthorization.

Responsibility for cleanup of released materials would be shared between DOE, the owners of the materials, and carriers under regulation of the Motor Carrier Act of 1980. Section J.1.4.2.5 of the EIS provides information on the cost of cleanup and ecological restoration following a transportation accident.

11.1 (346)
Comment - EIS000049 / 0004
In the past the government has done business with Nye County and when dollars were paid to the county and the community closest to the project is Amargosa and our community will be increased with population and the schools and housing and other services should be taken into account as to what we could do and how we could fund these problems without increasing our taxes. We have the second largest county in the nation and the population isn't very many. We are the second largest township in the country and the lowest population so you can bet we have high taxes now and when this project takes place the only logical thing would be to give a real look at the help you could give to make the transition as easy as possible.

Response
DOE has expanded its socioeconomic discussions in Chapter 3 to clarify the magnitude of potential impacts described in Chapters 4 and 6. This discussion includes a projection of baseline parameters through 2035 based on the most recently available information and assumptions. In the Final EIS, DOE provides a quantified estimate of school enrollment and changes in law enforcement and public service personnel requirements.

As indicated in Chapter 9 of the EIS, Section 116(c)(2)(A)(i) and (ii) of the NWPA state that "the Secretary shall provide financial and technical assistance to the State of Nevada and any affected unit of local government…to mitigate the impact on such State [Nevada] or affected unit of local government of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Within that broad framework, neither Section 116 nor any other provision of the NWPA limits the impacts that are subject to assistance under Section 116 to the environmental impacts considered in this EIS.

Under the NWPA, the Section 116 impact assistance review process and this EIS process are distinct from one another, and the implementation of one would not depend on the implementation of the other. Thus, the provision of assistance under Section 116 would not necessarily be limited either by the impacts identified in this EIS or by its findings on such impacts. Any decision to provide assistance under Section 116 would be based on an evaluation of a report submitted by affected units of local government or the State of Nevada pursuant to Section 116 to document likely economic, social, public health and safety, and environmental impacts. DOE would enter into discussions with potentially affected units of local government and consider appropriate support and mitigation measures.

11.1 (514)
Comment - EIS000154 / 0002
No mitigation. No mention of the fact that the town water system for Goldfield is pumped thirteen miles out in the flats right alongside the highway into town.

Response
Transportation analyses in Chapter 6 of the EIS indicate that shipments of spent nuclear fuel and high-level radioactive waste would not pose any harm to facilities such as Goldfield's water system.

Section 116(c) of the NWPA establishes a procedure, unrelated to the EIS process, by which affected units of local government, such as Nye County, can report effects from the proposed repository to DOE and receive impact assistance upon agreement with DOE on matters raised in the report. Section 116(c) commits DOE to participate in this procedure and to provide assistance consistent with direction from Congress.

11.1 (653)
Comment - EIS000157 / 0001
I would like to recommend that as part of the impact mitigation discussion in the final EIS, the DOE cooperate with the Nevada Division of Health, the Nevada Nuclear Waste Project Office, the Nevada Department of Environmental Protection, and Nye County as host to the proposed repository and other potentially affected counties and communities to facilitate a baseline radiological health assessment to be used in the future to accurately analyze potential health impacts of the proposed Yucca Mountain project.

Response
DOE has extensively evaluated the potential for public exposure to radionuclides in the Yucca Mountain region. Studies are continuing. Sections 3.1.8 and 8.2.7 of the EIS describe the DOE's work in this area. The affected environment and the potential cumulative health impacts associated with the repository (Section 9.2) discusses potential health-related mitigation measures.

The EIS analysis of public health does not show a potential for significant impacts to the population in the region of the proposed site. On this basis, DOE has concluded that a new baseline radiological health assessment is not warranted as an addition to the EIS evaluation of the Yucca Mountain proposal or for later comparative analyses.

11.1 (655)
Comment - EIS000192 / 0002
The Draft EIS identifies a number of impacts resulting from transportation of the nuclear material. However, there is no mention of mitigation measures that will be taken to minimize these impacts. The mitigation measures have to be addressed per NEPA requirements.

Response
Section 9.3.6 of the EIS mentions five mitigation measures under consideration to reduce health and safety impacts from transportation of radioactive materials, including measures to reduce exposure to radionuclides and measures to reduce accidents. Other parts of Section 9.3 describe measures to mitigate transportation impacts that DOE has adopted or is considering.

11.1 (764)
Comment - EIS000140 / 0004
In the EIS, there is nearly a complete lack of attention given to identification and evaluation of measures designed to mitigate impacts of spent fuel management within Nevada.

Response
Chapter 9 of the EIS describes many actions that are under consideration to mitigate potential impacts associated with a repository at Yucca Mountain.

11.1 (1188)
Comment - EIS000114 / 0009
What about the lack of payments equal to taxes for our county? You have an Environmental Impact Statement. What about the socioeconomic impacts and what are you going to do for us here in Pahrump and for Nye County? You've done crap.

Response

Payments-Equal-To-Taxes (PETT) are made pursuant to Section 116(c)(3)(A) of the NWPA which requires the Secretary of Energy to "…grant to the State of Nevada and any affected unit of government, an amount each fiscal year equal to the amount such State or affected unit of government, respectively, would receive if authorized to tax site characterization activities…." These payments, historically and for the future, are determined by estimating the amount of Yucca Mountain Project property, purchases (in and out of the State of Nevada), and business activities (employees) within the jurisdiction of an affected unit of local government. Nye County and the State of Nevada have been eligible to receive PETT since commencement of site characterization activities in May 1986. The other affected units of government include Clark, Lincoln, Esmeralda, Eureka, White Pine, Churchill, Lander, and Mineral Counties in Nevada, and Inyo County, California. Potentially, they have been eligible to receive PETT since the passage of the Nuclear Waste Policy Amendments Act of 1987.

For PETT relating to property taxes in Nye County, DOE and the County entered into a settlement agreement in July1994 (amended in May 1999) whereby DOE would make specified payments on a fixed disbursement schedule. The current agreement runs through 2003.

As noted above, DOE acquires data from the Yucca Mountain Project organizations that purchase or acquire property for use in Nevada, have employees in Nevada, or use property in Nevada. These organizations include Federal agencies, national laboratories, and private firms. Not all of these organizations have Federal exemption status, so they pay the appropriate taxes. The purchases (sales and use tax), employees (business tax), and property (property or possessory use tax) of the Yucca Mountain Project organizations that exercise a Federal exemption are subject to the PETT (DIRS 103412-NLCB 1996).

The actual sales and use taxes, property taxes, and Nevada business taxes paid by Yucca Mountain Project organizations from May 1986 through September 2000 have been calculated. These organizations paid sales and use taxes of $2.5 million for purchases made in Clark County, paid property or possessory taxes of about $90,000 in Clark County, and paid the State of Nevada about $810,000 in business taxes (DIRS 156763-YMP 2001). The PETT for sales or use taxes from May 1986 through June 2000 was about $4.4 million for purchases in Clark County. For property taxes, it was about $940,000 in Clark County. About $130,000 was paid to the State of Nevada in business taxes.

DOE has not estimated and does not intend to make long-term PETT estimates. While the NWPA requires PETT payments, such payments are not discriminating factors in the EIS decisionmaking process.

In the Final EIS, DOE has expanded the socioeconomic discussions in Chapter 3 to clarify the magnitude of the potential impacts described in Chapters 4 and 6. This discussion includes a projection of baseline parameters through 2035 based on the most recently available information and assumptions. The Final EIS provides a quantified estimate, to the extent possible, of school enrollment and changes in law enforcement and public service personnel requirements. Other socioeconomic impact discussions are included in Sections 6.1.2.7 (related to transportation of spent nuclear fuel and high-level radioactive waste), and 8.2.6 (related to cumulative impacts).

The Final EIS incorporates Nevada population data developed by and received from county and State officials. In response to comments, DOE has updated its population estimates in the regions of influence to reflect the most recent state and local information, as well as Bureau of the Census 2000 population summary data for Nevada. For the repository- and transportation-related regions of influence, DOE performed REMI computer model simulations to establish an updated population baseline by accounting for population estimates and projections provided by county governments. In the absence of county information, population estimates and projections from the Nevada State Demographer's Office were used. The updated population baselines were then used to estimate populations for Clark, Nye, and Lincoln Counties and the Rest of Nevada through 2035. These population projections were then compared and adjusted to the 2000 Census population summary data. In this way, model population projections were calibrated to reflect the best available information.

The Final EIS baseline used REMI model projections of population totals for each Nevada county in the region of influence and the Rest of Nevada through 2035. The Clark County projections correspond to those used by the University of Nevada, Las Vegas (DIRS 136698-Riddel and Schwer 1999), which also used the REMI EDFS 53-sector model. DOE based inputs to Nye County projections for the Final EIS on data identified in Nye County documents (DIRS 150996-Williams 2000; DIRS 148140-PIC 1998). The Nye County projections provided during the comment period are based in part on a REMI 14-sector model. DOE used (1) Lincoln County and Rest of Nevada projections through 2018 by the Nevada State Demographer's Office (DIRS 155350-State of Nevada 1999) as inputs to population projections for these areas; (2) county projections and Nye County source documents to project population distributions within the 80-kilometer (50-mile) radiological monitoring grid; and (3) California Department of Finance projections (DIRS 150294-California State Department of Finance 1998) for Inyo County as the basis for projecting population distributions for Inyo County sections of the grid (see Section 3.4 of the EIS).

11.1 (1201)
Comment - EIS000379 / 0001
As far as the nuclear accident involving trucking transport, it's been stated that there are potentially an estimated 40,000 trucking accidents a year in the US. If that's true, it means that the potential of an accident is quite high, and that brings me back to this thought about mitigation and how do you mitigate this sort of an accident with these kinds of materials? Because we know that ionizing radiation has effects. Some of the things that it causes are leukemia, birth defects, mental retardation, and physical deformations, cancers. So, essentially, there's really no mitigation.

It was stated here tonight that there is a cleanup fund, and there's legislation that ensures that if there's an accident, there's plenty of money to clean it up. But the problem that I see with this is that it's not really a matter of money. How do you mitigate cancer or how do you mitigate deformed babies? These sorts of things are just not easily remedied.

Response
In Chapter 6 of the EIS, DOE has analyzed potential impacts from transportation accidents. Given the number of shipments to the proposed repository, traffic accidents would be probable. However, DOE believes that such accidents would be unlikely to release radioactive material, primarily because of the structural integrity of the transportation casks. In the more than 2,700 shipments of spent nuclear fuel in the U.S. over the past three decades, there have been seven accidents, with no releases of radioactive materials to the environment. The risk assessment results discussed in the EIS demonstrate that radiological risks to persons on and near transportation corridors would be very small. The small risks, and the fact that these shipments would be a small fraction of all cargo shipped, means that moving spent nuclear fuel and high-level radioactive waste should not be the cause of major disruptions of the use of transportation corridors.

The Price-Anderson Act establishes a system of financial protection (compensation for damages, loss, or injury suffered) for the public in a nuclear accident, regardless of who causes the damage. Section M.8 of the EIS discusses this Act. Under the Motor Carrier Act of 1980 DOE, the owners of the materials, and carriers would share responsibility for cleanup of released materials. Under provisions of the DOE Draft Policy for implementing Section 180(c) of the NWPA, the Department would provide training for emergency response personnel. Section M.6 discusses these provisions.

11.1 (1473)
Comment - EIS010340 / 0002
I also recommend that all cultural resources on the Yucca Mountain Project be left in place. If any are removed, that this group be notified as soon as possible.

Response
DOE would include avoidance of significant archaeological sites as a mitigative option. Due to cultural value and cost, preservation of archaeological sites in place is the preferred option. If avoidance was not possible, a data recovery effort would be necessary to preserve the archaeological data. DOE is committed to using Native American monitors on field crews when significant data recovery (collection of resources) at a site is necessary. Archaeological contractors are on-call to monitor known sites for potential impacts from project activities. In addition, Native Americans can come to the site to monitor locations during Native American Interaction Program field trips, or during special trips, as necessary. Section 9.2.5 of the EIS contains additional information regarding proposed mitigative measures.

11.1 (1809)
<u>Comment</u> - EIS000332 / 0008
Nye County has repeatedly attempted to utilize the administrative process to inform DOE and other federal agencies of the impacts that have occurred, continue to occur, and will likely be exacerbated by the implementation of yet another federal action in Nye County. Federal agencies have repeatedly failed to fulfill their obligations through the NEPA [National Environment Policy Act] administrative process, and have failed to provide mitigations that are required. Nye County will continue to identify environmental issues, the potential impacts, and appropriate mitigation measures, and will ensure that the County's position is made part of the DOE's Administrative Record for the NEPA process.

<u>Response</u>
DOE acknowledges Nye County's active role in monitoring Yucca Mountain Repository-related activities. The Department has received and reviewed studies issued by the County and utilized this information in the Final EIS to the fullest extent possible. For example, the Final EIS socioeconomic baseline projections for the County incorporate projections provided by Nye County in its quarterly population updates. DOE has included the Nye County input in its project record and is cognizant of the issues Nye County has identified. DOE will work with Nye County and other potentially affected units of government to determine reasonable management actions required to mitigate potential adverse environmental impacts pursuant to 10 CFR 1508.20 and Section 116(c) of the NWPA.

11.1 (1819)
<u>Comment</u> - EIS000771 / 0003
What guarantees will be in place by the DOE?

1. Transportation
2. Security -- Transportation and Containers
3. Evacuation Plans
4. Medical Plans -- Residents
5. Payments to Nevada for storage
6. Warning system -- Disaster
7. Insurance -- Residents

<u>Response</u>
DOE intends to implement the requirements of Sections 180(c) and 116(c) of the NWPA. Section 180(c) requires the Secretary of Energy to provide technical assistance and funds to states for training public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions spent nuclear fuel and high-level radioactive waste would pass. The training is required to cover procedures for safe routine transportation and for dealing with emergency response situations.

In addition, Section 116(c)(2) of the NWPA requires the Secretary of Energy to provide financial assistance to the State of Nevada and any affected unit of local government requesting such assistance to mitigate the impacts of the development of a repository and site characterization. The State and any affected unit of local government can request such assistance by submitting a report on probable economic, social, public health and safety, and environmental impacts.

With regard to the topics of concern listed in the comment, transportation and transportation security would be in full compliance with applicable U.S. Department of Transportation and Nuclear Regulatory Commission regulations. DOE would develop emergency response plans, including evacuation plans and warning systems, as part of the activities required by Section 180(c) of the NWPA. The State, affected units of local government, and Native American tribes can request financial and technical assistance to implement these plans under Section 180(c).

The Price-Anderson Act provides liability coverage for commercial activities operating under a license from the Nuclear Regulatory Commission and for DOE activities. The Price-Anderson Act establishes a system of private insurance and Federal indemnification that generally ensures that as much as $9.43 billion is available to compensate for damages suffered by the public from a "nuclear incident," regardless of who causes the damage. Payment would be from Federal funds or, if public liability arose from activities funded by the Nuclear Waste Fund (for example, activities at a geologic repository), from that Fund. The liability of all responsible parties is limited to the amount of coverage provided by the Price-Anderson Act system. State and local governments cannot be required to provide additional compensation. DOE has revised the EIS to include more details about indemnification under the Price-Anderson Act (see Section M.8.1).

Price-Anderson indemnification would apply to transporters of nuclear waste from commercial nuclear utilities and from DOE sites to the repository. In addition to Price-Anderson indemnification, the Motor Carrier Act of 1980 and implementing regulations (49 CFR Part 387) require all motor vehicles carrying spent nuclear fuel or high level radioactive waste to maintain financial responsibility of at least $5 million, which would be available to cover public liability from a non-nuclear incident and for environmental restoration. Federal law does not require rail, barge, or air carriers of radioactive materials to maintain liability coverage, although these carriers often carry such insurance voluntarily. Regardless of whether they had insurance, a radioactive materials incident involving these carriers would be subject to state law applicable to any other type of accident.

Congress would have to approve additional payments to Nevada and affected units of local government, other than Payments-Equal-To-Taxes that they would have received if the activity was a non-Federal activity.

11.1 (1822)
Comment - EIS000198 / 0003
We're being asked to place our children's futures in the hands of some what at first will be highly paid hourly personnel, and as time goes by, these positions will be held by untrained people.

Response
If the proposed repository became operational, the personnel involved in repository operations would be well trained, and training would be maintained in accordance with the Nuclear Regulatory Commission's license requirements. The Commission's final rules for Disposal of High-Level Radioactive Wastes in a Geologic Repository at Yucca Mountain include training and certification requirements for personnel operating systems and components that are identified as important to safety in the Safety Analysis Report.

11.1 (1877)
Comment - EIS000443 / 0009
The DEIS does not consider property values. In the consequences of its court cases in New Mexico have shown property along waste transportation routes decreases in value. This needs to be examined for Nevada as well.

Finally, EIS should obtain estimates of loss of property values along the likely shipping routes which gets to the points of identifying national routes.

Response
DOE did not address potential change in property values near waste-transport routes because of the dynamic nature of real estate values and other factors that can influence property values. Assessing the perceived impact to property values or the impact of stigma is problematic because it does not depend on the actual physical effects or risks of the Proposed Action, but on the negative perception of those effects or risks by the public. Section 2.5.4 and Appendix N of the EIS provide additional information and addresses the issue of stigma from the Yucca Mountain Project.

Definitive information is not available on specific tracts of land that could be required for a specific transportation mode or route. For land that would be required or materially affected, the Department would fairly compensate landowners pursuant to Federal procedures. Should DOE be required to exercise its right of eminent domain, it would do so pursuant to applicable laws and regulations.

11.1 (2410)
Comment - EIS001160 / 0129
The effect of transport corridors be designated as "heavy-haul nuclear free" as a mitigating measure in order to alleviate concerns of motorists who wanted to avoid worst case scenario nuclear accidents should be considered within the FEIS. The extent to which such a measure might also reduce the possibility of exposure if there was a highway accident causing a loss of containment should be addressed within the FEIS.

Response
If the proposed repository was approved for the Yucca Mountain site and if DOE selected heavy-haul truck as a transportation mode in Nevada, heavy-haul trucks would operate in accordance with permits issued by the State of Nevada. As a consequence, the State would be responsible for providing information for motorists identifying the routes that would be used. Impacts presented in Chapter 6 of the EIS include exposure to passing motorists and a motorist stuck in traffic during incident-free transportation. These exposures, which would be very low for motorists on Nevada highways, would be about equal to exposures for persons who lived along transportation routes. The EIS also presents and discusses estimates of the dose to a maximally exposed individual in the event of an improbable maximum reasonably foreseeable accident in which radioactive materials were released from a cask (see Section 6.3.3). Mitigation measures that could be adopted to further reduce the possibility of accidents are addressed in Section 9.3.6 of the EIS.

11.1 (3167)
Comment - EIS001195 / 0005
A large mine haulage road would be intersected by the [Carlin] corridor. A crossing designed to safely accommodate loaded mine haulage trucks with a gross vehicle weight of 1,000,000 pounds must be incorporated. Additionally, other multiple crossings will be needed to provide access for ancillary mining facilities/activities and ranching needs. Safety measures tailored to both light vehicles and the large mining equipment must also be provided for at all crossings.

Additionally, we [Cortez Gold Mines] would require the installation of large culverts at strategic locations to allow for the future installation of dewatering pipelines that feed our infiltration galleries.

Response
DOE is aware of the Cortez Gold Mines operation in Crescent Valley (see Sections 8.1.2.3 and 8.4.2 of the EIS). At this time, however, definitive information is not available on specific tracts of land that could be required for a given transportation alternative. For any land that would be required, the Department would compensate landowners under Federal acquisition procedures. In other cases, as indicated in Section 9.3.1 of the EIS, mitigation measures would be developed where construction and operation of transportation facilities would result in (1) impacts to publicly used lands (2) direct and indirect land loss, and (3) displacement of capital improvements. Specific mitigation measures could include the items mentioned by the commenter.

11.1 (4571)
Comment - EIS001521 / 0085
Page 9-5, second bullet--(Surface-Water Measures Under Consideration) Using “hay bales” as more-or-less mitigative devices to trap sediment will be a short-term solution at best (by the way, straw is much cheaper). Using fabric fences and longer lasting “weir-notched” dams to create an impoundment for trapping sediment would be more reliable in accomplishing this task.

Response
DOE has changed Section 9.2.3.1 of the EIS to reflect that it would use sediment- trapping devices such as hay or straw bales, fabric fences, and weir-notched dams. DOE would choose the most appropriate methods for specific situations.

11.1 (4869)
Comment - EIS000337 / 0007
Pg. 2-37, Section 2.1.2.3, Repository Closure, 2nd par: There is no discussed plan on how the sealed repository will be monitored. If there is a monitoring plan, what is the plan if the monitoring reports a significant failure due to unforeseen problems. There must be a contingency plan in place before the DEIS is approved.

Response
The Testing and Performance Confirmation Program is designed to meet specific Nuclear Regulatory Commission requirements (see 10 CFR 60.137, 10 CFR 63.102(m), and 10 CFR Part 63 Subpart F). As defined, the program consists of tests, experiments, and analyses to evaluate the accuracy and adequacy of the information used to determine, with reasonable expectation, that performance objectives would be met. The *Performance Confirmation Plan* (DIRS 146976-CRWMS M&O 2000) formally documents and describes the Testing and Performance

Confirmation Program. DOE understands that ensuring public safety requires continued stewardship and has developed components for site stewardship programs including long-term monitoring of the site. The Proposed Action includes a lengthy program of monitoring and testing. This program would give future decisionmakers the option to take corrective actions, if required, and make societal choices on closing the repository or retrieving the wastes. After closure, a postclosure monitoring program required by 10 CFR Part 63 (see, for example, 10 CFR 63.51) would be further defined during the processing of the license amendment for permanent closure. The program would allow for continued oversight to prevent any activity at the site that poses an unreasonable risk of breaching the repository's engineered barriers, or increasing the exposure for individual members of the public to radiation beyond allowable limits. The license amendment for permanent closure must specifically provide an update of the assessment for the repository's performance for the period after permanent closure, as well as a description of the program for post-permanent-closure monitoring. Deferring a description of this program until the closure period would enable the identification of appropriate technology, including technology that could become available in the future.

11.1 (5204)
Comment - EIS001443 / 0028
All of the design alternatives considered in the EIS lead, ultimately, to a repository that is expected to leak (albeit at different rates depending on the particular choice of tunnel configuration, waste packaging, assumptions regarding geology, climate, and the response of the waste packages to the repository environment). Given the scale and complexities of the aquifers subject to potential contamination by the project, mitigation of impacts to these resources will range somewhere between extremely expensive to completely impossible. The DEIS should explain DOE's stance on providing mitigation, and either consider the adoption of feasible mitigation measures or state that such impacts cannot or will not be mitigated by the Federal government.

Response
The Environmental Protection Agency and the Nuclear Regulatory Commission have issued standards for the long-term performance of the proposed Yucca Mountain Repository (40 CFR Part 197 and 10 CFR Part 63, respectively). The standards set performance levels to protect the public health and safety. These levels do not presume absolute containment of the radioactive material forever. Rather, they specify safe levels of exposure for 10,000 years.

The long-term performance analysis described in Chapter 5 of the EIS demonstrates that the full range of predicted behaviors of the repository system would result in levels of contaminants in the groundwater well below the Environmental Protection Agency and Nuclear Regulatory Commission standards. The repository is expected to meet these standards, even if there were no institutional controls to avoid or mitigate impacts. Therefore, using the best available techniques and data, DOE concluded that the repository would maintain safety and environmental protection in accordance with the standards and that further mitigation would not be necessary.

DOE is considering a range of possible mitigation measures aimed at reducing effects of the proposed repository project. These measures would complement the physical features, procedures, and safeguards already incorporated in the project plan and design to reduce environmental consequences. Chapter 9 of the EIS, which provides DOE's initial list of commitments available at this time, identifies DOE-determined impact reduction features, procedures, and safeguards and mitigation measures under consideration for inclusion in the project plan and design. Chapter 9 also identifies ongoing studies that could eventually influence mitigation measures related to the project plan and design. For example, Section 9.2 discusses mitigation measures DOE would implement or consider to reduce potential impacts from the construction, operation and monitoring, and eventual closure of the proposed repository. Similarly, Section 9.3 discusses mitigation measures to reduce potential impacts from the national transportation of spent nuclear fuel and high-level radioactive waste.

11.1 (5554)
Comment - EIS001660 / 0046
Mineral County's comments have identified many areas where the impact assessment is incomplete and inadequate including: agriculture, air quality, archeological and ethnographic resources, environmental justice, flood plains and wetlands, land use and community development, local government, mining, public health and safety, public services, recreation, soils, transportation, vegetation, water, wild horses and burros, endangered species, and wildlife. Since impacts in these areas have not been fully disclosed, the discussion of mitigation is also inadequate.

Pending a complete and thorough analysis of the transportation impacts of the proposed action, a required mitigation list is difficult to prepare. However, based on Mineral County's comments to date, that mitigation must be included at least for:

- Reductions in the size, number, and productivity of federal grazing allotments;
- Emissions of fugitive dust, diesel particulate, and smoke from fires caused by the construction and operations on the improvements of alternative routes;
- The spread of noxious weeds, which may adversely affect agriculture, other vegetation, wild horses and burros, bison, and wildlife;
- Direct and indirect damage to archeological and ethnographic resources;
- Economic impacts on the mining, construction, services, and agricultural sectors of the economy;
- Environmental justice impacts on residents of rural areas;
- Damage to wetlands and changes in the boundaries of the flood plains from large storms;
- Radiological risks to the public along transportation routes;
- Damage or displacement of public infrastructure during rail corridor construction and related alternative transportation improvements;
- The taking of private property; reduced private property values due to perceived risk and stigmatization; reduced private property value due to restrictions on access; and fiscal, agricultural, and groundwater impacts caused by accelerated parcelization of private property,
- Direct and indirect fiscal impacts on Mineral County and other local governments;
- Restrictions on legal or physical access to mining claim and mineral deposits;
- Direct and indirect impacts on the provision of education and other essential public services;
- Recreational impacts from construction on the improvements of railway lines and alternative routes, as well as impacts caused by improved access to the back country and wildlife habitat;
- Adverse impacts on the existing surface transportation systems, including the Union Pacific railroad, I-80, US 6, US 50, NV278, NV 306, NV 376, and minor roads that provide access to private property, public lands, and mining claims;
- Direct and indirect impacts on rare and sensitive plants and their habitats;
- Direct and indirect impacts on wild horses, burros, and bison, including their forage, water, movement, and safety; and
- Direct and indirect impacts on designated riparian habitats and wildlife generally, including impacts from fragmentation, noxious weeds, interference with migration, disturbance or dewatering of water sources, and increased risk of wildlife.

Response

The possibility of impacts in Mineral County and the appropriateness of mitigation measures would depend on the mode and actual route of transportation of spent nuclear fuel and high-level radioactive waste to the proposed repository. However, candidate rail corridors do not directly pass through Mineral County. This Final EIS identifies mostly rail as the preferred mode of transportation both nationally and within Nevada. If the site was approved, the choice of a final route alignment after the selection of a transportation corridor would be the subject of additional National Environmental Policy Act documentation, including analysis of and decisions regarding, potential mitigation measures. However, the EIS analysis did not show a potential for significant impacts to Mineral County in the areas the commenter identifies, and thus did not indicate a need for proposing specific mitigation measures.

Section 116(c) of the NWPA establishes a procedure by which affected units of local government such as Mineral County can report effects from the proposed repository to DOE and receive impact assistance upon agreement with DOE on matters raised in the report. Section 116(c) commits DOE to participate in this procedure and to provide assistance consistent with direction from Congress. DOE would enter into discussions with potentially affected units of local government and consider appropriate support and mitigation measures.

11.1 (5999)
Comment - EIS001879 / 0024
p. 9-5 to 9-6 Section 9.2.2.2, [Mitigating Measures for] Groundwater

The Draft EIS states that "The selection of a potential site with favorable characteristics is a fundamental impact reduction measure" is misleading and should be deleted. Site selection is not a mitigating measure.

Response
DOE agrees that this statement is misleading. An appropriate correction has been made to the EIS.

11.1 (6048)
Comment - EIS001898 / 0007
The DEIS does not include a thorough discussion of mitigative measures or of long-term environmental monitoring to measure the impacts on the environment.

Basis:

The DEIS does not identify what options will be combined for a Proposed Action. Public comments on the DEIS can be used by DOE to help in the selection of those options that will form the Proposed Action, refine its analysis of environmental impacts, and evaluate the need for particular mitigative measures. In this connection, it is important to ensure that all environmental impacts have been identified or bounded in order to provide a basis for decisions for mitigative measures. Mitigative strategies currently address dust suppression, the desert tortoise, and occupational health and safety. In addition, the FEIS needs to evaluate the need for mitigative strategies for water use, economic, social, cultural, biological, or public health and safety impacts.

For example, the discussion in Chapter 9 (Management Actions to Mitigate the Potential for Environmental Impacts) of the DEIS does not fully address mitigative measures for Native American interests, including several measures presented by the AIRD [American Indian Resource Document; American Indian Perspectives on the Yucca Mountain Site Characterization Project and the Repository Environmental Impact Statement] (American Indian Writers Subgroup, 1998), such as ways to alleviate the severity of the effects on Native American cultural, religious, subsistence, recreational, ceremonial and associated uses of Yucca Mountain. The suggested mitigation actions in the AIRD include providing emergency preparedness training, establishing emergency medical facilities, and providing controlled access to sacred or ceremonial areas or resources.

Further, it is not apparent that a complete monitoring program for mitigative strategies has been clearly defined. The FEIS should include monitoring as a way of evaluating the effectiveness of any mitigative measures, such as measures to reduce impacts from transportation or waste handling at intermodal or site surface-based facilities (40 CFR 1505.2(c)).

Recommendation:

The FEIS should provide reasonable mitigative strategies to address potentially significant adverse impacts from the Proposed Action. Mitigative measures which comprise these strategies should be implementable and effective in reducing environmental impacts. Moreover, the FEIS should discuss monitoring to assess the environmental impacts and the effectiveness of planned mitigative measures. As appropriate, this monitoring could be integrated with DOE's long-term performance confirmation monitoring.

References:

American Indian Writers Subgroup. *American Indian Perspectives on the Yucca Mountain Site Characterization Project and the Repository Environmental Impact Statement.* American Indian Resource Document MOL 19980420.0041. Las Vegas, NV: American Indian Writers Subgroup, Consolidated Group of Tribes and Organizations. 1998.

Response

At present, DOE does not have definitive information on specific tracts of land or community elements that the Proposed Action could affect, so it is premature to identify specific mitigation measures categorically. If the repository was approved, however, DOE would have discussions with potentially affected units of local government and consider appropriate support and mitigation measures. DOE would also continue its ongoing interactions with Native American tribes. In addition, specific mitigation measures could be part of a Mitigation Action Plan or similar plan, such as terms and conditions to Biological Opinions from the U.S. Fish and Wildlife Service and Nuclear Regulatory Commission licensing conditions. DOE, in submitting an application to construct and operate a repository, would identify relevant mitigation measures to the Commission for its consideration, and could reasonably expect a comprehensive set of mitigation measures or conditions of approval to be part of any licensing process. At this time, DOE has not decided whether to prepare a Mitigation Action Plan. As described in Chapter 9 of the EIS, DOE intends to commit to reasonable management actions required to mitigate potential adverse environmental impacts. The Department would develop mitigation actions in cooperation with potentially affected units of local government.

Section 116(c)(2)(A)(i) and (ii) of the NWPA state that "the Secretary shall provide financial and technical assistance to the State of Nevada and any affected unit of local government…to mitigate the impact on such State [Nevada] or affected unit of local government of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Within that broad framework, neither Section 116 nor any other provision of the NWPA limits the impacts that are subject to assistance under Section 116 to the environmental impacts considered in this EIS. This section also allows payments to the State of Nevada and to any affected unit of local government equal to taxes they would have received if the activity was performed by a non-Federal entity.

Under the NWPA, the Section 116 impact assistance review process and the Yucca Mountain Repository EIS process are distinct from one another, and the implementation of one would not depend on the implementation of the other. Thus, the provision of assistance under Section 116 would not be limited either by the impacts identified in this EIS or by its findings on such impacts. A decision to provide assistance under Section 116 would be based on an evaluation of a report submitted by an affected unit of local government or the State of Nevada pursuant to Section 116 to document likely economic, social, public health and safety, and environmental impacts. Similarly, Section 180(c) of the NWPA requires the Secretary of Energy to provide technical assistance and funds for training public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions DOE would transport spent nuclear fuel and high-level radioactive waste.

Mitigation measures discussed in the EIS include those for water use (Sections 9.2.3 and 9.3.3), cultural resources (Sections 9.2.5 and 9.3.5), biological resources (Sections 9.2.4 and 9.3.4); and public health and safety (Sections 9.2.6 and 9.3.6). Chapter 9 discusses impacts in addition to the areas mentioned in this comment. Conversely, DOE has generally not proposed mitigation measures in areas where analyses did not identify consequential impacts. In some instances, an analysis might reveal impacts for which there would be no practical mitigation measures. Decisionmakers would consider the unmitigated consequences in weighing the need for the project against the potential for adverse consequences.

With regard to this comment's example of mitigative measures for Native American interests, DOE supported the preparation of the American Indian Writers Subgroup document (DIRS 102043-AIWS 1998) and used it as a primary reference to the EIS (see Sections 3.1.6.2.2 and 4.1.13.4). DOE would include avoidance of significant archaeological sites as a mitigative action where feasible. If avoidance was not feasible, a data recovery effort would preserve the archaeological data. In addition, DOE would implement Section 180(c) of the NWPA, which requires the Secretary of Energy to provide technical assistance and funds for training public safety officials of appropriate units of government and Native American tribes through whose jurisdictions transportation of spent nuclear fuel and high-level radioactive waste would occur. The training would cover procedures for safe routine transportation and for dealing with emergency response situations.

Since issuing the Draft EIS, DOE has continued to evaluate design features and operating modes that would reduce uncertainties in or improve long-term repository performance, and would improve operational safety and efficiency. The result of the design evolution process was the development of the flexible design (which the Supplement to the Draft EIS called the Science and Engineering Report Flexible Design). Although this design focuses on controlling the temperature of the rock between the waste emplacement drifts (as opposed to areal mass loading) the basic elements of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository at Yucca Mountain remain unchanged.

DOE would monitor impacts during the construction and operation of the repository. A postclosure monitoring program, required by 10 CFR Part 63, would include monitoring activities around the repository after closure. The regulation requires submittal of a license amendment for permanent closure of the repository [10 CFR 63.51(a)(1) and (2)]. This amendment must provide an update of the assessment for repository performance for the period after permanent closure, as well as a description of the program for postclosure monitoring. This program would include continued oversight to prevent any activity at the site that posed an unreasonable risk of breaching the repository's engineered barriers or increasing the exposure of individual members of the public to radiation beyond allowable limits. The details of this program would be defined during the processing of the license amendment for permanent closure. Deferring final development of this program until the closure period would enable a more complete understanding of the circumstances of the repository at closure and incorporation and use of new technologies that could become available by closure.

11.1 (6744)
<u>**Comment**</u> - EIS001878 / 0080
Pending a complete, thorough analysis of the transportation impacts of the proposed action, a list of required mitigation is difficult to prepare. Nevertheless, based on Eureka County's comments to date, mitigation must be included at least for:

- Conversion of agricultural land and water rights to other uses, fragmentation of range and grazing allotments, loss of forage, restrictions on livestock movement, loss of water supplies or restricted access to such supplies, loss of livestock in accidents, changes in value of agricultural land, changes in costs of agricultural production, and increased harassment of livestock;

- Emissions of fugitive dust, diesel particulates, and smoke from fires as well as reduced visual range caused by rail corridor construction and operations;

- Direct and indirect damage to, and loss of, archeological and ethnographic resources;

- Economic impacts on the mining, services, construction, and agricultural sectors of the economy;

- Environmental justice impacts on residents of rural areas;

- Damage to springs, wetlands, and surface waters (including the Humboldt River), and changes in the boundaries of flood plains;

- Radiological risks to the Humboldt River;

- Damage or displacement of public infrastructure (including the Crescent Valley airport) during rail corridor construction, as well as increased demand on public infrastructure due to construction employment;

- The direct and indirect housing impacts of a 500-person (or larger) construction crew;
- The taking of private property; reduced private property values due to perceived risk, stigmatization, restricted access, and other factors; and fiscal, agricultural, and groundwater impacts caused by accelerated parcelization of private property;
- Direct and indirect fiscal impacts on Eureka County and other local governments;
- Restrictions on legal or physical access to mining claims and mineral deposits; division of mining claims; and takings of private property rights related to mining;
- Direct and indirect impacts on the provision of education and other public, social, and medical services;
- Adverse impacts on the quality of life in Eureka County and neighboring areas, including diminished environmental quality, impacts on fish and wildlife, impacts from noise, impacts on scenery and views, diminished safety and security, loss of traditional livelihoods, and other effects;
- Recreational impacts from construction of a railroad bed, access roads, borrow pits, and fences, as well as impacts caused by improved access to the back country and wildlife habitat;
- Impacts on scenic resources, including both expansive views and features of interest;
- Impacts on soils from construction and operation of a railroad bed and access roads, including cuts, fills, and soil compaction;
- Impacts on solid waste disposal infrastructure;
- Adverse impacts on the existing surface transportation systems, including the Union Pacific railroad, I-80, US 6, US 50, NV 278, NV 306, NV 376, R.S. 2477 roads, and other roads that provide access to private property, public lands, and mining claims;
- Direct and indirect impacts from the spread of noxious weeds, and impacts on rare and sensitive plants and their habitats;
- Damage to groundwater resources from a radiological accident or the discharge of hazardous materials; adverse impacts on existing water rights; takings of private property rights in water; and adverse effects of well development and closure;
- Direct and indirect impacts on wild horses and burros, including impacts on their ranges, herd management areas, forage, movement, water supplies, safety, and management costs; and
- Direct and indirect impacts on the Bates Mountain antelope release area, designated riparian habitats, the Simpson Park habitat management area, and wildlife habitat generally, including impacts from conversion of habitat, fragmentation of habitat, loss of forage, restrictions on movement, diminished safety, loss of monetary and nonmonetary value, and increased management costs.

Specifically regarding mitigation of environmental impacts caused by fencing of railroad tracks and access roads, the DOE must commit to consultation not only with the BLM but also with local agricultural producers, public safety officials, and local governments to determine whether or not fences are needed at any location.

Response

Under the Council on Environmental Quality Regulations implementing the National Environmental Policy Act (40 CFR 1508.20) mitigation includes those activities that:

- Avoid or eliminate the impact over time by preservation or maintenance operations during the life of the action.
- Avoid the impacts by limiting the degree or magnitude of the action and its implementation.

- Repair, rehabilitate, or restore the affected environment.
- Compensate for the impact by replacing or providing substitute resources or environments.

Chapter 9 of the EIS discusses the mitigation measures DOE has identified that could reduce potential impacts from the operation of the repository and the transportation of spent nuclear fuel and high-level radioactive waste and covers many of the subject noted by the comment related to Eureka County. The mitigation measures specifically identified in Section 9.3 of the EIS are based upon the impacts discussed in Section 6.3 of the EIS and includes land use; air quality; biological resources and soils; hydrology, including surface water and groundwater; cultural resources, occupational and public health and safety; aesthetics; waste management; socioeconomics; noise; utilities, energy, and materials; and environmental justice.

Before selecting the mode or route in Nevada, the Department would have consultations with agencies at the Federal, State, and county levels. The selected mode and route would require a more detailed environmental and engineering analysis.

Mitigation measures that could be implemented to minimize potential impacts from the construction and operation of a transportation corridor would depend on several factors, including the corridor selected and the final alignment of the route within the corridor. Avoidance of impacts would be among the factors considered in corridor selection and route alignment. Once DOE selected a corridor and aligned a route, it could determine the need for and nature of any mitigation measures.

11.1 (6771)
<u>Comment</u> - EIS001878 / 0081
Mitigation related to emergency response and management. Mitigation measures for impacts to local governments for emergency response and management activities made necessary by the proposed action (including the transportation alternatives) are incomplete or absent. This is a significant oversight. Local emergency response resources will typically be the first on the scene of any accident involving the transportation of SNF [spent nuclear fuel] and HLW [high-level radioactive waste]. The DOE's National Transportation Program publication, Transporting Radioactive Materials, Answers to Your Questions (June 1999) says (p. 24), "As with any traffic accident, the local, Tribal, and State police, fire departments, and rescue squads are the first to respond to transportation accidents involving radioactive materials."

The introduction to Chapter 9 (p. 9-1) tries to head off any discussion of specific mitigation actions for emergency response services and emergency management actions. The discussion is based on an over-simplified reference to Section 116(c) of the Nuclear Waste Policy Act. While Section 116(c) may help mitigate impacts to public health and safety, it does not eliminate the need for identification of specific mitigation actions in the DEIS. Furthermore, it does not constitute the universe of mitigation measures for public health and safety.

Through the DEIS, DOE must examine all relevant mitigation measures, including mitigation of ongoing impacts over the life of the proposed waste shipments.

The discussion of occupational health and safety (p. 9-23) includes no mitigation to reduce the impacts from waste shipment transportation accidents. For example, it does not mitigate impacts from the lack of local emergency response capabilities. Such mitigation could include dedicated emergency response teams (not local government teams) that would be immediately available within a short response time to the scene of an accident. The teams could travel in conjunction with, but away from, SNF and HLW shipments, or they could be stationed strategically and equipped for quick initial response. Such teams would be a particularly effective mitigation where there are few or no local emergency resources.

Further, mitigation actions should address all phases of emergency management, including preparedness, response, and recovery. Thus, they should address programs, funding, and training.

Some mitigation actions described in Chapter 9 are so general that it is not possible to determine what they would consist of or how effective they would be. For example, the DEIS suggests a measure to "improve design of affected roadways to reduce accidents." (p. 9-23) The mitigation measures must be specifically designed to reduce or eliminate foreseeable hazards from the operation of rail lines in Nevada. They must address hazards at rail crossings, during switching, when shipments are parked on sidings, and from train derailments.

Response
As the commenter notes, mitigation measures that could be adopted to further reduce potential impacts associated with the transportation of spent nuclear fuel and high-level radioactive waste to a repository at Yucca Mountain, including measures to reduce the possibility of accidents, are addressed in Section 9.3.6 of the EIS. The development of mitigation actions related to emergency management, including preparedness, response, and recovery is premature because such mitigation actions, if needed, could differ from community to community, from mode to mode, and from route to route. As stated in Chapter 6 of the EIS, DOE cannot confidently identify the mode of transportation and routes that would be used beginning almost 10 years in the future and continuing for an additional 24 years. Nevertheless, DOE could fund mitigation measures that a qualifying local government sought to implement. Section 116(c)(2)(A)(i) and (ii) of the NWPA state that "the Secretary shall provide financial and technical assistance to the State of Nevada and any affected unit of local government…to mitigate the impact on such State [Nevada] or affected unit of local government of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Any decision to provide assistance under Section 116 would be based on an evaluation of a report submitted by an affected unit of local government or the State of Nevada to document likely economic, social, public health or safety, and environmental impacts. If the proposed repository was to become operational, DOE would enter into discussions with potentially affected units of local government and consider appropriate support and mitigation measures.

If there was a decision to construct and operate the proposed repository, and after the identification of transportation modes and routes, local jurisdictions would be better able to identify the likely economic, social, public health and safety, or environmental impacts that would be the basis for a request for economic assistance, which could include assistance in providing additional medical and emergency response capabilities, under Section 116(c) of the NWPA.

With respect to training, including emergency response training, as required by Section 180(c) of the NWPA, DOE would provide technical assistance and funds to States for training for public safety officials of appropriate units of local government and Native American tribes through whose jurisdiction DOE would transport spent nuclear fuel and high-level radioactive waste. DOE anticipates that training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations.

11.1 (7182)
Comment - EIS001337 / 0073
Page 2-44 Nevada Transportation - Transportation is the major source of interest/concern to the people living in Lincoln County. This is due to the extreme likelihood that shipments to Yucca Mountain will pass through our county. Based upon objections expressed by Nevada leaders and actions taken related to DOE low-level waste transportation routing it is unlikely that any of the final routes, rail or highway, will go through Clark County. Likely routes whether legal weight truck, heavy-haul truck or rail will be through the rural areas of the State. The Draft EIS identifies a number of impacts resulting from transportation of nuclear material. However, there is no mention of mitigation measures that will be taken to minimize these impacts. It is essential that the EIS address mitigation plans in detail.

Response
Section 9.3 of the EIS discusses mitigation measures that DOE could adopt to reduce potential impacts associated with the transportation of spent nuclear fuel and high-level radioactive waste to a repository at Yucca Mountain, including measures to reduce the possibility of accidents. The Department would identify and implement more specific mitigation measures if the repository was approved and a particular transportation mode and route were selected.

In addition, DOE could fund mitigation measures that a local government sought to implement. Section 116(c)(2)(A)(i) and (ii) of the NWPA state that "the Secretary shall provide financial and technical assistance to the State of Nevada and any affected unit of local government…to mitigate the impact on such State [Nevada] or affected unit of local government of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." DOE would base a decision to provide assistance under Section 116 on an evaluation of a report submitted by affected units of local government or the State of Nevada to document likely economic, social, public health and safety, or environmental impacts. If the proposed repository became operational, DOE would hold discussions with potentially affected units of local government and consider appropriate support and mitigation measures.

11.1 (7229)
Comment - EIS001337 / 0122
Page 9-21 Section 9.3.4.2. This section does not include any measures to replace vegetation or animal unit months (AUM's) of forage lost to rail spur construction.

Response
As indicated in Section 9.3.1 of the EIS, DOE would evaluate appropriate mitigation measures that would minimize impacts to grazing lands. These actions could include providing access to lands on both sides of a rail line via underpasses, revegetation, and assisting in providing water should there be a need.

11.1 (7302)
Comment - EIS010485 / 0006
The Mitigation process, and Native review of any proposed mitigation is also not discussed [in the Supplement to the Draft EIS].

Response
DOE did not discuss any of the specifics concerning the mitigation process and Native American reviews in the Supplement to the Draft EIS, although it did acknowledge it would consult with Native American tribes and organizations to ensure the implementation of the most appropriate mitigation measures to reduce any adverse effects (see Section 3.1.6 of the Supplement to the Draft EIS). However, the interaction program with Native American groups designed to ensure the identification and evaluation of issues important to Native American, as well as a discussion of potential mitigation measures for the repository and transportation corridors, can be found in Sections 3.1.6.2, 9.2.5, and 9.3.5, respectively, of the EIS.

11.1 (7415)
Comment - EIS001912 / 0010
We are extremely concerned that DOE proposed no mitigation measures for waste transportation, particularly in light of the latent cancer fatalities associated with the program.

Response
Mitigation measures that could be adopted to reduce potential impacts associated with the transportation of spent nuclear fuel and high-level radioactive waste to a repository at Yucca Mountain, including measures to reduce the possibility of accidents, are addressed in Chapter 9 of the EIS. Although radiation exposures would be small, Section 9.3.6 lists measures under consideration that could minimize radiation exposure for workers. More specific mitigation measures, including measures to reduce dose to the public during incident-free transportation, could be identified and implemented if the repository was approved and a particular transportation mode and route were selected.

11.1 (8182)
Comment - EIS001653 / 0106
Much of the mitigation in Chapter 9 should be included in the proposed action.

Response
Chapter 9 of the EIS describes a combination of mitigation measures that include measures that would be part of the Proposed Action; measures that are under consideration; and possible measures that DOE is still studying.

If the Nuclear Regulatory Commission granted a license for the repository project, DOE would define these mitigation measures in more detail and would establish its commitments.

11.1 (8187)
Comment - EIS001653 / 0108
None of the discussion in the long-term performance section [9.2.8] has much to do with mitigation. It has more to do with site selection, design, and defense in depth. Without these measures it is doubtful that DOE would even have a proposed action, which could meet regulatory standards.

Response
Section 9.2.6 of the EIS lists mitigation measures that DOE is considering that could reduce the long-term potential for possible radionuclide releases from the proposed repository.

11.1 (8188)
Comment - EIS001653 / 0109
Transportation mitigation needs to include the following:

- Efforts to monitor impacts to land values and development.
- Specific contingency plans for spill situation that describe roles, responsibilities and financial assistance.
- Mitigation assistance to local communities for emergency response capabilities, management and training.
- Measures to monitor and compensate for loss of visitors or other related economic development associated with transportation and repository development.
- Specific transportation mitigation measures such as escorts, dedicated mains, time of day restrictions, etc.
- Specific measures to accommodate heavy haul trucks, highway improvements, roadway maintenance and financial assistance committed by DOE.

Response
Chapter 9 of the EIS discusses mitigation measures DOE has determined it could use to reduce potential impacts from the construction, operation and monitoring, and eventual closure of the proposed repository. DOE believes that it is speculative to estimate impacts to land values and development, loss of visitors, or other perceived economic issues, and has not addressed them in the EIS. Estimating such impacts could result in a misrepresentation of the direct impacts of an action.

The Price-Anderson Act establishes a system of financial protection (compensation for damages, loss, or injury suffered) for the public in a nuclear accident, regardless of who causes the damage. Section M.8.1of the EIS discusses the Price-Anderson Act. Under the Motor Carrier Act of 1980, DOE, the owners of the materials, and the carriers would share responsibility for cleanup of released materials. Under provisions of the DOE Draft Policy for Implementing Section 180(c) of the NWPA, the Department would provide technical assistance and funding for emergency response personnel. Appendix M also discusses these provisions.

Sections 2.1.3.3, 6.3, 9.3, and J.3 of the EIS discuss Nevada transportation. Specifically:

- Section 2.1.3.3.3.2 discusses road upgrades for candidate routes, along with the specific routes potentially used for heavy-haul truck transportation. Similarly, Section 2.1.3.3.2.1 discusses branch rail line construction and mitigation measures for the five rail implementing alternatives.
- Section 6.3 discusses impacts that could occur in Nevada from the construction and operation of a branch rail line or from upgrades to highways and the construction and operation of an intermodal transfer station.
- Section 9.3 discusses mitigation measures DOE would have to implement, has decided to implement, or has identified for consideration to reduce potential impacts from the transportation of spent nuclear fuel and high-level radioactive waste.
- Section J.2.3 discusses the use of dedicated rail lines.

11.1 (8190)
Comment - EIS001653 / 0110
DOE needs to establish a committee of potentially affected areas to review and monitor transportation shipments and potential impacts similar to the Transportation Protocol Working Group established by DOE-NVO [Nevada Operations Office]. The group could also address issues related to emergency response and management, risk perceived impacts, and whether they actually materialize and other issues.

Response
DOE could establish a committee analogous to the Transportation Protocol Working Group if the Yucca Mountain site was designated for a repository. DOE has noted the potential consideration of such a committee in Chapter 9 of the Final EIS, which identifies potential impact reduction features, procedures, and safeguards; and mitigation measures under consideration for inclusion in the project plan and design.

11.1 (8416)
Comment - EIS001873 / 0078
P.9-21. Surveys of biological resources at some future date do not constitute mitigation. These resources must be identified prior to the route decisions.

Response
Section 6.3.2 of the EIS discusses biological impacts that could occur as a result of implementing each Nevada transportation alternative. If the Yucca Mountain site was approved, DOE would issue at some future date, a Record of Decision to select a mode of transportation. If, for example, mostly rail was selected (both nationally and in Nevada), DOE would identify a preference for one of the rail corridors in consultation with affected stakeholders, particularly the State of Nevada. In this example, DOE would announce a preferred corridor in the *Federal Register* and other media. No sooner than 30 days after the announcement of a preference, DOE would publish its selection of a rail corridor in a Record of Decision. A similar process would occur in the event that DOE selected heavy-haul truck as its mode of transportation in Nevada. Other transportation decisions, such as the selection of a specific rail alignment within a corridor, would require additional field surveys, State and local government and Native American tribal consultations, environmental and engineering analyses, and appropriate National Environmental Policy Act reviews.

11.1 (8664)
Comment - EIS001837 / 0024
Mitigation measures are lacking. The DOE does not propose to move the people living in harms way. The DEIS should have addressed the issue of buying the homes along the railroad and helping the people to move if the DOE is going to implement this kind of disruptive, potentially dangerous nuclear waste shipment plan.

Response
Regarding requirements for land associated with branch rail line development, definitive information is not available at this time on specific tracts that DOE could need for a given transportation alternative. For land that would be required or otherwise affected, the Department would fairly compensate landowners under Federal acquisition procedures. If DOE was required to exercise its right of eminent domain, it would do so in compliance with applicable laws and regulations.

11.1 (8702)
Comment - EIS010004 / 0002
I would just offer one suggestion and that has to do with building a camp for YMP [Yucca Mountain Project] workers.

Within 3 or 4 miles of the tunnel entrance, DOE should build a man-camp along the lines of the camp that was used for over 10 years at Area 12. The rooms should be set up for one person, and each room should have its own bathroom. The camp could start off as a 200 man (and women) camp with room for expansion.

The cost should be $1 per day, and $1 per meal. This is just so you could keep track of how many workers are staying and eating in camp. This is very much along the lines as “Systems.” (Over the hill.) If the DOE did this they would attract a high quality of worker, particularly "travelers" who are staying in Las Vegas motels until they can catch a call out of the union hall.

The lack of a man-camp at YM has always been the number one drawback to working there. (Please don't tell me about the man-camp in Mercury. DOE and Bechtel have turned that once fine camp into an overpriced, under performing, cost prohibitive, joke.)

Response
DOE appreciates the suggestion and the commenter's participation in the National Environmental Policy Act process.

11.1 (9087)
Comment - EIS001873 / 0079
P.9-23. This document must include a commitment to these safety measures.

Response
Chapter 9 of the EIS, which provides DOE's list of possible mitigation measures identified at this time, including impact reduction features, procedures and safeguards; and mitigation measures under consideration for inclusion in the project plan and design. Chapter 9 also identifies ongoing studies that could eventually influence mitigation measures related to the project plan and design. The Department notes that current contracts for operations of DOE sites do contain requirements and incentives for minimizing worker exposure to ionizing radiation, and that such provisions could be expected in contracts for operating the proposed repository and transportation of materials to the repository. The Department currently contracts for bus transportation of workers to the Nevada Test Site, and that bus transportation would be expected to continue. Other measures could be implemented as appropriate. DOE anticipates that the project plan and design would continue to evolve, creating additional opportunities for mitigation and potentially eliminating the need for some mitigation measures currently under consideration.

11.1 (9309)
Comment - EIS001888 / 0036
DOE needs to reflect on how local elected officials consider a major federal project such as the one being proposed in the DEIS. In making decisions, local officials must use any information, no matter how uncertain or well defined, to consider the implications to their constituents. This basic criterion may be stated as follows, "Is an event or impact from that event more likely than not to happen and, if so, what must we do to mitigate any harmful effects?"

In other words, the standard of proof for technical or statistical decision-making may have the appearance of being more stringent but it is generally much less related to the real world than that which needs to be considered by local elected officials and the public when evaluating the effects of major projects.

It should also be noted that technical or statistical data, even when applied with accepted "industry" standards, often provide an artificial appearance of reality. Often there isn't sufficient experience, information or data to substantiate the numbers.

It is this need on the part of local governments that must be met in order for an environmental impact statement to reflect reality. Thus, DOE does a great disservice to local communities when the DEIS is not written to take into account the potential effects of the Yucca Mountain Program on the economy of Clark County and in other potential impact areas. For example, effects on program costs and the liability of local governments, on the necessity for transportation infrastructure improvements, on the potential loss of value of property, and the potential stigmatization of local area services and products have all been documented as impacts elsewhere. But, they have not been addressed in the Yucca Mountain DEIS. To reiterate, while there may be questions regarding the present or future occurrence of such impacts and their potential magnitude, it is important that there at least be acknowledgement of the issues in the DEIS.

If these impacts of greatest concern to the residents and elected officials of Clark County are not addressed, there can be no reasonable expectation that meaningful mitigation planning can take place. Since a major goal of an EIS is to provide a broad enough scope and enough detail to allow for such action, this DEIS must be considered incomplete and insufficient.

Response
The commenter accurately notes that the EIS makes use of statistical techniques in some disciplines to estimate potential environmental impacts. The commenter states that this provides an artificial appearance of reality and that often there isn't sufficient experience, information, or data to substantiate the numbers. This argument is precisely why DOE does not include the impacts of perceived risks, such as lost property value due to stigmatization, in its environmental impact documents, or attempt to presume what agencies need to do to serve their citizens. DOE has focused its evaluations on the parameters most likely to provide the decisionmaker discriminating information between alternatives.

Regarding mitigation, DOE would enter into discussions with potentially affected units of local government and consider appropriate support and mitigation measures. In addition, as required by Section 180(c) of the NWPA, DOE would provide technical assistance and funds to states for training for public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions DOE would transport spent nuclear fuel and high-level radioactive waste. Training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. In addition, Sections 116(c)(2)(A) of the NWPA provides for financial and technical assistance and 117(c) of the Act sets forth assistance guidelines covering a number of issues including emergency preparedness and response, state liability arising from accidents, and necessary road upgrading.

11.1 (9315)
Comment - EIS001888 / 0045
The DEIS also does not contain sufficient detail in order to evaluate mitigation needs. While this may be addressed in future documents, the current DEIS language provides no guarantees. Thus, a whole range of issues and responsibilities are left ambiguous. This could result in a significant harm to the residents of Clark County.

Response
If the repository was approved, DOE would enter into discussions with potentially affected units of local government and consider appropriate support and mitigation measures. As described in Chapter 9 of the EIS, DOE intends to commit to reasonable management actions required to mitigate potential adverse environmental impacts. DOE would develop mitigation actions in cooperation with potentially affected units of local government. At present, DOE does not have definitive information on specific tracts of land or community elements that could be adversely affected, so it is premature to identify specific mitigation measures categorically.

Section 116(c)(2)(A)(i) and (ii) of the NWPA state that "the Secretary shall provide financial and technical assistance to the State of Nevada and any affected unit of local government…to mitigate the impact on such State [Nevada] or affected unit of local government of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Within that broad framework, neither Section 116 nor any other provision of the NWPA limits the impacts that are subject to assistance under Section 116 to the environmental impacts considered in this EIS.

Under the NWPA, the Section 116 impact assistance review process and the Yucca Mountain Repository EIS process are distinct from one another, and the implementation of one would not depend on the implementation of the other. Thus, the provision of assistance under Section 116 would be independent of the impacts identified in this EIS or its findings on such impacts. Any decision to provide assistance under Section 116 would be based on an evaluation of a report submitted by an affected unit of local government or the State of Nevada pursuant to Section 116 that documented likely economic, social, public health and safety, and environmental impacts.

11.1 (10507)
Comment - EIS002105 / 0007
As a 54-year resident of the state, having two children I have raised in the state, my wife and I, I certainly do not want to [see] the State of Nevada become a wasteland in any way, shape or form, and I don't think that the acceptance of this material will cause that. Do I feel the waste will come to our state? Yes, I do. Should we be properly compensated? Yes, we certainly should be. Should every reasonable precaution be taken to protect our future generations? Of course. Every precaution should be taken. But I do feel that we're going to have the

material and I think that we need to protect ourselves economically, scientifically, every way we possibly can, but in the long run, the material has to go somewhere.

Response
The NWPA establishes a comprehensive process for determining the suitability of Yucca Mountain as a repository and for determining whether a repository should be constructed and operated at the site. After completion of site characterization and the issuance of the Final EIS, the Secretary of Energy must determine whether to recommend the site to the President. If the Secretary recommends the site to the President, the President must then decide whether to recommend the site to Congress. If the President recommends the site to Congress, then the State of Nevada has 60 days in which to submit a notice of disapproval regarding the site designation. Congress could then, if it chooses, override Nevada's disapproval by passing a resolution of repository siting approval within 90 calendar days of continuous session of Congress following receipt of the notice of disapproval from the State. If Congress overrode the State of Nevada's disapproval, DOE would submit an application for authorization to construct a repository to the Nuclear Regulatory Commission, which could approve or deny the application. If Congress does not pass an override resolution, then the site would be disapproved. Nevada citizens, through their democratically elected representatives in Congress and in the State Legislature and Governor's Office, have had and will continue to have opportunities to make their views known.

The NWPA also provides for funding to the State of Nevada and to the affected units of local government for the purpose of participating in the NWPA process of characterizing and selecting a site for a geologic repository. In addition, Section 116(c) of the NWPA requires DOE to provide financial and technical assistance to the State of Nevada and to the affected units of local government to mitigate the impacts of the development of a repository and the characterization of the site. Section 116(c)(3)(A) also authorizes the State of Nevada and any affected unit of local government to collect an amount equal to the amount that the state or local government would receive if authorized to tax site characterization, repository development and activities (known as Payments-Equal-To-Taxes, or PETT). If the repository was constructed and operated at Yucca Mountain, the State and local governments would also be able to collect an amount equal to the taxes imposed on other non-Federal real property and industrial activities. Financial assistance comes from the Nuclear Waste Fund, which is funded by contributions from nuclear utility ratepayers.

11.1 (10802)
Comment - EIS002043 / 0003
A significant concern to the people of Esmeralda County and particularly those residing in Goldfield, is the transportation of nuclear material. Esmeralda County believes that it is highly likely that political considerations will result in the county serving as a major corridor for nuclear waste transportation to the Yucca Mountain Site. Spent nuclear fuel and high-level radioactive waste will likely be transported through Esmeralda County by either legal weight truck, heavy-haul truck, rail or a combination of modes. The Draft EIS identifies a number of impacts resulting from transportation of the nuclear material without mention of any mitigation measures that will be taken to minimize these impacts. DOE needs to address mitigation measures in detail.

Is the Department not addressing impact mitigation because it assumes that impact mitigation will be achieved through implementation of Section 116c(2) of the Nuclear Waste Policy Act?

If yes, does the Department intend to work directly with each Affected Unit of Local Government to address impact mitigation needs?

In accordance with NEPA the Department should develop specific measures to mitigate impact. These measures should be described in detail in the EIS.

Response
Chapter 9 of the Yucca Mountain EIS discusses mitigation measures that DOE could use to reduce potential impacts from the construction, operation and monitoring, and eventual closure of the proposed repository.

Training for emergency response personnel would be provided under provisions of the DOE Draft Policy for implementing Section 180(c) of the NWPA. These provisions are described in Appendix M.6 of the EIS.

Sections 2.1.3.3, 6.3 and J.3 of the EIS discuss Nevada transportation. Specifically, the following items noted in this comment are discussed:

Section 2.1.3.3.3.2 discusses time-of-day restrictions for heavy-haul trucks and road upgrades for candidate routes and specific routes to be used for heavy-haul transportation. Similarly, Section 2.1.3.3.2.1 discusses rail-line construction and mitigation measures for the five rail implementing alternatives.

Section 9.3 discusses mitigation measures DOE is required to implement, has determined to implement, or has identified for consideration, to reduce potential impacts from the transportation of spent nuclear fuel and high-level radioactive waste.

Section 6.3 discusses the impacts that could occur in Nevada for the construction and operation of a branch rail line or from upgrades to highways and the construction and operation of an intermodal transfer station.

Section J.2.3 discusses the use of dedicated rail.

DOE intends to fully implement the provisions of Section 116(c)(2). The Department regards the process established by that section to be separate from the EIS process. Section 116(c)(2)(A)(i) and (ii) of the NWPA states that "the Secretary shall provide financial and technical assistance to the State of Nevada and any affected unit of local government…to mitigate the impact on such State [Nevada] or affected unit of local government of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Within that broad framework, neither Section 116 nor any other provision of the NWPA limits the impacts that are subject to assistance under Section 116 to the environmental impacts considered in this EIS.

Under the NWPA, the Section 116 impact assistance review process and the Yucca Mountain Repository EIS process are distinct from one another, and the implementation of one would not depend on the implementation of the other. Thus, provision of assistance under Section 116 would be independent of the impacts identified in this EIS or its findings on such impacts. Any decision to provide assistance under Section 116 would be based on an evaluation of a report submitted by an affected unit of local government or the State of Nevada pursuant to Section 116 that documented likely economic, social, public health and safety, and environmental impacts.

Need for any additional mitigation measures from construction and operation of transportation routes would depend on the transportation corridor selected and the final alignment of the route within the corridor. Once a specific corridor and route alignment was selected, mitigations appropriate to that corridor and route could be determined.

11.1 (11329)
Comment - EIS002267 / 0003
[DOE] has provided insufficient scope and detail to allow for planning and negotiation of mitigation and management plans. This is because they have narrowly defined the scope and nature of the impact, thus insuring that few impacts of significance would be identified.

Response
The Department has defined the scope of the analysis and defined impacts in accordance with Council on Environmental Quality and DOE guidance and regulations implementing the National Environmental Policy Act. Mitigation measures that DOE could undertake to reduce potential environmental impacts below the level described in the EIS are discussed in Chapter 9.

Section 180(c) of the NWPA requires the Department to provide funds and technical assistance for training for public safety officials of appropriate units of local government through whose jurisdictions the Department would to transport spent nuclear fuel or high-level radioactive waste. Further, Section 116(c) of the Act requires the Secretary to provide financial and technical assistance to the State and affected units of local government requesting such assistance to mitigate the impacts of the development of the repository.

11.1 (11451)
Comment - EIS010096 / 0009
Table S-2 – The SDEIS predicts a 30 to 60 percent increase in material transport related traffic fatalities under the low temperature alternative yet offers no suggestions for mitigating increased transportation risk nor considers whether any mitigation measures proposed in the DEIS remain valid. The implications of increased material transport through Lincoln County and the City of Caliente should be addressed in the FEIS.

Response
Section 9.3 of the Draft EIS discussed potential mitigation measures for transportation; these measures are still valid. Section 9.3 of this Final EIS contains additional information on mitigation of impacts.

DOE could also consider additional mitigation measures if the repository was approved and if decisions were made on the mode of transportation and the specific corridors that would be used. Any additional mitigation measures would be evaluated with appropriate Federal, state, tribal, and local agencies. Subsequent plans could include such things as infrastructure upgrades, operational guidelines aimed at alleviating specific problems, and emergency response training and assistance under Sections 116 and 180 of the NWPA.

11.1 (11914)
Comment - EIS000308 / 0001
The last statement under Section S.8 [of the Draft EIS] is unacceptable. The DOE MUST be committed to research and development of additional measures to improve the long-term performance of the repository. Anything less is unacceptable. At least TRY to find better ways to mitigate the adverse effects of this thing for future generations.

Response
The Supplement to the Draft Environmental Impact Statement addresses the latest repository design and the corresponding environmental impact analyses. The information provided in the Supplement to the Draft EIS and this Final EIS demonstrates DOE's commitment to the improvement of repository long-term performance.

Since issuing the Draft EIS, DOE has continued to evaluate design features and operating modes that could reduce uncertainties or improve long-term repository performance, including the design of the waste package and improvements in repository operational safety and efficiency. The result of the design evolution process was the development of the flexible design. This design focuses on controlling the temperature of the rock between waste emplacement drifts (as opposed to areal mass loading described in the Draft EIS), but the basic elements of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository at Yucca Mountain remain unchanged. DOE acknowledges in the EIS that the flexible design could be further modified or refined during the License Application process, if the site was approved for development of a repository.

11.1 (12058)
Comment - EIS000226 / 0022
Page 28 of the County/City EIS Scoping Report points out the need for the DEIS to consider unavoidable impacts which can not be mitigated (i.e., additional transportation risk) and that compensation for such impacts must be considered.

Response
The EIS does consider additional transportation risk associated with the repository program. Further, DOE would implement the requirements of Section 180(c) of the NWPA, which requires the Secretary of Energy to provide technical assistance and funds to states for training for public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions transportation of spent nuclear fuel or high-level radioactive waste would travel. The training would cover procedures for safe routine transportation and for dealing with emergency response situations.

11.1 (12433)
Comment - EIS001106 / 0003
2.2.1 Decommissioning and Reclamation: This section provides no details about reclamation procedures, their application, and their chances for success.

Response
Section 7.1 of the EIS addresses potential short-term environmental impacts in the Yucca Mountain vicinity associated with the No-Action Alternative and includes substantial discussion of proposed decommissioning and reclamation activities.

In addition, Section 9.2.4 of the EIS addresses potential mitigation measures for potential impacts to biological resources and soils. Chapter 9 addresses mitigation measures associated with repository construction, operation and monitoring, and closure, and reclamation associated with the No-Action Alternative described in Section 2.2 would be similar in nature.

11.1 (13010)
Comment - EIS010334 / 0007
Under the Supplemental Draft EIS under the cultural resources section it primarily appears to devote itself to archaeological findings. We believe while this is indeed part of the cultural resources, it talks about mitigating issues and a lot of other -- lot of other proposals to try to protect areas in and the like and we believe that it's imperative that the Indian concerns and involvement be included into that section in the final EIS.

Response
This Final EIS incorporates the information provided in the Supplement to the Draft EIS. DOE acknowledges the importance of protecting cultural resources and minimizing potential impacts to them.

11.1 (13012)
Comment - EIS010334 / 0009
On page 3-16 it talks about under section 3.1.13 and this is under the Environmental Justice section, it alludes to and specifically states actually that the DOE will continue its protection of Native American cultural resources and protect the traditional cultural properties. It will implement appropriate mitigation measures.

To date there's been no studies specific to traditional cultural properties as identified under both Bulletins 30 nor as cultural landscapes under -- I'm sorry -- under traditional cultural properties under Bulletin 38 and traditional landscape areas under Bulletin 30. And as such there should be provisions to include those kinds of studies to make those determinations if indeed there's going to be protective measures implemented.

Response
Research to date has identified no traditional cultural properties of interest to groups other than Native American tribes at the Yucca Mountain Repository site itself. Once DOE determines the final mode, transportation corridor, and alignment, it would conduct corridor-specific studies for the alignment in accordance with the requirements of the National Historic Preservation Act and 36 CFR Part 800 to identify traditional cultural properties that might exist in or adjacent to the corridor. During these evaluations the Department would consult, as appropriate, with parties who have an interest in traditional cultural properties along the route.

DOE is committed to ensuring that its analyses include all historic properties that have traditional value to interested parties. The Department agrees that traditional cultural properties are not restricted to those of Native American concern (see DIRS 155897-Parker and King n.d.). Simply, DOE would consider the guidelines pursuant to McClelland et al. (DIRS 155896- n.d.), which addresses protecting rural and other cultural landscapes.

11.1 (13211)
Comment - EIS010244 / 0010
The SDEIS predicts a 30 to 60 percent increase in material transport related to traffic fatalities under the low-temperature alternative yet it does not offer suggestions for mitigating increased transportation risk nor considers whether any mitigation measures proposed in the DEIS remain valid.

Response
Section 9.3 of the Draft EIS discussed potential mitigation measures for transportation; these measures are still valid. Section 9.3 of the Final EIS contains additional information on the mitigation of impacts.

DOE could also consider additional mitigation measures if the repository was recommended and approved and if decisions on the mode of transportation and specific corridors were made. Any additional information would be coordinated with responsible Federal, state, tribal, and local agencies. Subsequent plans could include infrastructure upgrades and operational guidelines aimed at alleviating specific problems. Section 116 of the NWPA provides for participation in the identification of mitigation actions and Section 180 provides for funding and technical assistance for training.

11.1 (13222)
Comment - EIS010244 / 0021
The SDEIS indicates that DOE will continue performance confirmation activities following site approval and designation. DOE should propose to continue state and local government oversight functions to mitigate a longer site characterization like process.

Response
The Testing and Performance Confirmation Program is designed to meet specific requirements of the Nuclear Regulatory Commission (10 CFR Part 63.102(m) and 10 CFR Part 63, Subpart F). The program allows continued oversight. If the site is recommended for further development, the performance confirmation period would begin at the time of the site recommendation and would extend until the beginning of repository closure activities. It would provide data to future decisionmakers on the performance of the repository and support choices on closing the repository or retrieving the wastes. DOE is not able to determine its commitment for oversight funding at this time because of dependence on Congressional funding and other factors. If a repository was constructed at Yucca Mountain, DOE expects that it would be able to fund activities required for regulatory compliance and to implement the oversight provisions of the NWPA.

11.1 (13375)
Comment - EIS010182 / 0017
The SDEIS predicts 30 to 60 percent increase in material transport related traffic fatalities under the low-temperature alternative; however, it offers no suggestions for mitigating increased transportation risk nor considers whether any mitigation measures proposed in the DEIS remain valid. In addition, it predicts up to 50 percent increase in worker transport fatalities. This increase does not correlate with the estimated "small increase" in workers. Furthermore, due to the "blending design," hotter fuel would be shipped/transported sooner. The SDEIS should consider mitigating increased transportation risk and what mitigation measures proposed in the DEIS still remain valid.

Response
Section 9.3 of the Draft EIS discussed potential mitigation measures for transportation, which are still valid. This Final EIS integrates the information provided in the Supplement to the Draft EIS and further elaborates on information obtained since DOE issued the Draft EIS.

DOE could consider additional mitigation measures if the repository was recommended and approved and if decisions on the mode of transportation and specific corridors were made. Any additional mitigation measures would be evaluated with responsible Federal, state, tribal, and local agencies. Subsequent plans could include such things as infrastructure upgrades and operational guidelines aimed at alleviating specific problems. Section 116 of the NWPA provides for participation in the identification of mitigation actions and Section 180 provides for funding and technical assistance for training.

11.1 (13456)
Comment - EIS010296 / 0042
Can radon release be reduced? According to the document, radon will account for 99 percent of the public exposure to radionuclides. Can anything be done to mitigate emissions and reduce those levels? Potential mitigation of the emissions should be addressed in the FEIS.

Response
Radon would emanate from the rock of the subsurface repository, enter the repository drifts, and be exhausted in ventilation air. For purposes of public exposure, the source of the radon would be the ventilation shafts and exhaust ducts that would service the subsurface repository, since the radon would be released in the subsurface ventilation

air. Nevertheless, DOE recognizes natural ventilation could be used to reduce long-term repository temperatures and radon emissions. As a consequence, natural ventilation has been proposed in several lower-temperature operating scenarios for the repository by extending the time during which loaded emplacement drifts were ventilated, so the repository would be operated at lower temperatures. The design of the repository is still evolving and the concept of natural ventilation is a design element that could be further developed for License Application. No members of the public would be routinely exposed within the proposed land withdrawal boundary, because this area would be unavailable to public access. If members of the public entered this area, it would be for limited periods, and not for the continuous yearly exposure considered for people living outside the land withdrawal area. If members of the public did visit the Yucca Mountain operations areas, they would be subject to DOE's radiation protection limits and guidance. Any potential radiation exposure from radon or other sources would be of limited duration and any potential radiation dose would be expected to be very low.

11.2 Impacts Compensation

11.2 (56)
Comment - 3 comments summarized
Commenters contend that the EIS has not identified adequate impact mitigation and state that EIS mitigation measures for the Proposed Action must include a special trust or escrow account for prompt and complete compensation to persons affected by radiation along transportation routes, as well as a baseline health assessment to enable the identification of such effects. Commenters stated that the mitigation program must include compensation for takings of private property rights, as required by the Constitution of the United States.

Response
Although DOE has characterized the environment along the candidate transportation routes in Nevada, it has not performed a baseline health assessment. DOE believes it has estimated the potential environmental impacts, including the health impacts, in sufficient detail to allow decisionmakers to determine the relative merits of each transportation scenario. However, DOE would assess the environmental and engineering conditions along the selected corridor in a subsequent National Environmental Policy Act document.

The Price-Anderson Act establishes a system of financial protection (compensation for damages, loss, or injury suffered) for the public in a nuclear accident, regardless of who causes the damage. See Section M.8 for a discussion of the Price-Anderson Act. Responsibility for cleanup of released materials would be shared between DOE, the owners of the materials, and carriers under regulation of the Motor Carrier Act of 1980. Funding and technical assistance for training of emergency response personnel would be provided under Section 180(c) of the NWPA. These provisions are described in Appendix M.8 of the EIS.

At present, definitive information is not available on specific tracts of land that could be required for a given transportation alternative. Where practicable, DOE would align corridors and design facilities to minimize the potential for impairment of private property rights. However, for any taking of property that could be required, DOE would compensate landowners under Federal acquisition procedures. If DOE needed to exercise its right of eminent domain, it would do so pursuant to applicable laws and regulations. DOE believes these actions, as well as those described in Chapter 9 of the EIS, would be appropriate and effective means of mitigating project impacts.

11.2 (108)
Comment - 13 comments summarized
Commenters stated that, because the project serves a national purpose, it is important that Nevada, which has not been the direct beneficiary of nuclear power, not bear the undue burden attributed to this project. Commenters further stated that it is important and entirely appropriate that state and local impacts of the project be offset through mitigating measures, financial and otherwise. Commenters said that a large compensatory package should be developed for residents of the repository area, who, commenters believe, are being disproportionately affected by a problem for which the whole country is responsible. Commenters believe that they should be entitled to discretionary use of funds received, and not be told how to spend them. Commenters stated that a great opportunity exists to derive maximum benefits not only during the repository study period but also during the waste isolation operation period as well.

Response
Under the Council on Environmental Quality regulations (40 CFR 1508.20) for implementing the National Environmental Policy Act, mitigation includes activities that (1) avoid the impact altogether by not taking a certain action or parts of an action; (2) minimize impacts by limiting the degree or magnitude of the action and its implementation; (3) repair, rehabilitate, or restore the affected environment; (4) reduce or eliminate impacts over time by preservation or maintenance operations during the life of the action; or (5) compensate for the impact by replacing or substituting resources or environments.

Section 116(c)(2)(A)(i) and (ii) of the NWPA states that "the Secretary shall provide financial and technical assistance to the State of Nevada and any affected unit of local government…to mitigate the impact on such State [Nevada] or affected unit of local government of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Within that broad framework, neither Section 116 nor any other provision of the NWPA limits the impacts that are subject to assistance under Section 116 to the environmental impacts considered in this EIS. Any decision to provide assistance under Section 116 would be based on an evaluation of any reports submitted by an affected unit of local government or the State of Nevada pursuant to Section 116 to document likely economic, social, public health and safety, and environmental impacts. Neither Section 116(c) nor any other section of the NWPA gives DOE discretion to provide general financial assistance to individuals.

DOE is considering a range of mitigation measures aimed at reducing adverse effects of the proposed repository project. The mitigation analyses in Chapter 9 of the EIS discuss impact reduction measures for the repository and for waste transport, as well as other mitigation measures DOE continues to evaluate in the event the Nuclear Regulatory Commission granted a license for the repository project.

Section 9.2 of the EIS discusses mitigation measures DOE has determined it would implement, or has identified for consideration, to reduce potential impacts from the construction, operation and monitoring, and eventual closure of the proposed repository.

Section 9.3 discusses mitigation measures DOE is required to implement, has determined to implement, or has identified for consideration, to reduce potential impacts from the transportation of spent nuclear fuel and high-level radioactive waste. These measures address impacts from the possible construction of a branch rail line or an intermodal transfer station in Nevada; construction of other transportation routes; upgrading of existing Nevada highways to accommodate heavy-haul vehicles; transportation of spent nuclear fuel and high-level radioactive waste from existing storage sites to the proposed repository; and fabrication of casks and canisters.

11.2 (202)
Comment - 4 comments summarized
Several commenters asked how they would be compensated for decreases in land values due to their proximity to candidate rail corridors. Some of these commenters also raised health-based concerns related to their possible proximity to routes.

Response
At present, definitive information is not available on specific tracts of land that could be required for a given transportation alternative. For any taking of property that could be required, the Department would compensate landowners under Federal acquisition procedures. Should DOE be required to exercise its right of eminent domain, it would do so pursuant to applicable laws and regulations. Where practicable, DOE would also align corridors and design facilities to minimize the potential for impairment of private property rights.

With regard to decreases in land values in proximity to rail corridors, DOE's examination of relevant studies and literature concluded that while under some scenarios the perception of risk could result in adverse impacts on portions of a local economy (including property values), there are no reliable methods whereby such impacts could be predicted with any degree of certainty. While possible impacts can be envisioned, they are not inevitable. Any such adverse conditions would likely be an aftereffect of unpredictable future events, such as a serious accident.

The EIS analysis concluded that the potential for risk to public health and safety along any of the alternative transportation routes would be small. Based on the results of the impact analyses in Chapter 6 and Appendix J of the EIS, as well as the results published in numerous other studies and environmental impact analyses cited in the EIS, DOE is confident that spent nuclear fuel and high-level radioactive waste could be and would be safely transported to Yucca Mountain. DOE also believes, as the EIS reports, that the potential impacts of transportation would be so low for individuals who live and work along the routes that impacts to individuals would not be discernible. The EIS analytical results are supported by numerous technical and scientific studies (see Appendix J of the EIS) that have been compiled through decades of research and development by DOE and other Federal agencies of the United States, including the Nuclear Regulatory Commission and the U.S. Department of Transportation, as well as the International Atomic Energy Agency.

11.2 (454)
Comment - EIS000091 / 0002
We will have more of an influx of people that will come here to live. I'm quite sure of that, and I hope that they do take care of the problems that Amargosa Valley itself, not Nye County and not the State of Nevada, but Amargosa will take care of X amount of influx of people for schooling their children, housing and medical and transportation.

Response
DOE has expanded its socioeconomic discussions in Chapter 3 of the EIS to clarify the magnitude of potential impacts described in Chapters 4 and 6. This discussion includes a projection of baseline parameters through 2035 based on the most recently available information and assumptions. In the Final EIS, DOE provides a quantified estimate, to the extent possible, of school enrollment and changes in law enforcement and public service personnel requirements.

Under the NWPA, the Section 116 impact assistance review process and the EIS process are distinct from one another, and the implementation of one would not depend on the implementation of the other. Thus, the provision of assistance under Section 116 would not necessarily be limited either by the impacts identified in this EIS or by its findings on such impacts. Any decision to provide assistance under Section 116 would be based on an evaluation of a report submitted by affected units of local government or the State of Nevada pursuant to Section 116 to document likely economic, social, public health and safety, and environmental impacts.

DOE would enter into discussions with potentially affected units of local government and consider appropriate support and mitigation measures. In addition, as required by Section 180(c) of the NWPA, DOE would provide technical assistance and funds to states for training of public safety officials from appropriate units of local government and Native American tribes through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. Training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. In addition, Sections 116(a) and 117(c)(5) of the NWPA set forth assistance guidelines covering a number of issues including emergency preparedness and response, state liability arising from accidents, and necessary road upgrading.

11.2 (809)
Comment - EIS000103 / 0007
We cannot allow Lake Barrett to use the term "applied uncertainty" in this project, and all I can say in conclusion [is] that you cannot put classified waste in our mountain, and if you're going to kill us, I want to be paid for it.

Response
While the exact concerns being expressed by the commenter are not entirely clear, the question of compensation for impacts, possibly focused on public health and safety, is apparent. In that regard, Chapter 9 of this EIS addresses the requirements for impact mitigation and compensation. Section 116(c)(2)(A)(i) and (ii) of the NWPA states that "the Secretary shall provide financial and technical assistance to the State of Nevada and any affected unit of local government…to mitigate the impact on such State [Nevada] or affected unit of local government of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Within that broad framework, neither Section 116 nor any other provision of the NWPA limits the impacts that are subject to assistance under Section 116 to the environmental impacts considered in this EIS.

Any decision to provide assistance under Section 116 would be based on an evaluation of a report submitted by an affected unit of local government or the State of Nevada pursuant to Section 116 to document likely economic, social, public health and safety, and environmental impacts. If the proposed repository was to become operational, DOE would enter into discussions with potentially affected units of local government and consider appropriate support and mitigation measures.

11.2 (982)

Comment - EIS000242 / 0003

Finally, there is the question of equity. The risks posed by the spent fuel and the high-level wastes here in Idaho aren't going away. They're going to Nye County. Nye County will bear the burden of risk reduction in each of the counties where the spent fuel and DOE facilities are located, just as they must bear the legacy of more than 300 million curies of radioactivity left from the nuclear weapons testing area.

Once again, Nye County is called upon to host a facility that carries with it an inherent risk and stigma that will last, for all practical purposes, in perpetuity.

How much will one county be told to do in the national interests? Nye County has faithfully served the nation's need for secure facilities for the testing and development of nuclear and conventional weapons, and has received only negligible benefits from these actions.

The soils and water resources have been contaminated. The water resources over large regions have been effectively taken by land withdrawals. The proposed repository at Yucca Mountain will result in further contamination of the county's groundwater resources in additional land withdrawals.

The adverse cumulative impacts associated with the proposed repository must be adequately mitigated. A comprehensive package of compensation and equity offsets must be put forth as part of the proposed action so that the county has the wherewithal to ensure that the long-term health and safety of its residents is protected. Anything less would be quite unfair.

Response

DOE has examined the potential for socioeconomic impacts in Nye County. In addition, the Department has examined potential cumulative impacts from the repository and other past, present, and reasonably foreseeable future actions in the affected region (see Chapter 8 of the EIS). Based on its analysis, DOE believes that it has accounted for actions that could affect Nye County. After publishing the Draft EIS, DOE reviewed cumulative impacts and updated the information in the Final EIS where appropriate. The review included activities at locations with a potential for cumulative impacts on environmental resources (Nevada Test Site, waste disposal sites, Nellis Air Force Range, DOE waste management activities, etc.). DOE reviewed resource plans, environmental impact statements, environmental assessments, strategic plans, consultation documents, tribal meeting records, and other documents of Federal, local, and private agencies and documented potential direct or indirect impacts.

Potential impact mitigation measures, as explained in Chapter 9 of the EIS, are not limited to impacts identified as part of the EIS process. Section 116 (c) of the NWPA establishes a procedure by which affected units of local government, such as Nye County, can prepare and submit a report to DOE documenting likely economic, social, public health and safety, and environmental impacts and can negotiate impact assistance based on matters raised in that report. Section 116(c) commits DOE to participate in that process and to provide assistance consistent with direction from Congress.

Although DOE can measure the public's perception regarding the geologic repository and transportation of spent nuclear fuel and high-level radioactive waste, there is no known method to translate these perceptions into quantifiable impacts. Researchers in the social sciences have not found a way to reliably forecast linkages between perceptions or attitudes stated in surveys and actual human behavior. While stigmatization of Southern Nevada can be envisioned in some scenarios, it is not inevitable. As a consequence, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in this EIS. This issue is discussed in Section 2.5.4 and Appendix N of this Final EIS.

11.2 (996)
Comment - EIS000235 / 0002
Assuming that the nation will move the waste to the Yucca Mountain site, such an action will shift risks to Nevada. Many areas of the nation will become risk free. The Draft EIS does not address the disequitable distribution of risk which will attend the Yucca Mountain project. The Final EIS should identify methods for mitigating/compensating Nevadans for bearing the risks that the rest of the nation does not want.

Response
Section 116(c)(2)(A)(i) and (ii) of the NWPA states that "the Secretary shall provide financial and technical assistance to the State of Nevada and any affected unit of local government…to mitigate the impact on such State [Nevada] or affected unit of local government of the development of [a] repository and the characterization of [the Yucca Mountain] site." DOE could give such assistance to mitigate likely "economic, social, public health and safety, and environmental impacts." Within that broad framework, neither Section 116 nor any other provision of the NWPA limits the impacts that are subject to assistance under Section 116 to the environmental impacts considered in this EIS.

Any decision to provide assistance under Section 116 would be based on an evaluation of a report submitted by an affected unit of local government or the State of Nevada to document likely economic, social, public health and safety, and environmental impacts. DOE would enter discussions with potentially affected units of local government and consider appropriate support and mitigation measures.

While the EIS estimates environmental impacts, it does not, nor would it be appropriate to, address the equity of shifting risk from one location to another, although it does discuss overall impacts (or risks). Risk to the public for both preclosure operations and monitoring and postclosure performance would be small, as reported in Chapters 4 and 5, respectively.

11.2 (2415)
Comment - EIS000659 / 0001
I recognize that whether we like it or not, nuclear waste may be transported to our community. We need to be provided information and needed protection for our health and safety and get some compensation for our community. I agree with others that have spoken in the previous meeting that I wish that we could have the matter taken care of sooner so that we don't waste so much of our tax money on this issue over so many years.

Response
Section 116(c)(2)(A)(i) and (ii) of the NWPA states that "the Secretary shall provide financial and technical assistance to the State of Nevada and any affected unit of local government…to mitigate the impact on such State [Nevada] or affected unit of local government of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Within that broad framework, neither Section 116 nor any other provision of the Nuclear Waste Policy Act limits the impacts that are subject to assistance under Section 116 to the environmental impacts considered in this EIS.

In terms of impact mitigation, under the Nuclear Waste Policy Act, the Section 116 impact assistance review process and this EIS process are distinct from one another, and the implementation of one would not depend on the implementation of the other. Thus, the provision of assistance under Section 116 would not necessarily be limited either by the impacts identified in this EIS or by its findings on such impacts. Any decision to provide assistance under Section 116 would be based on an evaluation of a report submitted by an affected unit of local government or the State of Nevada pursuant to Section 116 that documented likely economic, social, public health and safety, and environmental impacts. If the proposed repository was to become operational, DOE would enter into discussions with potentially affected units of local government and consider appropriate support and mitigation measures.

11.2 (2720)
Comment - EIS000637 / 0003
We will be crossing the tracks about six or eight times a day. This is going to greatly impact our lives because we will have to schedule our lives around the train schedule. If it's even available to us. Will it be?

We don't want to be stopped at the crossing waiting for the train to go by because our radiation exposure will go up. We will lose spontaneity in our lives and the freedom to make our decisions for our movement in the valley we live in.

We use our hot springs to improve our health, and it is hardly compatible with train cars full of deadly waste sitting in Beowawe and going by in full view from our hot water therapy bath.

This will definitely devaluate our property and ruin us financially. Even if DOE did compensate us, would it be enough to relocate at another hot springs? Hot springs are not replaceable. We would be lucky to ever find another one to buy.

Response
While DOE has identified rail as the preferred mode of transportation both nationally and in Nevada, it has not identified a preferred corridor for a branch rail line or the schedule of waste shipments. The Department is considering five candidate rail corridors, but has not selected one as preferred. Minimizing impacts to current land uses, such as the potential impacts identified by the commenter for a branch rail line in the Carlin Corridor, would be a primary consideration in the selection of a corridor and a specific route alignment in that corridor.

DOE would have several options for locating a rail alignment within the Carlin Corridor should that corridor be selected. Specific information on the tracks of land that would be needed to construct a branch rail line and other specific impacts to property owners would not be available until DOE conducted surveys and environmental reviews. Therefore, DOE would not consider route-specific mitigation actions until it selected a corridor and a specific track alignment in the corridor. Assuming that another EIS would be prepared in support of alignment selection, mitigation actions would be evaluated in that document. DOE would mitigate or compensate landholders in compliance with applicable Federal laws and regulations.

Assuming one cask per shipment, there would be about 9 shipments per week (based on 10,725 total rail shipments under the national mostly rail scenario as noted in Section J.1.2.1 of the EIS).

11.2 (2968)
Comment - EIS000727 / 0013
There is no mention of actions to prevent, to compensate or to mitigate local governments for increased wear and tear and for damage to the highway infrastructure caused by the 220 foot long transport vehicle.

Response
DOE would consult with potentially affected units of local government and consider appropriate support and mitigation measures. Sections 116(c)(2)(A) and 117(c)(5) of the NWPA establish assistance guidelines on a number of issues, including emergency preparedness and response, state liability arising from accidents, and necessary road upgrading.

11.2 (3123)
Comment - EIS000726 / 0015
Health insurance does not cover nuclear exposure. There is no mention of how people are to be provided health care when they become sick.

Response
Illnesses caused by acute direct exposure to radioactive materials from accidents would be the responsibility of the transporter, and the transporter's insurance would cover such incidents. Cancer caused by low-level radiation exposure resulting from accidents probably would not become evident for many years, and would not be distinguishable from other causes of cancer, including naturally occurring radiation. Health insurance probably would not exclude coverage of such health impacts for reasons of nuclear exposure because of the difficulty of attributing a cause to an illness.

11.2 (3125)
Comment - EIS000726 / 0017
There is no mention of compensation or mitigation because of an increase in government services required because of the activity here. There will be an increased need for government inspectors in several different organizations, increased law enforcement, etc. etc.

Response
Based on the analysis in the EIS, DOE does not believe that there would be a substantial increase in need for government services as a result of the proposed repository. Nevertheless, Section 116(c)(2)(A)(i) and (ii) of the NWPA states that "the Secretary shall provide financial and technical assistance to the State of Nevada and any affected unit of local government…to mitigate the impact on such State [Nevada] or affected unit of local government of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Within that broad framework, neither Section 116 nor any other provision of the NWPA limits the impacts that are subject to assistance under Section 116 to the environmental impacts considered in this EIS. A decision to provide assistance under Section 116 would be based on an evaluation of a report submitted by an affected unit of local government or the State of Nevada pursuant to Section 116 to document likely economic, social, public health and safety, and environmental impacts.

As another form of assistance used to address the need for additional services to support the repository program, Payments-Equal-To-Taxes (PETT) are made pursuant to Section 116(c)(3)(A) of the Nuclear Waste Policy Act, which requires the Secretary of Energy to "…grant to the State of Nevada and any affected unit of government, an amount each fiscal year equal to the amount such State or affected unit of government, respectively, would receive if authorized to tax site characterization activities…." These payments, historically and for the future, are determined by estimating the amount of Yucca Mountain Project property, purchases (in and out of the State of Nevada], and business activities (employees) within the jurisdiction of an affected unit of government. Nye County and the State of Nevada have been eligible to receive PETT since commencement of site characterization activities in May 1986. The other affected units of local government include Clark, Lincoln, Esmeralda, Eureka, White Pine, Churchill, Lander, and Mineral Counties in Nevada, and Inyo County, California. Potentially, they have been eligible to receive PETT since the Nuclear Waste Policy Amendments Act was passed in December 1987.

As noted above, DOE acquires data from the Yucca Mountain Project organizations that purchase or acquire property for use in Nevada, have employees in Nevada, or use property in Nevada. These organizations include Federal agencies, national laboratories, and private firms. Not all of these organizations have Federal exemption status, so they pay the appropriate taxes. The purchases (sales and use tax), employees (business tax), and property (property or possessory use tax) of the Yucca Mountain Project organizations that exercise a Federal exemption are subject to the PETT (DIRS 103412-NLCB 1996).

The actual sales and use taxes, property taxes, and Nevada business taxes paid by Yucca Mountain Project organizations from May 1986 through September 2000 have been calculated. These organizations paid sales and use taxes of $2.5 million for purchases made in Clark County, paid property or possessory taxes of about $90,000 in Clark County, and paid the State of Nevada about $810,000 in business taxes (DIRS 156763-YMP 2001). The PETT for sales or use taxes from May 1986 through June 2000 was about $4.4 million for purchases in Clark County. For property taxes, it was about $940,000 in Clark County. About $130,000 was paid to the State in business taxes.

DOE has not and does not intend to make long-term PETT estimates. While the NWPA requires PETT payments, they are not discriminating factors in the EIS decisionmaking process.

If the proposed repository was to become operational, DOE would enter into discussions with potentially affected units of local government and consider appropriate support and mitigation measures. In addition, as required by Section 180(c) of the NWPA, DOE would provide technical assistance and funds to states for training for public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions DOE would transport spent nuclear fuel and high-level radioactive waste. Training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. Sections 116(c)(2) and 117(c)(5) of the NWPA set forth assistance guidelines covering a number of issues, including emergency preparedness and response, state liability arising from accidents, and necessary road upgrading.

11.2 (5169)
Comment - EIS001910 / 0008
The DEIS does not include information regarding Indian nations and their current and future economic development initiatives. Tribes along potential corridor routes are investing in tribal and joint economic ventures and which facilities will be along highway transportation routes contained in the DEIS. As part of the trust responsibility to ensure protection of economic well-being of Indian nations, the document needs to include a section of what can be done in the event of a radioactive waste transportation accident which impacts an Indian tribe as the mitigation and liability circumstances can be quite different than state and local government considerations.

Response
As required by Section 180(c) of the NWPA, DOE would provide technical assistance and funds to states for training of public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions DOE would transport spent nuclear fuel and high-level radioactive waste. Training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. DOE would institute this training before beginning shipments to the repository. In the event of an incident involving spent nuclear fuel or high-level radioactive waste, the transportation vehicle crew would notify local authorities and the central communications station monitoring the shipment. DOE would make resources available to local authorities, if requested, to respond to such an incident. However, state and tribal governments have a primary responsibility to respond to and protect the public health and safety in their jurisdictions in accidents involving radioactive materials.

In addition, Sections 116 and 117(c) of the NWPA set forth assistance guidelines covering a number of issues, including possible public health and safety, environmental, social, and economic impacts; ongoing emergency preparedness and response; liability arising from accidents; and necessary road upgrading. Section 118 of the Act authorizes the Secretary of Energy to provide grants to affected Native American tribes to participate in repository-related activities and to enable such tribes to determine potential economic, social, public health and safety, and environmental impacts of a repository on Native American reservations and its residents. Any affected tribe can request such assistance by preparing and submitting a report on the probable economic, social, public health and safety, and environmental impacts. Section 118(b)(3) requires the Secretary to provide financial and technical assistance to any affected Native American tribe that requests it to mitigate the impacts of the development of a repository where there is a site which the Nuclear Regulatory Commission has authorized construction of a repository. If a repository at Yucca Mountain was recommended and approved for development, DOE would enter into discussions with potentially affected Native American tribes and consider appropriate support and mitigation measures.

The Price-Anderson Act provides liability coverage for commercial activities operating under a license from the Nuclear Regulatory Commission and DOE activities by establishing a system of private insurance and Federal indemnification that generally ensures that up to $9.43 billion is available to compensate for damages suffered by the public, from a "nuclear incident," regardless of who causes the damage. Payment would be from government funds or, if public liability arose out of nuclear waste activities funded by the Nuclear Waste Fund (for example, activities at a geologic repository), from that Fund. The liability of all responsible parties is limited to the amount of coverage provided by the Price-Anderson Act system. State and local governments cannot be required to provide any additional compensation. Price-Anderson Act indemnification would apply to the operators of a nuclear waste repository at Yucca Mountain and to transporters of nuclear waste from commercial nuclear utilities and from DOE sites to the repository. The EIS has been revised to include more details about indemnification under the Price-Anderson Act (see discussion in Section M.8.1 of the EIS). The EIS (Section 3.1.6.2) recognizes that tribes are separate entities from state and local governments. In Section 3.1.13 of the EIS, DOE identifies the minority or low-income populations in the State of Nevada in relation to Yucca Mountain and the alternative rail and heavy-haul truck corridors. Section 3.2.2.1.5 acknowledges the presence of Native American communities in at least two of the candidate rail corridors that are under consideration. DOE has also included maps of the routes used in the transportation analysis that show tribal boundaries in relation to the site and the transportation corridors (see Figures in Appendix J.4). Section 6.3.4 addresses environmental justice impacts that could occur in Nevada as a result of the shipment of spent nuclear fuel and high-level radioactive waste to the proposed repository.

Chapter 9 of the EIS, which provides DOE's initial list of mitigation commitments available at this time, describes management actions that DOE would consider to reduce or mitigate adverse impacts to the environment that could occur if it implemented the Proposed Action. If DOE made a decision on a specific mode and route of transportation through Nevada to the repository site, it would perform additional engineering and environmental studies to support detailed designs and additional National Environmental Policy Act reviews that included potential impacts to minority and low-income populations. Along with these studies, the Department would initiate consultations with responsible Federal, State, tribal, and local agencies to gather information and address potential mitigation of impacts.

11.2 (5721)
<u>Comment</u> - EIS010073 / 0010
Page 2-3 - The SDEIS should consider locating titanium drip shields, emplacement pallets and other required off-site manufactured goods in counties near to Yucca Mountain, in part, to mitigate otherwise unmitigable impacts.

<u>Response</u>
DOE has made no decisions with regard to the procurement or manufacture of waste shipping casks, emplacement pallets, or drip shields. Final determinations would be subject to Federal procurement regulations, total need, timing, manufacturing capabilities, and availability of raw materials. DOE assumed for purposes of analysis that existing vendors in Massachusetts, North Carolina, Ohio, Pennsylvania, and Tennessee would supply waste shipping casks and emplacements pallets. However, DOE would not categorically exclude any location as a possible site for repository support functions.

11.2 (5844)
<u>Comment</u> - EIS001845 / 0006
Provide the funding to counties and states to repair roads, bridges and overpasses to compensate for wear and deterioration caused by heavy loads.

<u>Response</u>
Because existing rail and highway systems would be adequate for transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain, infrastructure upgrades would not be necessary and therefore are not included in the analysis. Analyses presented in Section 6.3.3 of the EIS describe the DOE assumptions regarding upgrade and maintenance of highways that would be used by heavy-haul trucks if this mode was selected for transportation in Nevada.

At this time, DOE has not identified a preference for a specific rail corridor within Nevada. A preference for a corridor(s) would be identified in consultation with affected stakeholders, if the Yucca Mountain site was approved pursuant to the NWPA.

Sections 116(c) and 117(c)(5) of the NWPA set forth assistance guidelines covering a number of issues, including necessary road upgrading. In addition, Section 116(c)(2)(A)(i) and (ii) states that "the Secretary shall provide financial and technical assistance to [an affected unit of local government or the State of Nevada]… to mitigate the impact on such [an affected unit of local government or the State of Nevada] of the development of [a] repository and the characterization of [the Yucca Mountain] site. Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Any decision to provide assistance under Section 116 would be based in part on the evaluation of a report submitted by an affected unit of local government or the State of Nevada to document likely economic, social, public health and safety, or environmental impacts. If the proposed repository was to become operational, DOE would enter into discussions with potentially affected units of local government and consider appropriate support and mitigation measures.

11.2 (6142)
<u>Comment</u> - EIS001888 / 0167
[Summary of comments noted by Clark County Nuclear Waste Division staff at various citizens' meetings.]

Others felt that now is the time to go after DOE for mitigation funds.

Response
As indicated in Chapter 9 of the EIS, Section 116(c)(2)(A)(i) and (ii) of the NWPA state that "the Secretary shall provide financial and technical assistance to the State of Nevada and any affected unit of local government…to mitigate the impact on such State [Nevada] or affected unit of local government of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Within that broad framework, neither Section 116 nor any other provision of the NWPA limits the impacts that are subject to assistance under Section 116 to the environmental impacts considered in this EIS.

Under the NWPA, the Section 116 impact assistance review process and this EIS process are distinct from one another, and the implementation of one would not depend on the implementation of the other. Thus, the provision of assistance under Section 116 would not necessarily be limited either by the impacts identified in this EIS or by its findings on such impacts. Any decision to provide assistance under Section 116 would be based on an evaluation of a report by an affected unit of local government or the State of Nevada pursuant to Section 116 to document likely economic, social, public health and safety, and environmental impacts. DOE would enter into discussions with the State of Nevada and affected units of local government and consider appropriate support and mitigation measures.

Further, as required by Section 180(c) of the NWPA, DOE would provide technical assistance and funds to states for training for public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions DOE would transport spent nuclear fuel and high-level radioactive waste. Training would cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations. In addition, Sections 116(a) and 117(c)(5) of the NWPA set forth assistance guidelines covering a number of issues including emergency preparedness and response, state liability arising from accidents, and necessary road upgrading.

11.2 (6143)
Comment - EIS001654 / 0031
Page S-62. Management Mitigation Actions

We may have missed it but there does not appear to be any reference in this section or Chapter 9 that considers socioeconomic impact mitigation measures for the proposed action. That may be because the socioeconomic impact analysis was conducted for an extraordinarily large region of influence that included metropolitan Las Vegas and concluded all impacts were negligible. (See NARUC ES-11 for our critique of that approach.)

DOE should consult with appropriate officials within Nevada and Nye County over alternative means of obtaining community support closer to the site than Las Vegas for a period of peak support need during construction and pre-closure phases of the repository use. However, all such infrastructure would be developed just for that period of need and should be removed at the stage when all the waste has been emplaced and support needs are greatly reduced.

A support "base" could be developed under federal government ground rules and some financial support that could serve many of the housing and community support services closer to the site than Las Vegas, yet would not lead to further permanent development near the repository if there is the risk of radiation, however small, over the long-term performance period of the repository.

There are costs and benefits of such a government-managed approach, but they are worth examining together with State and local stakeholders. The dual objective should be:

- Provide some support functions closer to the repository than Las Vegas, yet,

- Not encourage further development in an area which was chosen for being lightly populated

We realize there is already some resentment among some portion of the Nye County area population over "the government" being an intrusion in their lives. We simply suggest that some cooperative government mitigation measures be considered that enable the repository to be built and reduce the burden on present residents. The suggestion is to consider how to best accommodate an influx of increased demands on community services by having them cooperatively managed with federal government assistance. It may not be the complete answer but it is worth considering through cooperative public-private planning.

Response
Throughout the EIS process, DOE has maintained interactions with a number of government agencies and other organizations (see Appendix C of the EIS). The Department has been sensitive to the concerns of the potentially affected units of local government as defined in the NWPA. DOE has offered local governments the opportunity to submit documents providing their perspectives on issues associated with the EIS. In addition, DOE holds formal meetings twice a year with the affected units of local government. These meetings have included descriptions and briefings on a range of issues of interest to local governments. DOE has also held numerous informal meetings with representatives.

DOE has expanded its socioeconomic discussions in Chapter 3 to clarify the magnitude of potential impacts described in Chapters 4 and 6. This discussion includes a projection of baseline parameters through 2035 incorporating the most recently available information and assumptions.

Section 116(c)(2)(A)(i) and (ii) of the NWPA state that "the Secretary shall provide financial and technical assistance to the State of Nevada and any affected unit of local government…to mitigate the impact on such State [Nevada] or affected unit of local government of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Within that broad framework, neither Section 116 nor any other provision of the Nuclear Waste Policy Act limits the impacts that are subject to assistance under Section 116 to the environmental impacts considered in this EIS.

Under the NWPA, the Section 116 impact assistance review process and the EIS process are distinct from one another, and the implementation of one would not depend on the implementation of the other. Thus, the provision of assistance under Section 116 would not necessarily be limited either by the impacts identified in this EIS or by its findings on such impacts. Any decision to provide assistance under Section 116 would be based on an evaluation of a report submitted by an affected unit of local government or the State of Nevada pursuant to Section 116 to document likely economic, social, public health and safety, and environmental impacts. If the proposed repository became operational, DOE would enter into discussions with the State of Nevada and affected units of local government and consider appropriate support and mitigation measures.

11.2 (6144)
Comment - EIS001888 / 0503
[Clark County summary of comments it has received from the public.]

The State of Nevada and Clark County should negotiate a contract to accept the waste at the border in exchange for funding for a technology center at UNLV [University of Nevada, Las Vegas] and UNR [University of Nevada, Reno] and money for elementary to HS [high school] education.

Response
DOE is authorized to consider some forms of compensation as discussed in Chapter 9 of the EIS. The NWPA allows the Secretary of Energy to provide financial assistance to the State of Nevada and any affected unit of local government requesting such assistance to mitigate the impact of the development of a repository and characterization of the site. The State and any affected unit of local government may request such assistance by preparing and submitting a report on the likely economic, social, public health and safety, and environmental impacts.

In addition to this financial assistance, the Secretary is also authorized to grant to the State and any affected unit of local government an amount each fiscal year equal to that amount they would receive if authorized to tax the site characterization, development, and operation of a repository as they would tax non-Federal real property and industrial activities. Payments-Equal-To-Taxes (PETT) are made pursuant to Section 116(c)(3)(A) of the Act, which requires the Secretary of Energy to grant to the State of Nevada and any affected unit of government, an amount each fiscal year equal to the amount such State or affected unit of government, respectively, would receive if authorized to tax site characterization, and repository development and operation activities. These payments, historically and for the future, are determined by estimating the amount of Yucca Mountain Project property, purchases (in and out of the State of Nevada], and business activities (employees) within the jurisdiction of an affected unit of government.

As noted above, DOE acquires data from the Yucca Mountain Project organizations that purchase or acquire property for use in Nevada, have employees in Nevada, or use property in Nevada. These organizations include Federal agencies, national laboratories, and private firms. Not all of these organizations have Federal exemption status, so they pay the appropriate taxes. The purchases (sales and use tax), employees (business tax), and property (property or possessory use tax) of the Yucca Mountain Project organizations that exercise a Federal exemption are subject to the PETT (DIRS 103412-NLCB 1996).

The actual sales and use taxes, property taxes, and Nevada business taxes paid by Yucca Mountain Project organizations from May 1986 through September 2000 have been calculated. These organizations paid sales and use taxes of $2.5 million for purchases made in Clark County, paid property or possessory taxes of about $90,000 in Clark County, and paid the State of Nevada about $810,000 in business taxes (DIRS 156763-YMP 2001). The PETT for sales or use taxes from May 1986 through June 2000 was about $4.4 million for purchases in Clark County. For property taxes, it was about $940,000 in Clark County. About $130,000 was paid to the State of Nevada in business taxes.

Section 171 of the Act authorizes payments to the State of Nevada of $10 million per year prior to the first shipment of waste, $20 million upon the first spent nuclear fuel receipt, and thereafter $20 million per year until closure. However, receipt of this payment waives the right of the State to disapprove the siting of the repository under Title 1 of the Act, and the State of Nevada has not agreed to do this. Nevertheless, assuming the State's notice of disapproval of the site, and if Congress overrode that disapproval, there would be no impediment to the State accepting these funds.

Other forms of compensation, such as funding of a nuclear research facility at University of Nevada, Las Vegas, could be considered, but would require Congressional approval before they could be implemented if they are not otherwise authorized by the NWPA.

11.2 (7191)
<u>Comment</u> - EIS001337 / 0082
Page 2-69 Table 2-6. Comparison of Tables 2-5 and 2-6 suggests that the No-Action Alternative may be more costly to implement than the Preferred Alternative. The information in Table 2-7 suggests that the No Action Alternative is more risky than the Preferred Alternative. Collectively, these tables suggest that the Nation saves money by transferring risks from the 77 sites with waste inventories to Nevada. The savings to the Nation appears to be on the order of $23 to $28 billion. Given this magnitude of potential savings coupled with the transfer of risk to Nevada, the DEIS must discuss the issue of equity between locales where risk will be reduced and where risk will be concentrated. The concept of compensation of those areas to which risk will be concentrated by those areas in which risk will be reduced or eliminated must be discussed within the DEIS. Conceptually, up to 100 percent of the savings between the No Action and Preferred alternatives should be considered as compensation to those areas in which risk will be concentrated.

<u>Response</u>
The EIS does not address the issue of equity as it pertains to risk or compensation for the Proposed Action through transfer of cost savings. It does, however, address the relative impacts of the Proposed Action and No-Action Alternative (see Section 2.4).

While these issues are not directly addressed in the Final EIS, DOE would address mitigation of impacts by entering into discussions with potentially affected units of local government to consider appropriate support and mitigation measures. Section 116(c)(2)(A)(i) and (ii) of the NWPA state that "the Secretary shall provide financial and technical assistance to the State of Nevada and any affected unit of local government…to mitigate the impact on such State [Nevada] or affected unit of local government of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Furthermore, under the NWPA, the Section 116 impact assistance review process and the EIS process are distinct from one another, and the implementation of one would not depend on the implementation of the other. Thus, the provision of assistance under Section 116 would not necessarily be limited either by the impacts identified in this EIS or by its findings on such impacts. Any decision to provide assistance under Section 116 would be based on an evaluation of a report submitted by an affected unit of local government or the State of Nevada pursuant to Section 116 that documented likely economic, social, public health and safety, and environmental impacts.

11.2 (7233)
Comment - EIS001337 / 0120
Page 9-1 Section 9. In general, the treatment of mitigation in the DEIS is entirely insufficient. Many impacts identified within the DEIS have no mitigation measures identified for them at all (i.e., additional school enrollment in Lincoln County due to transportation activities). In preparing the FEIS, DOE needs to identify all impacts described within the DEIS and the FEIS must identify options for mitigation of all impacts.

Contrary to NEPA [National Environment Policy Act], the DEIS contains several proposed mitigation measures which are simply studies or simply describe studies which will lead to identification of mitigation measures. For most impacts identified within the DEIS, but characterized by DOE as non-significant (i.e., population growth in Lincoln County and [the] City of Caliente and related growth in government expenditures), the DEIS simply does not provide any suggested mitigation measures. In completing the FEIS, DOE should evaluate all listed mitigation measures against the types listed above to discern those which are of an unacceptable form under NEPA.

Response
DOE believes it has identified a reasonable range of mitigation measures it would consider for those impacts that could be minimized or avoided through mitigation actions. Because some decisions have yet to be made, such a transportation mode and specific transportation corridor, additional studies would be required and more definitions information on impacts or possible mitigation actions are not available.

Section 114(a)(1) of the NWPA authorizes the Secretary of Energy to determine whether to recommend approval of the Yucca Mountain site to the President for development as a repository for the disposal of spent nuclear fuel and high-level radioactive waste. A comprehensive statement of the basis for the recommendation, including a Final EIS, must accompany such a recommendation. However, because the decision to approve the site rests not with the Secretary, but with the President. DOE does not anticipate issuing a Record of Decision if the Secretary recommends the site to the President. Consequently, DOE does not anticipate issuing a Record of Decision.

DOE regulations (10 CFR 1021.331) require preparation of a Mitigation Action Plan when mitigation measures are identified in a Record of Decision. At this time, DOE has not decided whether it would prepare a Mitigation Action Plan. However, the Yucca Mountain site, if approved in accordance with provisions of the NWPA would be subject to licensing by the Nuclear Regulatory Commission. DOE, in submitting its application to construct and operate the repository, would identify relevant commitments, including those identified in the Final EIS, to the Commission for its consideration, and could reasonably expect a comprehensive set of mitigation measures or conditions of approval to be part of the licensing process.

DOE will enter discussions with potentially affected units of local government and consider appropriate support and mitigation measures. Chapter 9 of the EIS, which provides DOE’s initial list of commitments available at this time, describes management actions that DOE would consider to reduce or mitigate adverse impacts to the environment that could occur if it implemented the Proposed Action. Chapter 9 states that Section 116 of the NWPA requires the Secretary to provide financial and technical assistance to mitigate impacts of the development of a repository and the characterization of the site. The Section 116 mitigation assistance review process and the EIS process are distinct from one another and the implementation of one does not depend on the implementation of the other. Thus, the provision of assistance under Section 116 would not necessarily be limited either by the impacts identified in the EIS or by its findings on such impacts. Beyond the Payments-Equal-to-Taxes program that DOE has implemented under the requirements of Section 116(c)(3), a decision to provide financial and technical assistance under Section 116(c)(2) would be based on an evaluation of a report submitted by an affected unit of local government or the State of Nevada that documented probable economic, social, public health and safety, and environmental impacts.

11.2 (8259)
Comment - EIS001777 / 0002
You said this afternoon that there was money for states to help them educate people. Hopefully there is money to help people improve their health after having been affected by this nuclear waste. I did not see in my Belleville News Democrat paper – maybe it was – I don't think it was there. I didn't see anything in the paper, so that is another concern I do have. It has affected our health.

Response
As indicated in Chapters 4, 5, 6, and 8 of the EIS, the transport and disposal of spent nuclear fuel and high-level radioactive waste would cause relatively minor impacts to human health.

As required by Section 180(c) of the NWPA, DOE would provide technical assistance and funds to states and Native American tribes for training public safety officials through whose jurisdictions it would transport spent nuclear fuel and high-level radioactive waste. Training would cover procedures for safe routine transportation of these materials and for dealing with emergency response situations. DOE would implement this training before beginning shipments to the repository. In the event of an incident involving spent nuclear fuel or high-level radioactive waste, the transportation vehicle crew would notify local authorities and the central communications station monitoring the shipment. DOE would make resources available to local authorities, if requested, to respond to such an incident. However, state and tribal governments have a primary responsibility to respond to and protect the public health and safety in their jurisdictions in accidents involving radioactive materials. The EIS does not include detailed training and community education plans. State, local, and tribal agencies and governments would develop such plans.

In addition, Section 116(c)(2) of the NWPA requires the Secretary of Energy to provide financial assistance to the State of Nevada and any affected unit of local government requesting such assistance to mitigate the impacts of the development of a repository and characterization of the site. The State and affected units of local government can request such assistance by submitting a report on probable economic, social, public health and safety, and environmental impacts. This could include, for example, needs for public education programs on the probable impacts of a repository that are identified by the State or any affected unit of local government.

The Price-Anderson Act establishes a system of private insurance and Federal indemnification that generally ensures that as much as $9.43 billion is available to compensate for damages suffered by the public from a nuclear incident, regardless of who causes the damage. Price-Anderson Act indemnification would apply to the operators of a nuclear waste repository at Yucca Mountain and to transporters of nuclear waste from commercial and DOE sites to the repository. Payment would be from Federal funds or, if the liability was from activities funded by the Nuclear Waste Fund (for example, activities at a geologic repository), from that Fund. The liability of responsible parties is limited to the amount of coverage provided by the Act. State and local governments cannot be required to provide additional compensation. DOE has revised the EIS to include more details about indemnification under the Price-Anderson Act (see Section M.8).

11.2 (9112)
Comment - EIS001937 / 0004
In light of the controversy in Nevada regarding compensation for individuals who worked at the Nuclear Test Site, Nye County, Nevada, and who may have been exposed to radiation and/or toxic materials during the course of their work at the location, it is entirely appropriate for the public to have their concerns acknowledged. Assurances that every aspect of engineering, and environmental and biomedical safety has been addressed are not reassuring without also acknowledging that possible risks may not currently be known and that a process for addressing possible future damages is being included in the current planning.

With the contemporary examples of hearings addressing claims for compensation for surviving families and individuals affected by nuclear activities sites such as Hanford, Washington and Oak Ridge, Tennessee, among others, it is clear that the process for handling dangerous materials is not adequate at this point in time. Nor is the process for admitting responsibility, identifying potentially responsible parties, and providing health care and/or compensation for those affected by unsafe practices adequate at this point in time.

It may not be appropriate to address these sorts of issues within the draft EIS, but without acknowledging them and identifying where and when these aspects of the project will be addressed, I cannot, in good conscience, affirm any but the No-Action Alternative.

Response
When Congress passed the Nuclear Waste Policy Amendments Act in 1987, it directed DOE to determine if Yucca Mountain would be a suitable site for a repository. Analyses to date indicate that the Yucca Mountain site would be suitable for a repository and that the risk to populations and the environment would likely be small.

While DOE has made every effort to analyze all potential impacts and assess all risks in the near and long terms, it is not able to assess impacts resulting from currently unknown risks. It is equally hard to put in place a process to address such risks. DOE acknowledges that there are uncertainties associated with the Proposed Action. (Section 5.2.4 of the EIS discusses how DOE has addressed this issue.)

DOE is aware of public criticism of its operations, both ongoing and historic. DOE is working to rectify and eliminate adverse environmental impacts from past programs, and working to ensure that current activities are conducted without environmental insult. DOE continues to incorporate lessons learned from past waste management practices, and the knowledge gained from research and development, into new management programs.

DOE is committed to protecting the safety and health of its workers, the public, and the environment. Policy and proper conduct of operations emphasize safety and environmental considerations above other program goals. Furthermore, DOE intends to design, construct, and operate all new facilities in a safe manner, relying on lessons learned from the last 40 years of managing spent nuclear fuel. DOE also is evolving toward greater openness, as demonstrated by the recent releases of information regarding past programs and practices.

11.2 (9306)
Comment - EIS001888 / 0033
Congress, the NRC [Nuclear Regulatory Commission and others will also employ the DEIS as a major source of information on potential program impacts. Therefore, it is important to Clark County, other affected units of government (AULG), and the State of Nevada that the DEIS adheres to NEPA guidelines and accurately and completely describes potential impacts to our communities from Yucca Mountain Program activities.

To the extent that local impacts are not addressed or inadequately addressed in the DEIS, the chances increase that Congress may not consider, or even be aware of, potentially substantive impacts to AULG. Clark County is concerned that impacts not noted in a document required by the NWPA could result in the disallowance of mitigation request even when supported by other documentation. This is a major factor requiring Clark County, Nevada, to strongly object to the DEIS in its present form. To meet the demands of the National Environmental Policy Act (NEPA) the DEIS must characterize and describe potential Yucca Mountain program-related impacts that may affect our communities. To this DOE has failed in this document.

Response
DOE intends to implement the requirements of Sections 180(c) and 116(c) of the NWPA [42 U.S.C. 10175(c) and 10136(c), respectively]. Section 180(c) requires the Secretary of Energy to provide technical assistance and funds to States for training for public safety officials of appropriate units of local government and Native American tribes through whose jurisdictions, transportation of spent nuclear fuel or high-level radioactive waste would occur. The training is required to cover procedures for safe routine transportation and for dealing with emergency response situations.

In addition, and as discussed in Chapter 9 of the EIS, Section 116(c) requires the Secretary to provide financial assistance to the State of Nevada and any affected unit of local government requesting such assistance to mitigate the impacts of the development of a repository and characterization of the site. The State and any affected unit of local government can request such assistance by preparing and submitting a report on the probable economic, social, public health and safety, and environmental impacts. Within that broad framework, neither Section 116 nor any other provision of the NWPA limits the scope of impacts that might be properly considered under Section 116 to the environmental impacts considered in this EIS.

Besides the Payments-Equal-to-Taxes program already implemented pursuant to the requirements of Section 116(c)(3) of the NWPA, any decision to provide financial and technical assistance under Section 116(c) would be based on an evaluation of a report submitted by an affected unit of local government or the State of Nevada pursuant to Section 116(c)(2) to document likely economic, social, public health and safety, and environmental impacts.

11.2 (9938)
Comment - EIS001888 / 0466
[Clark County summary of comments it has received from the public.]

Local government funding may fall short of what is needed to provide services to the impacted populations.

Response
DOE does not anticipate impacts that would result in shortfalls to local government funding and the provision of community services. However, there are mechanisms in place to assist affected units of local government.

Section 116(c)(2)(A)(i) and (ii) of the NWPA states that "the Secretary shall provide financial and technical assistance to the State of Nevada and any affected unit of local government…to mitigate the impact on such State [Nevada] or affected unit of local government of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Within that broad framework, neither Section 116 nor any other provision of the NWPA limits the impacts that are subject to assistance under Section 116 to the environmental impacts considered in this EIS.

Under the NWPA, the Section 116 impact assistance review process and this EIS process are distinct from one another, and the implementation of one would not depend on the implementation of the other. Thus, the provision of assistance under Section 116 would not necessarily be limited either by the impacts identified in this EIS or by its findings on such impacts. Any decision to provide assistance under Section 116 would be based on an evaluation of requests for assistance from affected units of local government or the State of Nevada pursuant to Section 116 that documented likely economic, social, public health and safety, and environmental impacts. If the proposed repository became operational, DOE would enter into discussions with the State of Nevada and affected units of local government and consider appropriate support and mitigation measures.

After a decision was made regarding the proposed repository and transportation modes and routes, local jurisdictions would be better able to identify the likely economic, social, public health and safety, and environmental impacts that would be the basis for a request for economic assistance. This could include assistance in providing additional medical and emergency response facilities, under Section 116(c) of the NWPA.

11.2 (9989)
Comment - EIS001888 / 0493
[Clark County summary of comments it has received from the public.]

Several commenters believed that the EIS should discuss possible mitigations to offset or compensate negative socioeconomic impacts and provide analysis of how the measures would offset impacts. Suggested methods to mitigate impacts included use of Department policies that would encourage project employees to reside in specific counties, use of union versus non-union labor, or procurements being awarded to local companies. Some commenters requested this discussion should provide all sources of compensation for the diminution of property values caused by property being located in proximity to transportation routes and sources of compensation for takings of business opportunities and property interests which may be caused by perception-based impacts. One commenter stated the EIS should address how the program will achieve acceptable equity and fairness standards for the key affected communities, states, and participants. This analysis should consider acceptance in terms of a burden placed upon state and local governments and citizens.

Response
DOE appreciates the specific suggestions provided in the context regarding the possible mitigation of socioeconomic impacts. With regard to contracts and employment, DOE would continue to award contracts

pursuant to federal regulations but cannot address the issue of union vs. non-union labor. DOE would not involve itself in where employees live, but could, as it has done in the past, provide some support related to where employees live such as the transportation services to the work site.

The Yucca Mountain Site, if approved in accordance with provisions of the NWPA, would be subject to licensing by the Nuclear Regulatory Commission. DOE, in submitting its application to construct and operate the repository to the Commission, would identify relevant commitments, including those identified in the EIS, to the Commission for its consideration, and could reasonably expect a comprehensive set of mitigation measures or conditions of approval to be part of the licensing process. DOE anticipates that the project plan and design would continue to evolve, potentially eliminating the need for some mitigation measures currently under consideration. Chapter 9 of the EIS, which provides DOE's initial list of possible mitigation measures, also identifies DOE-determined impact reduction features, procedures and safeguards; and mitigation measures under consideration for inclusion in the project plan and design. Chapter 9 also identifies ongoing studies that could eventually influence mitigation measures related to the project plan and design. Additionally, there are mechanisms in place for providing financial and technical assistance to potentially affected units of local government and the state of Nevada.

Chapter 9 of the EIS also discusses Section 116(c)(2)(A)(i) and (ii) of the NWPA, which state that "the Secretary shall provide financial and technical assistance to the State of Nevada and any affected unit of local government…to mitigate the impact on such State [Nevada] or affected unit of local government of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Within that broad framework, neither Section 116 nor any other provision of the NWPA limits the scope of impacts that could be properly considered under Section 116 to the environmental impacts considered in this EIS. A decision to provide assistance under Section 116 would be based on the evaluation of a report submitted by an affected unit of local government or the State of Nevada pursuant to Section 116 to document likely economic, social, public health and safety, and environmental impacts.

Another issue of interest is the DOE Payments-Equal-To-Taxes Program. Section 116(c)(3)(A) of the NWPA requires the Secretary of Energy to "…grant to the State of Nevada and any affected unit of local government an amount each fiscal year equal to the amount such State or affected unit of local government, respectively, would receive if authorized to tax site characterization activities at such site, and the development and operation of such repository…." The Yucca Mountain Site Characterization Office is responsible for implementing and administering this program for the Yucca Mountain Project. DOE acquires data from the various project-related organizations that purchase or acquire property for use in Nevada, have employees in Nevada, or use property in Nevada. These organizations include Federal agencies, national laboratories, and private firms. The purchases (sales and use tax), employees (business tax), and property (property or possessory use taxes) of the Yucca Mountain Project organizations that exercise a Federal exemption are subject to the Payments-Equal-To-Taxes Program (DIRS 103412-NLCB 1996).

Concerning perception based impacts or stigma, while DOE can measure the publics perception regarding the geologic repository and transportation of spent nuclear fuel and high-level radioactive waste, there is no known method to translate these perceptions into quantifiable impacts. Research in the social sciences have not found a way to reliably forecast linkages between perceptions or attitudes stated in surveys and actual human behavior. While stigmatization of southern Nevada can be envisioned in some scenarios, it is not inevitable. Consequently, DOE addressed but did not attempt to quantify any potential for impacts from risk perceptions or stigma in the EIS. This issue is discussed in Section 2.5.4 and Appendix N of this Final EIS.

With regard to property values and takings, DOE does not have definitive information on specific tracts of land that could be required. However, the Department would be required to use fair market value in the acquisition of real property. The Department must comply with the policies contained in the Uniform Relocation Assistance and Real Property Acquisition Policies Act, Title III, which includes the provision that the Agency (DOE) offer just compensation.

11.2 (9990)
Comment - EIS001888 / 0495
[Clark County summary of comments it has received from the public.]

Many commenters indicated that the EIS and resulting Record of Decision should commit DOE to providing compensation for those communities and individuals negatively impacted (people nearby an accident, those contracting cancer). Commenters specifically indicated that compensation should be provided for: project oversight by Native Americans (all tribes, not just the National Congress of American Indians), State of Nevada and affected counties; peoples suffering radiological exposure above guidelines preparation of transportation (Section 180(c) of the NWPA), including accidents, education, emergency response, medical training and monitoring to communities along transportation routes; potential disruptions (routine, accidents, sabotage) and environmental damage from the construction and operation of rail spurs (Eureka County); health effects, floodplain damage, loss of game habitat/protected species, wetlands, disruption of crop production/marketing/transportation access, disruption of grazing patterns/marketing potential/mining and transportation access, and disruptions to historical rural and agricultural lifestyles; public safety training in local communities, especially affected governments and along highway or [rail] routes; Clark and Nye counties; infrastructure improvements and maintenance; communities and states that are burdened with HLW [high-level radioactive waste] facilities; police and fire protection, the cost of health/accident/disease prevention programs, and participation in worker safety programs.

Response
DOE has identified for consideration mitigation measures that could reduce the potential impacts from the construction, operation and monitoring, and eventual closure of the proposed repository (Section 9.2 of the EIS). Section 9.3 discusses mitigation measures for transportation. Most of the topics raised by the commenter are discussed in Chapter 9. DOE regulations (10 CFR 1021.331) require preparation of a Mitigation Action Plan when mitigation measures are identified in a Record of Decision. At this time DOE has not decided whether or not it would prepare a Mitigation Action Plan. However, the Yucca Mountain site, if approved in accordance with the NWPA, would be subject to licensing by the Nuclear Regulatory Commission. DOE, in submitting an application to construct and operate a repository would identify relevant mitigation measures to the Commission for its consideration, and could reasonably expect a comprehensive set of mitigation measures or conditions of approval to be part of the licensing process.

In addition, Section 116(c)(2)(A)(i) and (ii) of the NWPA states that “the Secretary shall provide financial and technical assistance to the State of Nevada and any affected unit of local government…to mitigate the impact on such State [Nevada] or affected unit of local government of the development of [a] repository and the characterization of [the Yucca Mountain] site.” Such assistance can be given to mitigate likely “economic, social, public health or safety, and environmental impacts.” Any decision to provide assistance under Section 116 would be based on an evaluation of a report submitted by an affected unit of local government or the State of Nevada that documented likely economic, social, public health and safety, or environmental impacts. If the proposed repository was approved, DOE would enter into discussions with the State of Nevada and affected units of governments and consider appropriate support and mitigation measures.

11.2 (10278)
Comment - EIS002203 / 0003
If it’s scientifically based, let’s go with it, but if it’s not, let’s get what we can get out of this whole thing. I mean, we can get a north/south railroad in this state. We can have four-lane highways between Vegas and Reno. We can have a lot of things, rather than trying to ignore the problem and hope it will go away, because it will not go away.

It is here, and for us not to accept money or not to accept land and trade off for what we’re dealing with the government, it’s ludicrous, because we’re going to get it, guys.

Response
If Yucca Mountain was approved as the site for a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste, DOE would initiate discussions with potentially affected units of local government and consider appropriate support and mitigation measures. Further, under the NWPA, the impact assistance review process and the Yucca Mountain Repository EIS process are distinct from each other, and the implementation of one would not depend on the implementation of the other. Thus, the impacts identified in this EIS or its findings on such

impacts would not necessarily limit the provision of assistance under Section 116 of the NWPA. A decision to provide assistance would be based on evaluation of a report submitted by an affected unit of local government or the State of Nevada pursuant to Section 116 that documented likely economic, social, public health and safety, and environmental impacts.

11.2 (10478)

<u>Comment</u> - EIS002103 / 0004

Equity concerns. And believe me, there are equity concerns. We haven't pursued the equity concerns. I've got a wish list. There are equity concerns to be considered. The benefits that could be realized at Yucca Mountain if the timing was right, if the folks were right, if the folks were listening. I've got funding to AULG, affected units of local government.

From the nuclear waste fund for local impact of environmental studies to include credible oversight issue funding. Equity entitlement benefits: A world class environmental and energy research center at the University of Nevada; federal funding for a state of the art emergency response program; water right issues for Southern Nevada growth; transition and release of Nevada's federal lands to the state were eighty-six percent federal; funding for Southern Nevada's infrastructure and transportation systems; a railroad line between the north and Southern Nevada; Nevada university research and educational funding; and last but not least, a stewardship trust fund for grants to the state and county [entities] for site and use of YMP [Yucca Mountain Project] as studies conclude, as a repository during emplacement operations and as a monitored study area and as a closure equity.

<u>Response</u>

The Department is authorized to consider some forms of compensation. Section 116(c)(2) of the NWPA requires the Secretary of Energy to provide financial assistance to the State of Nevada and any affected unit of local government requesting such assistance to mitigate the impact of the development of a repository and characterization of the site. The State and any affected unit of local government may request such assistance by preparing and submitting a report on the likely economic, social, public health and safety, and environmental impacts.

In addition to this financial assistance, the Secretary is authorized to grant to the State and any affected unit of local government an amount each fiscal year equal to that amount they would receive if authorized to tax the site characterization, development, and operation of a repository as they would tax non-Federal real property and industrial activities. Payments-Equal-To-Taxes (PETT) are made pursuant to Section 116(c)(3)(A) of the NWPA, which requires the Secretary of Energy to grant to the State of Nevada and any affected unit of government, an amount each fiscal year equal to the amount such State or affected unit of government, respectively, would receive if authorized to tax site characterization activities at such site, and the development and operation of such repository…" These payments, historically and for the future, are determined by estimating the amount of Yucca Mountain Project property, purchases (in and out of the State of Nevada], and business activities (employees) within the jurisdiction of an affected unit of government.

As noted above, DOE acquires data from the Yucca Mountain Project organizations that purchase or acquire property for use in Nevada, have employees in Nevada, or use property in Nevada. These organizations include Federal agencies, national laboratories, and private firms. Not all of these organizations have Federal exemption status, so they pay the appropriate taxes. The purchases (sales and use tax), employees (business tax), and property (property or possessory use tax) of the Yucca Mountain Project organizations that exercise a Federal exemption are subject to the PETT (DIRS 103412-NLCB 1996).

The actual sales and use taxes, property taxes, and Nevada business taxes paid by Yucca Mountain Project organizations from May 1986 through September 2000 have been calculated. These organizations paid sales and use taxes of $2.5 million for purchases made in Clark County, paid property or possessory taxes of about $90,000 in Clark County, and paid the State of Nevada about $810,000 in business taxes (DIRS 156763-YMP 2001). The PETT for sales or use taxes from May 1986 through June 2000 was about $4.4 million for purchases in Clark County. For property taxes, it was about $940,000 in Clark County. About $130,000 was paid to the State of State in business taxes.

While the NWPA requires PETT payments, they are not discriminating factors in the EIS decisionmaking process. Section 171 of the Act also authorizes payments to the State of Nevada of $10 million per year prior to the first shipment of waste, $20 million upon first spent fuel receipt, and thereafter $20 million per year until closure. However, receipt of this payment waives the right of the State to disapprove the siting of the repository under Title 1 of the Act, and the State of Nevada has not agreed to accept these payments. Nonetheless, assuming the State's notice of disapproval of the site, and if the Congress overrode that disapproval, there would be no impediment to the State accepting these funds.

Other forms of compensation, such as funding of a nuclear research facility at the University of Nevada, Las Vegas, could be considered, but would require Congressional approval before they could be implemented if they are not otherwise authorized by the NWPA.

11.2 (10493)
Comment - EIS002105 / 0006
If you accept the fact that in spite of your perhaps personal likes or dislikes of nuclear waste, it will come to Nevada, then what should Nevada receive as compensation for accepting nuclear waste? I would suggest the following minimum consideration: An annual payment to the State treasury to have State of Nevada, that number to be negotiated, needless to say, by our leaders. Nevada to receive all rights to recycling and also the income that would come from the recycling process. Creation of the world's best nuclear research facility at UNLV [University of Nevada, Las Vegas] as a result of having that facility in this area. The Federal Government to assume all liability and cost of management of the test site.

Response
The Department is authorized to consider some forms of compensation. Section 116(c)(2) of the NWPA, requires the Secretary of Energy to provide financial assistance to the State of Nevada and any affected unit of local government requesting such assistance to mitigate the impact of the development of a repository and characterization of the site. The State and any affected unit of local government may request such assistance by preparing and submitting a report on the likely economic, social, public health and safety, and environmental impacts.

Section 171 of the Act also authorizes payments to the State of Nevada of $10 million per year prior to the first shipment of waste, $20 million upon first spent fuel receipt, and thereafter $20 million per year until closure. However, receipt of this payment waives the right of the State to disapprove the siting of the repository under Title 1 of the Act, and the State of Nevada has not agreed to accept these payments. Nonetheless, assuming the State's notice of disapproval of the site, and if Congress overrode that disapproval, there would be no impediment to the State accepting these funds.

Other forms of compensation, such as funding of a nuclear research facility at University of Nevada, Las Vegas, could be considered, but would require Congressional authorization before they could be implemented if they are not otherwise authorized by the Nuclear Waste Policy Act, as amended.

11.2 (10755)
Comment - EIS002145 / 0002
As a state commander of the Veterans of Foreign Wars, I sat in Senator Reid's office and I asked him about the ten million dollars a year that we've been offered, and he said, "Roy, that money is a carrot that you hold in front of a donkey. If we take that money, we give up all our rights to say no." That was a lie. We went from his office to Senator Bryan's office. I ask him the same question. He said, "Roy, there's no money. There never has been." Which one was telling me the truth? As I said, there are liars on both sides. Gentlemen, this is a national problem -- and ladies, I'm sorry. This is a national problem. It's not just our problem.

Response
Section 171 of the NWPA, requires the Secretary of Energy to offer to enter into a benefits agreement with the State of Nevada. Section 171 specifies the benefits schedule – annual payments for a repository before the first receipt of waste of $10 million per year, $20 million on the first spent nuclear fuel receipt, and $20 million per year thereafter until closure of the facility. Section 171 also specifies that a state accepting these benefits waives its rights under Title I to disapprove the recommendation of a site for a repository.

The State of Nevada has chosen to not enter into such an agreement.

11.2 (10805)
Comment - EIS002043 / 0007
In the discussion of the socioeconomic impacts associated with construction of the Caliente (Pg. 6-57) and Carlin (Pg. 6-63) rail route, the DEIS identifies that the annual average number of construction workers would be 500 to 560 and that there would be 5 construction camps. One of the camps would most likely be in the vicinity of Goldfield and would have a significant impact on this community. The EIS needs to address this impact and how it will be mitigated. These mitigation measures could include financial assistance and temporary structures to accommodate the additional workers and their families.

Response
Section 6.3.2.2 of the EIS presents impacts for the rail corridor implementing alternatives including Carlin and Caliente. Mitigation measures that could be adopted to reduce potential impacts associated with the transportation of spent nuclear fuel and high-level radioactive waste to Yucca Mountain are addressed in Chapter 9 of the EIS. More specific or additional mitigation measures would be identified and implemented if the repository was approved and a particular transportation mode and route were selected.

In addition, Section 116(c)(2)(A)(i) and (ii) of the NWPA state that "the Secretary shall provide financial and technical assistance to the State of Nevada and any affected unit of local government…to mitigate the impact on such State [Nevada] or affected unit of local government of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health or safety, and environmental impacts." Any decision to provide assistance under Section 116 would be based on an evaluation of a report submitted by an affected unit of local government or the State of Nevada that documented likely economic, social, public health and safety, or environmental impacts. If the proposed repository was approved, DOE would enter into discussions with the State of Nevada and affected units of local government and consider appropriate support and mitigation measures.

After a decision was made regarding the proposed repository and transportation modes and routes, local jurisdictions would be better able to identify the likely economic, social, public health and safety, and environmental impacts that would be the basis for a request for economic assistance, which could include assistance in providing temporary housing facilities or other services, under Section 116(c) of the NWPA.

11.2 (11716)
Comment - EIS000601 / 0003
If the repository is placed in Nevada, we need to charge a million dollars a pound.

Response
While this commenter's particular concept of compensation is not directly addressed in the Draft EIS or within the scope of the EIS as established by the NWPA, Chapter 9 of the EIS does address the requirements for impact mitigation and compensation, indicating that Section 116(c)(2)(A)(i) and (ii) of the NWPA state that "the Secretary shall provide financial and technical assistance to the State of Nevada and any affected unit of local government…to mitigate the impact on such State [Nevada] or affected unit of local government of the development of [a] repository and the characterization of [the Yucca Mountain] site." Such assistance can be given to mitigate likely "economic, social, public health and safety, and environmental impacts." Within that broad framework, neither Section 116 nor any other provision of the NWPA limits the impacts that are subject to assistance under Section 116 to the environmental impacts considered in this EIS.

Under the NWPA, the Section 116 impact assistance review process and the EIS process are distinct from one another, and the implementation of one would not depend on the implementation of the other. Thus, the provision of assistance under Section 116 would not necessarily be limited either by the impacts identified in this EIS or by its findings on such impacts. Any decision to provide assistance under Section 116 would be based on an evaluation of a report submitted by an affected unit of local government or the State of Nevada pursuant to Section 116 to document likely economic, social, public health and safety, and environmental impacts. DOE would enter into discussions with potentially affected units of local government and consider appropriate support and mitigation measures.

11.2 (12501)
Comment - EIS001878 / 0089
The DEIS must also disclose whether the loss or diminution of a water right would be a taking of private property rights requiring compensation under the Constitution of the United States.

Response
The general purpose of this EIS is to analyze the potential for environmental impacts from the Proposed Action to construct, operate and monitor, and eventually close a repository for disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain. The EIS is not the appropriate forum to make determinations on constitutional matters. The EIS discusses the availability of groundwater resources in Section 3.1.4.2. Section 4.1.3.3 addresses the potential for adverse impacts to groundwater, including the potential for impacts to water availability, anticipated from repository construction and operation. Chapter 5 contains a full discussion of the potential for adverse long-term groundwater impacts and analyzes the potential for groundwater contamination thousands of years after the emplacement of spent nuclear fuel and high-level radioactive waste in the proposed repository. The EIS does not address the issue of whether the loss or diminution of any water right would be a taking of private property rights requiring compensation under the Constitution of the United States. Whether such an effect on a water right, if it occurred, would require compensation is a separate legal question that is beyond the purview of the EIS, and would more properly be a matter for consideration by the courts.

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12

DOE Credibility

12. DOE CREDIBILITY

12 (14)
Comment - 11 comments summarized
Commenters stated that DOE is biased toward the nuclear industry and needs an industry success. Thus, the Draft EIS reads as though lobbyists wrote it. Politicians have restricted DOE personnel's freedom to analyze, and DOE should tell Congress that they have made a mistake. Commenters see a conflict of interest in that approval of the repository would allow DOE to dispose of wastes from its own sites, and question the independence of personnel involved in the evaluation process.

Response
The following provisions of the process for evaluating the proposed site at Yucca Mountain provide a strong guarantee of the integrity of the process and the independence and sufficiency of the EIS.

Congress determined through the passage of the Nuclear Waste Policy Act of 1982 that the Federal Government has responsibility to dispose of spent nuclear fuel and high-level radioactive waste, and that primary responsibility for implementing permanent disposal should rest with the Department of Energy. DOE and its predecessor agencies have had general responsibility for governmental programs involving nuclear materials. DOE actions are taken pursuant to the Nuclear Waste Policy Act of 1982 and, thus, are not done to favor any particular industry or group.

As discussed in EIS Section 1.3, the Nuclear Waste Policy Act, as amended (this EIS refers to the amended act as the NWPA) established a process that locates decisionmaking responsibility for the proposed repository outside DOE and makes DOE more accountable for its actions. Decisionmaking power over the proposal rests first with the President, then with the Governor or Legislature of the State of Nevada, potentially Congress (assuming the President decides to approve and there is a notice of disapproval from the Governor or the legislature of Nevada), and ultimately with the Nuclear Regulatory Commission. DOE could construct, operate and monitor, and eventually close a repository only in accordance with licensing and continuing regulation by the Nuclear Regulatory Commission and under standards developed by the Environmental Protection Agency to protect the public from releases from radioactive material.

The Nuclear Waste Policy Act of 1982 also established an independent review body, the Nuclear Waste Technical Review Board (see Section 1.3.2.1 of the EIS). The Nuclear Waste Technical Review Board consists of scientists and engineers with distinguished careers in disciplines within the range appropriate for the repository proposal, and who are independent of DOE. The Nuclear Waste Technical Review Board has power to investigate DOE's activities with regard to the repository, determine the technical and scientific validity of DOE's activities, and issue independent reports stating their conclusions to Congress and to the Secretary of Energy.

The EIS process for the proposed Yucca Mountain Repository has been structured to provide detached input to the EIS and public scrutiny of the EIS results. In addition, DOE retained a contractor not involved previously in the Yucca Mountain Project to assist in preparing the EIS and, thus, offer a means to evaluate independently the available information from the site characterization program, design information, and information and opinions offered by the public, state and local government, and Native American tribes. Public hearings and public review of the Draft EIS and the Supplement to the Draft EIS provided interested parties with the opportunity to examine the assumptions, analyses, and conclusions in those draft documents, as well as the opportunity to provide input on how these issues and other concerns should be addressed in the Final EIS.

Under the Nuclear Waste Policy Act of 1982 or any other law, DOE has no independent power to approve a site or to build and operate a repository at Yucca Mountain. The NWPA established a time sequence that places all approval and licensing decisions in the future and ensures that the EIS would be completed before any such decisions could be made. No decisions on matters within the scope of this EIS have been made.

If DOE determined that the Yucca Mountain site was not suitable, the NWPA empowers the Secretary of Energy to stop the site evaluation, order restoration of the site, and report to Congress on other recommended approaches for disposal of the materials (see Chapter 7 of the EIS for more details). In other words, the Secretary of Energy and DOE cannot approve the site but can reject it.

DOE believes that this EIS was prepared using the best available data and methods of analysis. Consistent with National Environmental Policy Act and the NWPA, DOE has prepared the EIS to provide a site-specific assessment of the Proposed Action.

12 (139)

Comment - 111 comments summarized

Commenters indicated that it is difficult to trust the people (that is, DOE) who created the situation (radioactive waste contamination) and who now propose scenarios for cleaning it up. They further stated that even if DOE had sound plans, the plans would not work and DOE would not be accountable for its actions (for example, conduct a satisfactory performance confirmation program).

Commenters expressed a general lack of trust in DOE and its contractors based on past mistakes and flaws in various programs. Commenters accused DOE of secrecy, misinformation, lack of reliable documentation and recordkeeping, performance of nuclear experiments on humans, dishonesty, and lack of ethics or regard for human health and the environment. Commenters alleged that DOE has not been responsive to public concerns and has usurped the rights of the people. Commenters expressed the opinion that DOE has not shown recent or historic concern for or interest in the public, future generations, workers, or the environment. Commenters cited both specific and general adverse impacts from past DOE programs and operations, and charged that DOE has demonstrated general abuse of responsibility.

Response

For more than 50 years, the U.S. Government and various commercial organizations have engaged in nuclear activities for defense, power generation, and related purposes. These activities have resulted in the production of spent nuclear fuel and high-level radioactive waste, which are long-lived, highly radioactive materials. Management and disposition of these materials in a manner that ensures that the materials do not adversely affect the public health and safety and the environment for this or future generations poses challenging long-term problems.

DOE and its predecessor agencies have had general responsibility for Federal programs involving nuclear materials. Although many of these programs were in the national interest, their legacy materials must be isolated and monitored in the interest of public safety.

DOE is aware of public criticisms of its operations, both ongoing and historic, and is working to rectify and eliminate adverse environmental impacts from past programs, and to ensure that it conducts its current activities without environmental insult. DOE continues to incorporate lessons learned from past waste management practices and the knowledge gained from research and development in new management programs.

DOE is committed to protecting the safety and health of its workers, the public, and the environment. Policy and conduct of operations emphasize safety and environmental considerations above other goals. In fact, DOE has established performance monitoring and site stewardship programs that accomplish multiple goals related to the Department's obligation to protect public health and safety and the environment. Furthermore, DOE intends to design, construct, and operate facilities in a safe manner, relying on lessons learned from the last 40 years of spent nuclear fuel management. In addition, DOE is evolving toward greater openness, as demonstrated by recent releases of information regarding past programs and practices, such as those associated with worker exposures to hazardous and radioactive materials.

Several aspects of the overall process created by the NWPA have had the effect of locating decisionmaking responsibility for the proposed repository outside DOE. Decisionmaking power over the proposal rests (in hierarchical order) with the President, the Governor or Legislature of the State of Nevada, potentially Congress (assuming a notice of disapproval from the Governor or the Legislature of Nevada), and ultimately with the Nuclear Regulatory Commission as the licensing authority. While DOE would construct, operate and monitor, and eventually close a repository, it could do so only in accordance with licensing and continuing regulation by the Nuclear Regulatory Commission and under standards developed by the Environmental Protection Agency. DOE would be held accountable for its actions in the construction and operation of a repository.

The NWPA establishes an independent review body, the Nuclear Waste Technical Review Board (see Section 1.3.2.1 of the EIS). The Board consists of distinguished scientists and engineers with expertise in the disciplines required to ensure safe operation of the proposed repository. As an authority independent of DOE, the Board has power to investigate DOE activities regarding the repository, determine the technical and scientific validity of DOE activities, and issue independent reports and conclusions to Congress and the Secretary of Energy. The Board has consistently shown confidence in, and respect for, the opponents of the project and provided a forum for opponents to voice their views and have DOE address them.

In response to the lack of trust expressed by some members of the public, the Secretary of Energy places great emphasis on openness and public involvement. It is DOE policy that the business of the Department must be open to the full view of those whom it serves, consistent with applicable laws, regulations, and contracts. This policy challenges the Department and its contractors to perform to a new standard of openness and service. DOE will incorporate public input in its decisions when appropriate and feasible, and will provide feedback to the public on its reasoning.

For example, the EIS process for the proposed Yucca Mountain Repository has been structured to provide input to the EIS and public scrutiny of the EIS results. Public hearings and public review of the Draft EIS and the Supplement to the Draft EIS by public stakeholders, agencies, Tribal Nations, and others during the comment periods comprise an important part of the process. The review periods provided interested parties the opportunity to examine the assumptions, analyses, and conclusions in the EIS draft and the Supplement and the opportunity to provide input on how DOE should address these issues and other concerns in the Final EIS. This process improves the quality of the EIS and is crucial to the decisionmaking process.

DOE provided the public, agencies, Tribal Nations, and others with the Draft EIS, Supplement to the Draft EIS, and supporting documents and data. During the public comment periods, the Department made these documents available in its reading rooms and other public locations throughout the country. Information on the availability of the references cited in the Final EIS can be found in the DOE Reading Rooms listed in Appendix D or on the Internet at the Yucca Mountain Project web site at *http://www.ymp.gov*.

Commenters had the opportunity to send written comments, make oral comments, and submit facsimile comments over a toll-free telephone line, and to attend one or more public hearings in locations across the United States. DOE has considered all issues raised during the public comment periods.

12 (1399)
Comment - EIS000294 / 0005
The assumptions that are in this EIS are completely cooked, they're completely massaged. And even then, the doses that are pictured in this EIS exceed every possible radiation limit.

Response
DOE did not write the EIS or base its analyses on a manipulation of information, data, and assumptions. DOE prepared this assessment of the potential environmental impacts associated with the Proposed Action and the No-Action Alternative in accordance with the National Environmental Policy Act, the Council on Environmental Quality and Departmental implementing regulations, and various guidance. Further, the Department has provided the EIS and its supporting information, data, and analyses to the public for review. The health and safety analyses described in Chapters 4 and 5 indicate that the impacts of the Proposed Action would be within applicable standards and limits.

12 (1614)
Comment - EIS000104 / 0002
[A DOE contractor] just finally admitted that they used this dry cask scenario that everybody's been talking about to build it out of six-inch thick stainless steel, and they finally admitted that it cracked open. The reason they admitted it cracked open was because when they very foolishly tried to bolt it shut, the thing exploded. It had hydrogen gas in there. When I talked to the [contractor] people and I said, "Hey, what is this? You guys are supposed to be the technical experts on this job," and what they said was, "well, we can't be a technical expert because DOE doesn't have anybody that can understand what we're doing, and so every time we try to do something, we get an argument, so we just give up and take the paycheck and go." That's a fatal flaw through this whole project and that needs to be in the EIS. I got a similar answer from [another contractor]...Another example of the problems that we have is this cask that split open violates the Nelson limits. The Nelson limits -- I've asked for months from the DOE and Yucca

Mountain to tell me what they are, and they can't find it. NRC doesn't have anybody that can find them. The National Academy of Science doesn't have anybody that can find them, and this kind of thing needs to be addressed in the EIS that we have fatal flaws in the -- in the whole system and under the NEPA laws, that's required to be in there up front for the public. The people that use the Nelson limits that by the way predicted this cask would crack in two to six months, so they failed their -- either they covered it up for the last four and a half years or the Nelson limits failed. The thing supposedly lasted five years before it split open. The people that know about these Nelson limits are industrial engineers, chemical engineers, mechanical engineers, people that work in industry, and that's only about a third of the engineers in the country. Two-thirds work for the government and for government contractors, so you won't find anybody in your contractors, you won't find anybody in the government that even knows what I'm talking about. That's a fatal flaw in this whole process, and it violates the NEPA laws because anything other than having somebody who knows what they're doing is pure speculation, and that also needs to be mentioned in the EIS.

Response
DOE is unsure what this comment meant by the "Nelson limits," although it appears that the issue may reflect a general concern regarding casks rather than a specific critique of EIS information. DOE believes (1) that the EIS information regarding casks is accurate and (2) that casks used in connection with the proposed action would both meet applicable standards and be protective of public health and safety.

12 (7259)
Comment - EIS001832 / 0006
In a traditional DEIS that compares a number of alternatives to a proposed action, as long as each category of impacts is characterized in common terminology, the reader is given a relative yardstick by which to evaluate alternatives against one another. However, this DEIS is not, and can not, be a comparison of multiple alternatives. This DEIS is unique in evaluating, as mandated by Congress, the environmental impacts of the building and operating a repository at Yucca Mountain and the impacts of not taking that action. Accordingly, DOE should provide some measure of comparison of the environmental impacts in order that the postulated impacts can be better understood as they relate to the decision-making process.

We recommend that DOE facilitate the synthesis of results by using common terminology to depict each of the 13 categories of impact (i.e. low - moderate -high; 0 to 10 with 10 being most severe; or some other method). This scale should be defined in commonly understood terms. Examples should be provided of things that regularly occur in our world and where they fit onto each segment of the scale. For radiological risks, DOE should provide comparisons to both other radiological and nonradiological risks. Care should be taken to include facilities and activities that have common characteristics with Yucca Mountain wherever possible (i.e., where there is a broad societal need for action to be taken). Secondly, having applied a common scale to all impacts, DOE should then summarize the results in a manner that places Yucca Mountain risks in perspective.

Response
DOE believes that the discussion of impacts is forthright and informative, both for the public and for decisionmakers.

The EIS quantifies impacts on environmental resources to the extent practicable. These impacts are then compared to relevant regulatory standards as appropriate to provide perspective on the significance of the impact. For example, for radiological impacts, the EIS presents information in terms of a dose to the maximally exposed individual and to populations. These numbers are then compared to the relevant standard. The EIS also presents expected health consequences from dose rates. To aid understanding, Appendix F of the EIS provides a human health impacts primer with more analytical details.

While the use of a numeric scale such as suggested by the commenter could have some utility, it also creates a potential for confusion. Different readers might attach different importance to impacts in certain areas. The use of a common scale in different disciplines could result in adding totals for impacts in different areas, although a 3 in aesthetic impacts might not have equal weight with a 3 in human health impacts.

12 (7276)
Comment - EIS001106 / 0018
Ethics and principles: The YMP DEIS is indifferent to the principles of environmental and moral ethics expressed in the National Environmental Policy Act. Also lacking is a unifying environmental goal and a strategy for the DOE to achieve it for the YMP. A commitment on the part of the DOE is needed to assure the protection of environmental quality and the achievement of moral and civil ethical principles. This includes openness and informing all of the stakeholders in the YMP and related regional activities about the full nature of costs and benefits of the Yucca Mountain Program.

Response
While the NWPA can be the basis for establishing goals and overall strategy, the EIS provides a comprehensive assessment of environmental issues and addresses the potential mitigation of unavoidable impacts, factors in the views of Native Americans, and is sensitive to the concerns raised by the public through numerous comments and opposing viewpoints.

A major emphasis of the EIS process is to promote public awareness of the proposed actions and provide opportunities for public involvement. The actions that DOE has taken to facilitate and encourage public participation in the EIS process are described in Section 1.5.1 of the EIS. DOE's proposal to construct and operate a geologic repository at Yucca Mountain for the disposal of commercially generated spent nuclear fuel and DOE spent nuclear fuel and high-level radioactive waste is consistent with the NWPA.

From early in the Yucca Mountain Project, the Nuclear Waste Technical Review Board has performed independent reviews of the project, as mandated by the Nuclear Waste Policy of 1982. The Board has consistently provided a powerful forum for stakeholders to express and to have DOE address their views. The public comment period for the Draft EIS was extended beyond that required by DOE's National Environmental Policy Act implementing regulations to allow stakeholders sufficient time for independent review.

DOE's objectives are transparent and are clearly stated at the beginning of the EIS. Congress has identified in the NWPA a national need to deal with the problems associated with spent nuclear fuel and high-level radioactive waste. Congress has identified a potential solution, disposal of these materials at Yucca Mountain in the NWPA. Congress has established DOE's objectives: to evaluate the suitability of the site, to prepare a recommendation for the President, and to prepare an EIS to accompany the recommendation.

12 (7283)
Comment - EIS001106 / 0019
The intent of the NEPA [National Environmental Policy Act] process is that unbiased environmental documents be prepared before a proposed action is tailored. Because of the legislative nature of the Yucca Mountain Project and its exposure to powerful external and internal interests, this intent of NEPA has not been possible. In particular, the DOE has violated the ethical principle of avoiding biases in the conduct of EIA [Environmental Impact Assessment] for the YMP. To avoid these faults the YMP DEIS should adopt both life cycle EIA and regional strategic EIA on a regional basis.

Response
DOE disagrees with the comment's supposition that its National Environmental Policy Act (NEPA) evaluation of the proposed repository at Yucca Mountain is biased. DOE estimated the long-term costs of the repository and did so consistent with the long-term strategic goals established by the NWPA. DOE has attempted to avoid bias by considering views that are inconsistent with its own, and by discussing the use of incomplete and unavailable information – the uncertainties in the analyses. For example, in Section 2.5 of the EIS, DOE acknowledges the receipt of input from a number of organizations that in some cases departs from its own interpretations. DOE reviewed this input and evaluated findings for inclusion in the EIS. If the information represented a substantive view, DOE made efforts to incorporate that view in the EIS and identify its sources. If DOE did not incorporate the information, it attempted to identify and address the opposing view. Nevertheless, DOE provisions of the process for evaluating the Yucca Mountain site provide a strong guarantee of the integrity of the process and the independence and sufficiency of the EIS.

Furthermore, the Nuclear Waste Policy Act of 1982 established an independent review body, the Nuclear Waste Technical Review Board, which consists of scientists and engineers with distinguished careers in disciplines appropriate for the repository proposal. The Board investigates DOE activities, determines their technical and scientific validity, and issues independent reports stating their conclusions to Congress and to the Secretary of Energy.

Decisionmaking for the project rests in the future, first with the President, and then with the Governor and Legislature of Nevada and with Congress. The Nuclear Regulatory Commission would have to issue a construction authorization before DOE could proceed. DOE does not have independent authority under the Nuclear Waste Policy Act or any other law to approve a site, or to build and operate a repository for spent nuclear fuel and high-level radioactive waste. Therefore, if the repository was approved and licensed, DOE would construct and operate it, but only in accordance with a license issued by the Nuclear Regulatory Commission and under standards developed by the Environmental Protection Agency.

12 (8838)
Comment - EIS000216 / 0009
We believe that we can rely on the expertise of DOE to provide the details of the repository design, the Nuclear Waste Technical Review Board to provide impartial oversight of the program, and the Nuclear Regulatory Commission to protect the public health and safety.

Response
Thank you for your comment.

12 (10354)
Comment - EIS001371 / 0002
There is an irony in the Department of Energy's (DOE) promotion of the transport of high level radioactive waste on trains and trucks to the western United States in the 1990's when they officially discouraged transport of the low level radioactive waste at DOE's Weldon Spring Sites Remedial Action Project in St. Charles County in the 1980's. When the citizens' organization pressed for removal of the Weldon Spring radioactive wastes DOE officials told the citizens "it would be a greater risk to the St. Charles County communities and others all along the route to wherever it would be taken by train or truck transport." They say it would be far safer to keep it where it was already located.

Response
DOE is following its mandates under the NWPA and is only evaluating transportation of waste to the proposed repository at Yucca Mountain. The NWPA establishes a process leading to a decision by the Secretary of Energy on whether to recommend that the President approve Yucca Mountain for development as a geologic repository. In the Act, Congress recognized the permanent disposal of spent nuclear fuel and high-level radioactive waste as a national problem. Congress focused national efforts on deep geologic disposal and directed DOE to evaluate whether Yucca Mountain is a suitable candidate site for a repository. The EIS analyzes the potential impacts of transporting spent nuclear fuel and high-level radioactive waste to the repository.

12 (10489)
Comment - EIS002138 / 0004
This DEIS lists the materials, table A-8, volume 2, page A-17 to be stored. They are careful on this table not to list the half-life of the elements. This is an example how DOE presents a report which on the surface the general public receives a feeling that it must be good. Look how thick it is. DOE is very careful not to blatantly lie, but they come very close. I guess in a legal sense, DOE is puffing.

Response
The half-lives of the elements are presented in Table A-8 of the Final EIS. In Section 5.1 of the EIS, DOE acknowledges that there are more than 200 radionuclides in the waste inventory that it could dispose of at Yucca Mountain. However, to perform impact calculations efficiently, the EIS evaluated a reduced number of radionuclides as explained in Appendix I. The EIS analysis of long-term performance focused on the nine radionuclides that would contribute most to total radiological dose, as calculated in the performance assessment models. Table 5-2 lists the average radionuclide inventory per waste package for the performance assessment calculations together with their half-lives.

The Nuclear Waste Policy Act of 1982 established an independent review body, the Nuclear Waste Technical Review Board, which consists of scientists and engineers with distinguished careers in disciplines appropriate for the repository proposal. The Board investigates DOE activities, determines their technical and scientific validity, and issues independent reports stating their conclusions to Congress and to the Secretary of Energy.

12 (10754)
Comment - EIS002145 / 0001
I believe everybody here, whether they're pro or con, should read this article. It's very interesting. I believe that -- and I've heard a lot of people say DOE is full of liars. Well, both sides have their share of liars, the pro and the con.

Response
Thank you for your comment.

12 (11184)
Comment - EIS000249 / 0003
And as I look at Yucca Mountain and the moving target as it were of what its mission is, and how it is going to accomplish it, and I look at the people who are going to receive this waste, and the parties that are engaged in this process, I am beginning to have the feeling that we are having a much bigger Pit Nine rolling down the tracks.

Response
DOE acknowledges the commenter's views. While there is no doubting the scale and complexity of the proposed Yucca Mountain Repository, there is no basis for a comparison with the low-level waste disposal problems of Pit Nine at the Idaho National Engineering and Environmental Laboratory. The disposal strategies and waste forms are entirely different. The disposal procedure for a repository at Yucca Mountain and the nature of the waste inventory are stated in Section 2.1 and Appendix A, respectively, of the EIS. Appendix A reflects DOE's best estimates of the volumes and characteristics of all wastes that would be transported to the repository, as well as details on the sources of the material, present storage conditions, and final disposal forms.

12 (12102)
Comment - EIS001887 / 0402
Actions proposed and taken by the U.S. government often are contrary to the aims and intent of NEPA [National Environmental Policy Act]. Among the reasons is the indifference of civil servants and agency bureaucrats to matters of ethics and principles. Another reason is ignorance of the environment, the concepts of sustainability and ecosystem management, and the pervasiveness of pollution. Most important is the lack in some federal agencies of unifying goals and strategies for perceiving, pursuing, and realizing NEPA's principles and long-range purposes. The bureaucrats within federal agencies need to be seriously and effectively committed to assuring that high qualities for the environment and for productive and healthful personal and civic life are achieved and sustained. This includes a responsibility to inform the public and interest groups of what is at stake and how adverse environmental consequences can be averted over time. Above all, it means that government agencies and bureaucrats need to be honest with the public about the true nature and ultimate balance of costs and benefits from proposed actions.

Response
NEPA does not prohibit activities that harm the environment; rather, it requires Federal agencies to disclose the extent of such environmental harm, and environmental benefits, to the public and to agency decisionmakers. Consistent with NEPA, DOE has done so in its presentation of potential environmental impacts in the EIS, and through the public comment process.

The EIS process has been structured to provide detached input to the EIS and public scrutiny of the EIS results. An independent contractor was selected to assist DOE in preparing this EIS. Several independent assessments of the EIS have been performed to validate its results. Public hearings and public review of the Draft EIS and the Supplement of the Draft EIS provided interested parties including opponents and proponents of the Proposed Action with the opportunity to examine the assumptions, analyses, and conclusions in these documents and the opportunity to provide input on how these issues and other concerns should be addressed in the Final EIS.

DOE believes that it has assembled a well-trained, ethical, and independent team of experts to prepare the EIS. Chapter 13 lists preparers and their expertise.

DOE's objectives are transparent and are clearly stated at the outset of the EIS. Congress has identified in the NWPA a national need to deal with the problems associated with spent nuclear fuel and high-level radioactive waste. Congress has also identified a potential solution, disposal of these materials at Yucca Mountain. Congress has established DOE's objectives: to evaluate the suitability of the site, to prepare a recommendation for the President, and to prepare an EIS to accompany the recommendation.

12 (12103)
Comment - EIS001887 / 0403
The procedural requirements of NEPA [National Environmental Policy Act] are meant to force attention to the Act's purpose of producing environmental documents for the NEPA process through application of the discipline of EIA [Environmental Impact Assessment]. Thus, EIA is to be conducted by federal agencies before strategic decisions about a project have been made and not simply tailored to fit the project once a decision has been made to proceed with the action. In this context, NEPA is better served if environmental documentation is based on life-cycle EIA. This approach addresses a project's full life cycle from cradle to grave, including the fate of all pollutants and residuals and the full social, economic, and resource implications. NEPA also is better served when EIA is conducted in a strategic format that coordinates similar actions over time in a regional context. The intent of the NEPA process is that unbiased environmental documents be prepared before a proposed action is tailored. The information and insights resulting from the EIA process is meant to be integrated into the final design and implementation of the action. Because of the legislative nature of the YMP [Yucca Mountain Project] and its exposure to powerful external and internal interests, this intent of NEPA has not been possible. In particular, DOE has violated the ethical principle of avoiding biases in the conduct of EIA for the YMP. To avoid these faults, the YMP DEIS should adopt both life cycle EIA and strategic EIA on a regional basis.

Response
From this comment, DOE assumes that a "cradle-to-grave" approach would require consideration and analysis of the entire nuclear waste cycle, from production of nuclear fuel and associated waste to its ultimate disposal as spent nuclear fuel and high-level radioactive waste. The National Environmental Policy Act and implementing regulations require an EIS to evaluate the direct and indirect impacts of an agency's proposal and alternatives to that proposal, as well as impacts from connected or similar actions. In the context of the Proposed Action to construct, operate and monitor, and eventually close a repository at Yucca Mountain, analyses related to the production of nuclear fuel are not connected to a decision on the development of a repository or related to the implementation of such an action. Furthermore, other DOE EISs have addressed portions of the nuclear fuel cycle on a programmatic or project-specific basis.

As suggested by this comment, Chapter 8 of the EIS considers the potential for cumulative impacts in the region. The analysis considered past, present and reasonably foreseeable future activities that could occur in the same time and geographic vicinity as the Proposed Action.

DOE disagrees with the comment's supposition that DOE wrote the EIS to support previously made decisions. Decisionmaking for the project rests in the future, first with the President, and then with the Governor and Legislature of Nevada and Congress. The Nuclear Regulatory Commission would need to issue a construction authorization before DOE could proceed. DOE does not have independent authority under the Nuclear Waste Policy Act or any other law to approve a site, or to build and operate a repository for spent nuclear fuel and high-level radioactive waste. Therefore, if the repository was approved and licensed, DOE would construct and operate it, but only in accordance with a license issued by the Nuclear Regulatory Commission and under standards developed by the Environmental Protection Agency.

DOE has attempted to avoid bias by considering views that are inconsistent with its own, and by discussing the use of incomplete and unavailable information – the uncertainties in the analyses. For example, in Section 2.5 of the EIS, DOE acknowledges the receipt of input from a number of organizations that in some cases departs from its own interpretations. DOE reviewed this input and evaluated findings for inclusion in the EIS. If the information represented a substantive view, DOE made efforts to incorporate that view in the EIS and identify its sources. If the information was not incorporated in the analyses, DOE attempted to identify and address the opposing view.

Nevertheless, provisions of the process for evaluating the Yucca Mountain site provide a strong guarantee of the integrity of the process and the independence and sufficiency of the EIS.

Furthermore, the Nuclear Waste Policy Act of 1982 established an independent review body, the Nuclear Waste Technical Review Board, which consists of scientists and engineers with distinguished careers in disciplines appropriate for the repository proposal, and who are independent of DOE. The Board investigates DOE activities, determines their technical and scientific validity, and issues independent reports stating their conclusions to Congress and to the Secretary of Energy.

12 (12104)
Comment - EIS001887 / 0404
NEPA [National Environmental Policy Act] is meant to further environmental values and ethics present in our society that are supported by a majority of citizens. The values reflect concern about long-term physical environmental quality and the quality of the human environment in the face of material growth. Under NEPA, the process of EIA [Environmental Impact Assessment] also is meant to enhance the congruence of future actions with broad environmental goals that protect the environment for future generations. This means providing assurance of the widest range of beneficial uses of the environment without degradation, risk to health, and other undesirable consequences. A particular loser in the NEPA process for the YMP [Yucca Mountain Project] has been long-term quality of the human environment regarding future generations. The DEIS in particular condones sacrificing the Yucca Mountain region for the future. The inherent biases of those responsible for the DEIS weigh heavy on the project because independent outside review of the EIA process was limited. Those opposed to the YMP were viewed by DOE with a lack of confidence when the opposite situation was in fact the case. This also was true of the contractors who executed EIA for the YMP and compromised their ethics and objectivity on behalf of DOE.

To achieve good EIA as intended by NEPA, expertise must be assembled and allowed by agency bureaucrats to remain involved throughout the entire process and to participate as part of an interdisciplinary team. An agency's legal staff also should be part of the team and should be involved from start to finish with the NEPA process. Strategies and tactics taken by one component of the team must be understood and agreed to by the entire team. Participants must be educated in the substantive purposes of NEPA as well as in the procedural ones, and they must be trained properly to write satisfactory impact statements that all stakeholder groups can understand. Above all else, a good sense of professional ethics must be practiced by all participants in the EIA process. As a whole, DOE has a poor record regarding environmental ethics, an indifference to environmental quality, and lacks openness to the public. The YMP is being conducted in this characteristic manner, where civil servants and bureaucrats ignore the higher precept of NEPA and environmental ethics. The DEIS includes no sense of unifying goals and strategies for achieving national environmental policy and informing and educating people about DOE's objectives which remain hidden and unopen.

Response
The analysis in Chapter 5 of the EIS concludes that the Proposed Action would not prove detrimental to long-term environmental quality and that regional productivity and viability would not be affected.

DOE does not agree with contentions that it is biased. Nevertheless, DOE notes that provisions of the process for evaluating the Yucca Mountain site provide a strong guarantee of the integrity of the process and the independence and sufficiency of the EIS.

The Nuclear Waste Policy Act of 1982 established an independent review body, the Nuclear Waste Technical Review Board. The Board consists of scientists and engineers with distinguished careers in disciplines within the range appropriate for the repository proposal, and who are who are independent of DOE. The Board has power to investigate DOE activities in regard to the repository, determine the technical and scientific validity of DOE activities, and to issue independent reports stating their conclusions to Congress and to the Secretary of Energy.

The EIS process has been structured to provide detached input to the EIS and public scrutiny of the EIS results. An independent contractor was selected to assist DOE in preparing this EIS. Several independent assessments of the EIS have been performed to validate its results. Public hearings and public review of the Draft EIS and the Supplement to the Draft EIS provided interested parties including opponents and proponents of the Proposed Action with the opportunity to examine the assumptions, analyses, and conclusions in these documents and the opportunity to provide input on how these issues and other concerns should be addressed in the Final EIS.

If DOE determined that the Yucca Mountain site was not suitable, the NWPA empowers the Secretary of Energy to stop the site evaluation, order restoration of the site, and report to Congress on other recommended approaches for disposal of the materials. In other words, the Secretary of Energy and DOE cannot approve the site but can reject it.

DOE believes that it has assembled a well-trained, ethical, and independent team of experts to prepare the EIS. Chapter 13 lists preparers and their expertise.

DOE's objectives are transparent and are clearly stated at the outset of the EIS. Congress has identified in the NWPA a national need to deal with the problems associated with spent nuclear fuel and high-level radioactive waste. Congress has also identified a potential solution, disposal of these materials at Yucca Mountain. Congress has established DOE's objectives: To evaluate the suitability of the site, to prepare a recommendation for the President, and to prepare an EIS to accompany the recommendation.

13

Comments Outside the Scope of the Environmental Impact Statement and the Yucca Mountain Site Characterization Project

13. COMMENTS OUTSIDE THE SCOPE OF THE ENVIRONMENTAL IMPACT STATEMENT AND THE YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT

13 (5)
Comment - 213 comments summarized
Commenters expressed their opinions regarding the need for and use of nuclear power. Most were opposed. Many of the commenters stated that there would be no nuclear waste problem if there were no nuclear power. Others stated that nuclear power is uneconomical and unsafe. Commenters stated that a moratorium on the mining of uranium, the construction of new powerplants, weapons facilities, and nuclear testing areas should be enacted immediately and advocated energy conservation; the use of alternative energy technologies, primarily from renewable sources such as geothermal, solar, wind, hydrogen, biomass, and hydropower; and DOE's financial support and promotion of education, research, and implementation in these areas. The use of clean coal technology was also recommended.

A small number of commenters supported the use of nuclear power; some cited economic benefits, including jobs, or stated that nuclear powerplants do not emit greenhouse gases and other conventional air pollutants that are emitted from fossil-fueled power plants.

Response
The United States depends on nuclear power as an energy source to produce electricity. At present, approximately 20 percent of the electricity in the United States is generated by nuclear power. In accordance with the Atomic Energy Act, the Nuclear Regulatory Commission is responsible for licensing, regulating, and overseeing commercial nuclear powerplants, including the generation and interim storage of spent nuclear fuel at the reactor sites. Therefore, the Commission, not DOE, has authority over the Nation's nuclear power industry.

The National Energy Policy envisions a comprehensive long-term strategy that uses leading-edge technology to produce an integrated energy, environmental, and economic policy (DIRS 156756-Cheney 2001).

DOE is committed to the development and responsible use of all types of energy, and supports energy education and conservation activities. DOE actively promotes these efforts through its many outreach programs. The DOE Office of Energy Efficiency and Renewable Energy is leading the Nation's efforts in the study of alternative energy technologies, including geothermal, wind, solar, hydrogen, biomass, and hydropower. For information on the Office's activities, please visit its web site at http://www.eren.doe.gov or write to U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, 1000 Independence Ave., S.W., Washington, DC, 28585.

13 (35)
Comment - 11 comments summarized
DOE received comments on the reprocessing of spent nuclear fuel—both in favor of and opposed to reprocessing. Reprocessing is the chemical separation of spent reactor fuel into uranium, transuranic elements, and fission products. One commenter stated that the United States Government should reconsider the policy that deferred indefinite recycling of commercial spent nuclear fuel and noted that other countries such as France and the United Kingdom currently reprocess fuel. Others in support of reprocessing stated that the material to be emplaced at Yucca Mountain is not waste but rather yet-to-be-recycled fuel. Other commenters opposed to reprocessing stated that a firm commitment should be made against the reprocessing of irradiated/spent nuclear fuel and others stated that reprocessing adds to radiological contamination.

Response
The scope of this EIS is limited to an analysis of the potential environmental impacts of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain, and the No-Action Alternative.

At present, commercial spent nuclear fuel is not reprocessed in the United States . While materials disposed of in the proposed repository could have the potential to be an economic resource, it has been a long-standing policy of the United States to promote international nonproliferation efforts by not reprocessing nuclear material. The Carter

Administration cancelled the breeder reactor commercialization and plutonium recycle programs in this country on April 7, 1977.

In 1993, President Clinton reemphasized the U.S. policy, stressing the need to avoid increasing the accumulation of material that has the potential for use in nuclear weapons.

The policy further states that the United States does not encourage the use of civilian plutonium and, accordingly, does not engage in plutonium reprocessing for either nuclear power or nuclear explosive purposes.

13 (37)
Comment - 18 comments summarized
DOE received comments about activities involving DOE and commercial nuclear sites around the United States, conditions in the environments around those sites, potential health effects from activities or conditions at those sites, and other governmental activities not related to the proposed geologic repository at Yucca Mountain.

Response
This EIS analyzes the potential environmental impacts of constructing, operating and monitoring, and eventually closing a geologic repository at Yucca Mountain for the disposal of spent nuclear fuel and high-level radioactive waste, and the No-Action Alternative. The EIS also analyzes the potential impacts of transporting spent nuclear fuel and high-level radioactive waste to Yucca Mountain from 72 commercial and 5 DOE sites across the United States. Activities or conditions at other DOE or commercial nuclear sites, or that are within the purview of other governmental organizations, are outside the scope of this EIS. Comments and questions are of great concern to DOE and should be directed to the governmental organizations or corporations having authority over those projects or activities.

13 (72)
Comment - 12 comments summarized
DOE received comments opposed to the interim storage of spent nuclear fuel on Native American lands in the Western United States, in particular, the Private Fuel Storage Facility proposed for Skull Valley, Utah.

Response
Private Fuel Storage, L.L.C., which is owned by eight U.S. nuclear power generating utilities, has applied to the Nuclear Regulatory Commission for a license to receive, transfer, and possess spent nuclear fuel from commercial nuclear reactors at a privately owned spent nuclear fuel storage installation on the Reservation of the Skull Valley Band of Goshute Indians near Tooele, Utah. This facility would store spent nuclear fuel pending the availability of a DOE facility to accept the material permanently. The Commission is the lead agency for preparing the EIS for this proposed facility, and the Bureau of Indian Affairs, Bureau of Land Management, and the Surface Transportation Board are cooperating agencies. DOE is not involved in this proposal or in the preparation of the EIS. However, DOE has considered the Private Fuel Storage Facility to be a reasonably foreseeable future action that is analyzed as part of the cumulative impacts associated with the Proposed Action of the repository EIS (see Chapter 8).

The *Draft Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation on the Reservation of the Skull Valley Band of the Goshute Indians and the Related Transportation Facility on Tooele County, Utah* (DIRS 152001-NRC 2000), was published for public comment in June 2000.

13 (131)
Comment - 10 comments summarized
Commenters expressed their opposition to the production and testing of nuclear weapons. Reasons for their opposition include philosophical grounds and concerns about environmental contamination and wastes generated from nuclear weapons production and testing. Commenters also expressed opinions that the money used to maintain the U.S. nuclear arsenal could be better spent eliminating the arsenal, solving nuclear waste disposal issues, or on humanitarian causes.

Response
The United States no longer manufactures new-design nuclear weapons. DOE, under the Stockpile Stewardship and Management Program, is responsible for maintaining the safety and reliability of the United States nuclear weapons stockpile. The *Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management* (DIRS 103217-DOE 1996) describes DOE responsibilities, and analyzes the potential environmental impacts of proposed changes to the Nuclear Weapons Complex to support this mission.

This EIS analyzes the potential environmental impacts of constructing, operating and monitoring, and eventually closing a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain, as well as the No-Action Alternative. Chapter 8 evaluates the cumulative impacts of stockpile stewardship and management activities at the Nevada Test Site, including subcritical testing of weapons components.

13 (211)
Comment - 10 comments summarized
Some commenters expressed dissatisfaction with the way members of their Congressional delegations, local political entities, other publicly funded organizations, or tribal councils conduct their business or themselves. In particular, issues related to adequate involvement and representation, campaign contributions, and project funding were raised.

Response
This EIS analyzes the potential environmental impacts of constructing, operating and monitoring, and eventually closing a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain, as well as the No-Action Alternative. Commenters may submit their concerns about how members of Congress or other individuals or organizations conduct their business or represent their constituents directly to them.

13 (227)
Comment - 8 comments summarized
DOE received comments regarding civil disobedience and the use of peaceful, nonviolent protest. Some commenters wanted to assure DOE that there would be peaceful protests of spent nuclear fuel and high-level radioactive waste shipments to the proposed repository. Other commenters were concerned that peaceful protests could turn violent by response actions, citing incidents outside the United States as examples; expressed the opinion that these protests occurred and will continue to occur because the public has been excluded from the decisionmaking process; or questioned why the Draft EIS does not discuss the effect of civil disobedience on shipments to the repository.

Response
DOE recognizes that many persons in the United States oppose the manufacture, use, storage and transportation of nuclear materials and radioactive waste. DOE also recognizes the possibility of civil protests against these activities. DOE anticipates that if a repository were to be approved, any activities related to the implementation of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain, including the related transportation, would occur in a peaceful manner. Although activities occurring outside the United States such as those cited by the commenters are outside the scope of this EIS, they do illustrate potential concerns. Section 6.2.4.2.3 and Section J.1.4.2.1 of this EIS consider the impacts of hypothetical, successful sabotage attempts on a cask en route to the repository. While acts of civil disobedience would unlikely involve breaching a cask, this analysis considers the maximum reasonably foreseeable consequences of such activities.

In transporting spent nuclear fuel and high-level radioactive waste to the proposed repository at Yucca Mountain, DOE organizations would work with representatives of other Federal, state, local, and Tribal governments and law enforcement agencies, as appropriate, to ensure that shipments progress as safely as possible. Personnel from these organizations will receive training, as appropriate, that includes responses to protests and other civil actions. DOE will also work with these organizations and its nongovernmental stakeholders to minimize the potential for confrontations.

DOE has included the public in the decisionmaking process, and will continue to do so. DOE made the Draft EIS available in more than 35 locations (public Reading Rooms and libraries) in 17 states and the District of Columbia, and on the Internet at http://www.ymp.gov/deis.htm; and mailed copies to stakeholders and others requesting one. Public hearings were held in 21 locations from California to Washington, D.C. DOE accepted comments through the mail, via the Internet, and in person at the public meetings. Because the Supplement to the Draft EIS focused primarily on matters involving repository design, the Department held three public hearings in Nevada during the comment period. More than 13,000 comments received on the Draft EIS and approximately 1,900 comments received on the Supplement to the Draft EIS are answered in this Comment-Response Document. DOE will continue public involvement activities with its stakeholders, including citizens groups and the media, and the general public, throughout the life of this project.

13 (618)
Comment - EIS000181 / 0005
The administration should also seek ways to streamline and economize the ridiculous EIS process, including by seeking new legislation if need be. DOE should become more of an action agency.

Response
The NWPA requires that DOE prepare an EIS for the construction, operation, and closure of a geologic repository at Yucca Mountain. DOE prepared this EIS consistent with the process-related requirements of the NWPA and the National Environmental Policy Act, and the Council on Environmental Quality and DOE regulations implementing the National Environmental Policy Act. The regulations that implement the National Environmental Policy Act establish a process, described in Section 1.5 of this EIS, that begins with scoping, followed by preparation of a draft EIS for public distribution and comment. The process culminates with preparation of a final EIS that includes responses to comments received on the Draft EIS. The NWPA also discussed in Section 1.5, influences the scope of this EIS. In addition to assisting in decisionmaking, a major emphasis of the EIS process is to promote public awareness of proposed actions and to provide opportunity for public involvement. For this reason, DOE does not believe it necessary to seek legislation to modify the process.

13 (1138)
Comment - EIS000270 / 0025
Factors that give rise to public concerns about and opposition to approval of the Yucca Mountain site include:

Omitting impacts of political and economic changes affecting the commercial nuclear and defense industries with respect to their continued safe management of all radioactive wastes.

Response
This EIS analyzes the potential environmental impacts of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain, and the No-Action Alternative. Issues related to the management of radioactive wastes by the commercial nuclear and defense industries are beyond the scope of this EIS.

13 (1205)
Comment - EIS000272 / 0002
We feel as a state (Georgia) -- and I know that the governor has indicated this to the Department of Energy very recently, within the last month, to the Secretary of Energy, that we have significant issues with transportation. We're looking at the possibility of nuclear -- of plutonium, weapons-grade plutonium, being shipped across the state coming from the west back to the east, to the Savannah River plant, if the plutonium fuel fabrication plan goes forward at the Savannah River Site, as well as the immobilization of that fuel. So the governor is highly concerned about the question of waste being brought into our state and about who's going to pay the bill for the training, what level of training is going to be necessary for these kinds of unanticipated and never-before-experienced holocaust type of accidents and emergencies that can emerge from this, potentially.

Response
This EIS analyzes the potential environmental impacts of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain. Although issues related to the transportation of surplus weapons-usable plutonium through the State of

Georgia as part of the DOE Surplus Plutonium Disposition Program are beyond the scope of this EIS, DOE evaluated such potential impacts in detail in the Surplus Plutonium Disposition EIS (DIRS 118979-DOE 1999). Chapter 4 of that EIS describes transportation impacts, with detailed analyses in Appendix L of that document. In addition, comments from the State of Georgia Department of Natural Resources that included a number of transportation concerns, and the associated responses, are in the Comment Response Document (Volumes III and IV) of the Surplus Plutonium Disposition EIS.

13 (1243)
Comment - EIS010093 / 0002
The answer folks isn't unfettered energy policy "same oh same oh" but significant energy conservation. Dim the lights, auto time lighting switches, etc., etc. Solar or wind, energy accountability. Shut (text cut off).

Response
Thank you for your comment. DOE is committed to the development and responsible uses of all types of energy, including renewable energy sources such as geothermal, wind, solar, hydrogen, biomass, and hydropower. DOE's Office of Energy Efficiency and Renewable Energy is responsible for leading the Nation's efforts in the study of renewable energy sources. For information on the Office's activities, please visit its web site at http://www.eren.doe.gov, or write to U. S. Department of Energy, Office of Energy Efficiency and Renewable Energy, 1000 Independence Ave., S. W., Washington, DC, 28585.

13 (1548)
Comment - EIS000357 / 0007
Page 1-6. 1.2.2.2. How was the spent nuclear fuel from the "55 university- and government-owned test reactors" transported to Hanford and Savannah River? What was the accident record?

Response
University and government-owned spent nuclear fuel being considered for disposal in Yucca Mountain is transported to the Idaho National Engineering and Environmental Laboratory, not the Hanford Site. Section 1.2.2.2 discusses the small quantity of spent nuclear fuel that is generated from research conducted by approximately "55 university- and government owned test reactors." Transportation of university and government-owned test reactor fuel to the Idaho National Engineering and Environmental Laboratory for consolidated storage is an ongoing process that DOE is conducting in accordance with the Record of Decision for the *Department of Energy Programmatic Spent Nuclear Fuel Management and the Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs* (DIRS 103205-DOE 1995). This activity is outside the scope of this EIS, which analyzes the potential environmental impacts of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain, and analyzes the No-Action Alternative.

In the more than 2,900 shipments over the past three decades, there has not been an accident involving the transportation of spent nuclear fuel or high-level radioactive waste that has resulted in the release of radioactive contents from the package. The *Department of Energy Programmatic Spent Nuclear Fuel Management and the Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement* (DIRS 101802-DOE 1995) includes historical data regarding shipments of spent nuclear fuel. For more recent information regarding the transportation of radioactive materials, please visit the National Transportation Program's web site at www.ntp.doe.gov.

13 (1906)
Comment - EIS000464 / 0002
But first I would like to talk about so-called burial or dry cask burial, or otherwise known as vitrification. Russia was first to try dry cask vitrification in their Ural Mountain nuclear dump. It exploded in the 1950s because heat is continually being generated along with hydrogen gas. Temperatures can rise to 5,000° and you will have a thermal explosion. There is now a 100-mile-radius dead zone in the Ural Mountains. No one is allowed near the place.

Then Dr. Roy told me France tried vitrification and found it a failed technology. It simply will not work. Nothing can contain the most corrosive element in the universe, high-level nuclear waste. It is going to leak out or explode or both.

Response
The commenter could be referring to an explosion of an underground liquid radioactive waste storage tank at the Mayak nuclear complex on September 29, 1957, following a failure of the tank cooling system. These tanks contained liquid nuclear processed waste, not spent nuclear fuel or immobilized (vitrified) high-level radioactive waste. An accident of a similar nature could not occur at the proposed Yucca Mountain Repository because DOE would emplace only waste in a stable, solid form.

With regard to vitrification efforts in France, the Waste Act of 1991 established a legislative framework for disposition of high-level and long-lived intermediate-level wastes and initiated a 15-year research program in three areas:

1. Separation and transmutation of long-lived isotopes in waste
2. Disposition in deep geological formations (via underground research laboratory tests)
3. Immobilization processes and long-term surface storage.

According to the 1991 Act, the French government will submit an overall assessment of the three research areas (including immobilization processes) to Parliament by 2006 (DIRS 156712-National Research Council 2001).

DOE has successfully demonstrated vitrification technology at a number of facilities in the DOE Complex, and has implemented the technology at the West Valley Demonstration Project in New York State and at the Defense Waste Processing Facility at the Savannah River Site in South Carolina. The Department is also planning to use vitrification for tank waste at the Hanford Site in Washington State.

13 (2004)
Comment - EIS000528 / 0001
I recently attended a meeting concerning Nuclear Waste at Yucca Mountain at C.O. Bastian school in Caliente, NV. At that meeting a statement was made indicating that the people in Lincoln County had been made aware of and are kept updated on the issue of Nuclear Waste Storage in Yucca Mountain. This is not true. The people stating, or in charge of this have a committee, but have masked it from the public by calling it the Impact Alleviation Committee. I recently polled twenty people and only two out of the twenty knew what this committee was or what it did. I am sure that if this was named the Nuclear Waste Impact Alleviation Committee that all of the people I asked would have known and more than two or three people would show up to their meetings. Local residents poorly attend the meeting because they are not advertised and results not published of the meeting.

Response
The Impact Alleviation Committee is a Lincoln County and City of Caliente organization that is neither accountable to nor represents DOE. The Impact Alleviation Committee conducts and advertises its meetings in accordance with its own practices and procedures.

13 (2072)
Comment - EIS000765 / 0002
The first comment may be stretching the scope of this forum somewhat, as it relates to the management of the nation's surplus weapons plutonium. Thank God we have this problem because it means that we've reduced our stockpile of operational nuclear weapons. However, I am not in favor of any plan of disposal of this plutonium, some 50 metric tons, in a manner that would forever preclude its possible use by future generations as a mixed-oxide reactor fuel. The technologies for producing energy are now undergoing rapid advances, but our need for energy is also increasing and must be met. But of equal importance is our need for energy that does not consume carbon fuels and discharge carbon dioxide into the atmosphere. It is possible, according to some scientists, that we will experience a global warming crisis in the future. If that occurs, our future generations may need every bit of non-fossil fuel energy they can lay their hands on. This plutonium is a national resource. Let's not throw it away.

Response
Thank you for your comment. DOE evaluated the disposition of 50 metric tons (55 tons) of plutonium declared surplus to national defense needs in its *Surplus Plutonium Disposition Final Environmental Impact Statement* (DIRS 118979-DOE 1999). The Record of Decision for that EIS specified that approximately 33 metric tons (36 tons) of the surplus plutonium would be fabricated into mixed-oxide fuel for use in domestic commercial nuclear

reactors; but that approximately 17 metric tons (19 tons) will be immobilized for direct disposal (65 *FR* 1608, January 11, 2000).

13 (2628)
Comment - EIS000714 / 0004
Per SCIENTIFIC AMERICAN May '96 the DOE now admits that enormous amounts of the highly radioactive liquids and solids were pumped or dumped into the ground and estimates that throughout all the weapons complexes, billions of cubic meters of soil, groundwater and surface water are contaminated.

Charges for criminal violations should be brought against the DOE/AEC for past, present and planned future damage of the highest order to the United States and its injured citizens - damage that has been deadly and that may last for thousands of years.

Response
DOE has long acknowledged that its activities and those of its predecessor agencies in the production of nuclear weapons resulted in the contamination of facilities and the surrounding environment at many of its sites around the country. The Department is spending billions of dollars to clean up those sites, and will continue those efforts until all sites have been cleaned up to specified standards. DOE's goal is to have completed cleanup at more than 90 percent of its sites by 2006. At most sites, DOE will continue long-term surveillance and monitoring activities to ensure the protection of human health and the environment (DIRS 107294-DOE 1998).

13 (2790)
Comment - EIS000882 / 0003
We need more money spent on research to make use of the high level radioactive waste and contain plutonium that is in the waters in Southern Nevada.

Response
Thank you for your comment. The scope of this EIS is limited to an analysis of the potential environmental impacts of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain. Other issues concerning high-level radioactive waste, plutonium, or other materials are beyond the scope of this EIS.

13 (2793)
Comment - EIS000887 / 0003
If it's so safe we should require the heads of the DOE to live within 10 miles of the site for the rest of their lives. Do we have any takers? I think NOT!

Response
This EIS evaluates the potential environmental impacts of constructing, operating and monitoring, and eventually closing a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain, including potential health effects to the general public. This EIS identifies the maximally exposed individual as being a resident located on the southern boundary of the land withdrawal area. Section 4.1.7.5.3 of the EIS discusses potential health effects to this maximally exposed individual, as well as to the general population. Analyses indicate that the likelihood of the maximally exposed individual incurring a latent cancer fatality from repository activities over a 70-year lifetime would be about 0.000016 to 0.000031 (1.6 to 3.1 in 100,000) under the flexible design repository operating modes. The estimated total number of latent cancer fatalities in the exposed population over 115 to 341 years for the range of repository operating modes would range from 0.46 to 2.0. During the time the project would be active the estimated number of cancer deaths unrelated to the project would range from about 30,000 to 89,000 in the exposed population.

13 (3206)
Comment - EIS001133 / 0003
I thought the [there] was a ban on nuclear weapons. Lets not store the waste on the earth to poison what Mother Nature has left us.

Response
The NWPA states that the Federal Government has the responsibility to dispose of spent nuclear fuel and high-level radioactive waste that has accumulated and continues to accumulate across the United States. It also identified the Yucca Mountain site in southern Nevada as a potential location for a monitored geologic repository and directed DOE to characterize the site for suitability. As required by the NWPA, the EIS analyzes a Proposed Action to construct, operate and monitor, and eventually close a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain.

13 (3657)
Comment - EIS000926 / 0007
What about the Waste Isolation Plant in Carlsbad, New Mexico where testing is done for safe disposal of nuclear waste - radioactive waste. Why have we not heard about this???

Response
DOE operates the Waste Isolation Pilot Plant to dispose of transuranic waste left from research and production of nuclear weapons. This waste is different from the spent nuclear fuel and high-level radioactive waste that DOE would dispose of Yucca Mountain. For more information about the Waste Isolation Pilot Plant, please see the *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement* (DIRS 148723-DOE 1997) or visit the Plant's web site at *http://www.wipp.carlsbad.nm.us/wipp.htm*.

13 (3921)
Comment - EIS001287 / 0001
We do appreciate the Department of Energy's attempt to thoughtfully and carefully devise a long-range plan for the disposal of 70,000 metric tons of nuclear waste. While we believe there are major problems with the YMP [Yucca Mountain Project], we are even more worried about the disposal of nuclear wastes in many other nations. In countries lacking democratic traditions there will be no environmental impact statements, no public hearings, no openness in the process for siting and burial. Worldwide, there will be hundreds of thousands of metric tons to be disposed of, in coming decades. Many nations will not do this safely and effectively. Many people will die and their land will be poisoned, for all practical considerations, forever. This makes the continued development of nuclear power, as well as nuclear weapons, seem reckless and irresponsible. Added to these concerns is the prospect that spent nuclear fuel can be reprocessed into weapons-usable materials. Thus nuclear power is likely to fuel the proliferation of nuclear weapons around the globe. Pandora's box has been opened. The YMP is an attempt to close the box. It's a better attempt than we anticipate elsewhere, but not without problems.

Response
Thank you for your comment.

13 (3962)
Comment - EIS001547 / 0001
Now we do appreciate the Department of Energy's attempt to thoughtfully and carefully devise a long-range plan for the disposal of this waste. While we believe there are major problems with the Yucca Mountain project, we are even more worried about the disposal of nuclear wastes in many other nations. In countries lacking democratic traditions, there will be no environmental impact statements, no public hearings, no openness in the process of sighting and burial. Worldwide, there will be hundreds of thousands of metric tons to be disposed of in coming decades.

Many nations will not do this safely and effectively. Many people will die and their land will be poisoned, for all practical considerations, forever. This makes the continued development of nuclear power, as well as nuclear weapons, seem reckless and irresponsible. Added to these concerns is the prospect that spent nuclear fuels can be reprocessed into weapons usable materials. Thus nuclear power is likely to fuel proliferation of nuclear weapons around the globe. Pandora's box has been opened. The Yucca Mountain project is an attempt to close the box. It's better than we anticipate elsewhere, but is not without problems.

Response
Thank you for your comment.

13 (4139)
Comment - EIS001127 / 0002
We collectively have created this problem. Let me note however that the source of this problem is really not the electric industry or the Department of Energy. Rather it is the arms industry. Nuclear weapons are the source of the problem. Atoms for Peace, under President Dwight Eisenhower, became the focus of a governmental effort to find some redeeming qualities to nuclear fission. While the government was busy building nuclear warheads, our government sought to sell Atoms for Peace to the public. A variety of laws then made nuclear power attractive, and profitable, to the electric utilities. Today we collectively live with the results of the decisions made by our government to encourage nuclear production of electricity. I think all of us in this room know that there is a significant hazard in handling and storing of waste. Where we differ, I think, is over the level of confidence we place in our ability to handle it safely.

Response
Thank you for your comment.

13 (4337)
Comment - EIS001202 / 0007
I demand legislation providing for reduction of energy company inventories. If their cooling ponds are full, each rod taken gives them more storage space for new production, at unbelievable continuing expense to the public. This [is] charity to energy power utilities. We in Northeast Ohio have already given.

Response
Ratepayers and utilities are paying the cost of disposal of the spent nuclear fuel generated by the nuclear power industry. The Nuclear Waste Policy Act of 1982 specifies that the Federal Government is responsible for providing for the permanent disposal of spent nuclear fuel and high-level radioactive waste, and that the costs of this disposal should be the responsibility of the generators and owners of the spent nuclear fuel and high-level radioactive waste. Commercial utilities pay a fee of 1mil (one-tenth of 1 cent) per kilowatt-hour of electricity generated by nuclear energy to cover disposal costs for commercial spent nuclear fuel. The Federal Government pays for waste generated and owned by the United States from taxpayer revenues as appropriated by Congress.

Utility fees go into the Nuclear Waste Fund where unused portions earn interest. Since passage of the Nuclear Waste Policy Act of 1982, utilities and their ratepayers have paid approximately $9.8 billion into the Nuclear Waste Fund to pay for the development of a repository for the disposal of spent nuclear fuel and high-level radioactive waste. By the end of Fiscal Year 1999, the program had spent approximately $6 billion for the purposes specified in the Act. With accrued interest, the value of the Nuclear Waste Fund was $8.5 billion at the end of Fiscal Year 1999. The most recent review showed that approximately 70 percent of disposal-related costs would be paid from the Nuclear Waste Fund, and approximately 30 percent, to cover the cost of Federally owned spent nuclear fuel and high-level radioactive waste, would come from taxpayer revenues. Thus, the private commercial utilities are "paying their fair share" of repository program costs along with taxpayers. However, the cost estimates in the EIS do not consider and are not sensitive to the source of funding (see Sections 2.1.5 and 2.2.3 of the EIS).

13 (4687)
Comment - EIS001471 / 0001
Thanks very much. Just to pick up where I was at. I did want to talk some more about the history of actual shipments of high-level waste, and again go back to Germany where there was a shipment of high-level waste sent from Germany to France for reprocessing. And upon its return to the border between France and Germany it was discovered to be 3,000 times the permissible level of radiation on the surface of the casks. So there was a contamination event.

And this information was kept from the public for a considerable period of time and created quite a scandal when it was finally released. And so that's another example of things going wrong with high-level waste transportation.

Response
DOE is uncertain about the incident to which the commenter is referring, but there were a few incidents in 1997 involving German, Swiss, and United Kingdom shipments to France in which external surface contamination was in excess of routine contamination limits. Shipments were temporarily halted but resumed in 1998. Investigations

determined that there were no radiological consequences to workers or the public, but did reveal an absence of cleanliness in Electricite de France reprocessing plants. Monitoring, inspection, and other measures were increased in response to these incidents. A working group comprised of experts from all four countries was formed in 1998 to ensure future safety of spent fuel transportation. The common opinion of the working group was that the corrective measures implemented following the incidents allow safe spent fuel transportation (DIRS 156709-SNSI 1998).

DOE appreciates the commenter's concern that incidents could occur during the transport of spent nuclear fuel and high-level radioactive waste. However, the DOE safety record demonstrates that transportation of these materials can and does occur safely. There has never been an accident involving the transportation of spent nuclear fuel or high-level radioactive waste in the United States that resulted in the release of radioactivity from the cask. With regard to the potential for shipping casks with surface contamination, each facility that ships such materials has rigorous procedures to minimize the possibility that a cask with external contamination above allowable limits could leave the site. In addition, casks shipped to Yucca Mountain would not be opened between the shipping location and the repository site. Procedures at the repository would ensure that if a cask arrived with external contamination above allowable limits, it would be segregated and decontaminated prior to acceptance for emplacement or return to the point of origin.

13 (4801)
Comment - EIS001535 / 0004
What will happen to the tremendous amount of dangerous, so-called "low level wastes" that these nuclear power generating facilities generate?

Response
Utilities dispose of low-level radioactive waste in accordance with their operating licenses, Nuclear Regulatory Commission regulations, and the provisions of the Low-Level Radioactive Waste Policy Act. The nuclear industry uses privately operated low-level radioactive waste disposal facilities; this Act requires the development of more such facilities. It also requires that states form regional compacts for the purpose of developing low-level radioactive waste disposal sites by regions. If approved, the geologic repository proposed for Yucca Mountain would be used for the disposal of spent nuclear fuel and high-level radioactive waste, not low-level radioactive waste.

13 (4862)
Comment - EIS001708 / 0002
Start the current [government] over [with] young people.

Response
Thank you for your comment.

13 (4893)
Comment - EIS000337 / 0033
Pg. 8-11, Figure 8-3: I am glad to see a nuclear rocket development station on the test site.

Response
Thank you for your comment.

13 (4980)
Comment - EIS010144 / 0002
Decisions are going to be made. Just like before when the lights were out, we have to make sure that the lights will stay on in Nevada. Such as other parts of the country too, the lights must stay on. We must start a national energy policy. And like Mr. Bush has said, and to quote Mr. Bush, science will determine what will happen with a national energy policy. Science will also determine where the greatest site in America is for the storing of spent nuclear fuel.

Response
This EIS analyzes a Proposed Action to construct, operate and monitor, and eventually close a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain, and analyzes the No-Action Alternative.

13 (5218)
Comment - EIS001322 / 0001
If the proposed disposal is estimated to be safe, why not have the nuclear industry take full responsibility - full liability - for any harm involved? It's their mess - why should taxpayers take the risk for them? Our subsidizing their risk gives them an unfair competitive advantage over other energy sources.

Response
Taxpayers are not subsidizing utilities' costs for disposal of spent nuclear fuel. Taxpayers would, however, fund the cost for disposal of spent nuclear fuel and high-level radioactive waste that belongs to the Federal Government. The Nuclear Waste Policy Act of 1982 specifies that the Federal Government is responsible for providing for the permanent disposal of spent nuclear fuel and high-level radioactive waste, and that the costs of this disposal should be the responsibility of the generators and owners of these materials . Commercial utilities pay a fee of 1 mil (one-tenth of 1 cent) per kilowatt-hour of electricity generated by nuclear energy to cover disposal costs for commercial spent nuclear fuel. The Federal Government pays for waste generated and owned by the United States from taxpayer revenues as appropriated by Congress.

Utility fees go into the Nuclear Waste Fund where unused portions earn interest. Since passage of the Nuclear Waste Policy Act, utilities and their ratepayers have paid approximately $9.8 billion into the Nuclear Waste Fund to pay for the development of a repository for the disposal of spent nuclear fuel and high-level radioactive waste. By the end of Fiscal Year 1999, the program had spent approximately $6 billion for the purposes specified in the Act. With accrued interest, the value of the Nuclear Waste Fund was $8.5 billion at the end of Fiscal Year 1999. The most recent review showed that approximately 70 percent of disposal-related costs would be paid from the Nuclear Waste Fund and 30 percent from taxpayer revenues. Thus, the private commercial utilities are "paying their fair share" of repository program costs along with taxpayers. However, the cost estimates in the EIS do not consider and are not sensitive to the source of funding (see Sections 2.1.5 and 2.2.3 of the EIS).

13 (5555)
Comment - EIS010235 / 0008
Will hasty acceptance of this evolving design influence other countries to adopt this untested model, due to the United States' powerful international status?

Response
The repository design has evolved to reflect ongoing evaluations and other influences such as public comments and design and performance-related reviews by external organizations, such as the Nuclear Waste Technical Review Board. This EIS analyzes the potential environmental impacts of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain. The extent to which the international community would adopt engineering designs evaluated for the Yucca Mountain site, is speculative and outside of the scope of this EIS.

13 (5642)
Comment - EIS010100 / 0003
Can we really afford the cost and dangers of nuclear power in the long run? Cleanup costs are unbearable to many like us (U.S.) in the Cold Water Creek Florissant Valley that used to be flowers not radioactive waste there/here now.

Response
The Nuclear Waste Policy Act of 1982 states that the Federal government has the responsibility to dispose of spent nuclear fuel and high-level radioactive waste that has accumulated and continues to accumulate across the United States. The Act identifies the Yucca Mountain site in southern Nevada as a potential location for a monitored geologic repository and directed DOE to characterize the site for suitability. As required by the Act, the EIS analyzes a Proposed Action to construct, operate and monitor, and eventually close a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain.

13 (5917)
Comment - EIS000815 / 0007
Although not a part of this DEIS, the United States and the international community need responsible programs for appropriate control and disposition of weapons source materials, i.e., natural and depleted uranium, including that remaining from uranium enrichment. During the final two decades of the Cold War, weapons plutonium was produced in reactors at the SRP/SRS from these materials. An article in the March 2, 1999 issue of The New York Times by Matt Wald discusses plans by the Department of Energy (DOE) to turn depleted uranium into salable goods, but does not mention that depleted uranium "targets" can be used for production of weapons plutonium in any neutron source, i.e., research reactor, fusion device, medical isotope production reactor, commercial nuclear power plant, etc., or in an accelerator. Moreover, plutonium produced in targets would be much easier to recover, because most of the intensely radioactive fission products are in the reactor fuel. These materials should be stored under appropriate controls for eventual destruction through use in advanced nuclear power plants for production of electricity or other important and valuable purposes. The planned compromise by the US of important policies against use of commercial nuclear power plants for production of nuclear weapons materials makes this need all the more compelling.

Response
Management of the materials mentioned in this comment is not within the scope of this EIS. However, DOE manages all strategic materials (that is, the quantity of plutonium and highly enriched uranium material reserved for future weapons use) in accordance with strict security procedures, and protects them commensurate with the impact of the loss, theft, compromise, or unauthorized use of the material, as determined by vulnerability and risk analyses.

13 (6781)
Comment - EIS010141 / 0001
The first thing that I'm going to present to you is my favorite saying of Lake Barrett. And Lake Barrett is the head of all this, and what he says is we have assumed uncertainties for the two repositories, and remember it's not one, it is two repositories.

Response
When Congress passed the NWPA, it affirmed that the Federal Government is responsible for the permanent disposal of spent nuclear fuel and high-level radioactive waste. Congress envisioned more than one repository, prohibiting the Nuclear Regulatory Commission from approving a license for the emplacement of more than 70,000 metric tons of heavy metal (MTHM) in the first repository until a second repository is in operation [NWPA, Section 114(d)]. The total projected inventory of spent nuclear fuel and high-level radioactive waste is more than 70,000 MTHM. Emplacement of more than 70,000 MTHM at Yucca Mountain would require legislative action by Congress unless a second repository was in operation.

13 (6792)
Comment - EIS010133 / 0002
There's some of you folks who think there's going to be no end to oil, natural gas or coal. Well, some of us feel that, by gosh, Yucca Mountain may be a renewable energy resource.

Response
Thank you for your comment.

13 (6959)
Comment - EIS010134 / 0002
We have Senator Murkowski, who was elected in 1980, and Senator Domenici, who was elected in 1972, who were the proponents of the 1987 nuclear bill -- of the repository bill. All it was was an ending bill to them. They just didn't want this stuff in their states.

We have Vice President Cheney and Bruce Babbitt, who either was a hypocrite when he was in the Clinton administration or he's a hypocrite today, I'm not sure which one he is, saying that nuclear energy is clean, safe and economic. Boy, would I love to debate that.

Clean? Sure it's clean if all you look at is a smoke stack. What about this toxic nuclear waste that they want to transport through 41 states over 28 years, six convoys a day? I mean, that's nuts. That ain't clean.

Safe? Well, I guess we have to forget about Three Mile Island and Chernobyl, then it's safe.

Economical? This industry in 1954 when we decided to use nuclear power to produce electricity our government gave you, all of us, the liability for the waste. What other industry do we go out and collect their garbage? Do we collect garbage off the auto manufacturers? That belongs -- that responsibility was theirs. It should never have been ours, so we were sold out in '54. They got a lot of power today, but we were sold out in '54.

And in the meantime they passed the Price-Anderson Bill which limited their liability, their liability in the event of an accident. And all the while they began subsidies and tax breaks, research and development moneys.

Economical? They made a statement when they first started producing nuclear power it's going to be too cheap to meter. You know what, now it's too expensive to use.

So you can't trust your government. Please don't have blind faith in them. As far as I'll give you another reason why you shouldn't have blind faith or you're a veteran -- Agent Orange, posttraumatic syndrome, Gulf War Syndrome.

Nuclear veterans -- they stood, they made them stay in the pits. They said when the concussion comes back, we're going to give you these nice glasses. You can get up and look at this nice show. It's very pretty. And they have the God damn nerve to put those troops there, and when they got sick they didn't pay them.

They didn't pay them of course with Agent Orange. For 20 years after the war they didn't even recognize them. Posttraumatic syndrome, today they don't recognize it. They say they're phonies. Gulf War Syndrome, they jerked those poor guys around with talking about one syndrome when it was 12 different things and they knew it was 12 different things.

So don't just have blind faith in your government, because they do lie to you. What about the miners at the Test Site? Now, we talk about people with protected jobs. These guys all the while they said oh, it's safe. I got a nice job. I'm making 60,000 a year. All of a sudden they got sick now. They want compensation and they're getting compensation.

You know, they didn't give the veterans compensation at the same time. They gave them compensation. So don't trust your government. Don't have blind faith in anything that's done in government.

Response
Thank you for your comment.

13 (7200)
Comment - EIS010162 / 0002
What is the government doing? They put 55 metric tons at SRS. And what did our friend from Savannah River say from South Carolina? That's the most -- second most polluted place in the country. And I read volumes on it and it's criminal what they have done to SRS. Next to Hanford it is number two. There's no question about it.

Response
When Congress passed the NWPA, it affirmed that the Federal Government is responsible for the permanent disposal of spent nuclear fuel and high-level radioactive waste. DOE has long acknowledged that its activities and those of its predecessor agencies in the production of nuclear weapons resulted in the contamination of facilities and the surrounding environment at many of its sites around the country. The Department is spending billions of dollars to clean up those sites, and will continue those efforts until all sites have been cleaned up to specified standards.

13 (7352)
Comment - EIS001573 / 0004
The Department of Energy has an inherent number of interests and should not be the lead agency on the development of a permanent repository. Let me give you one good example. I'm an attorney and I represent a number of clients in Michigan in a federal court action pending in Kalamazoo U.S. District Court to stop a ridiculous experiment in the use of mixed oxide plutonium fuel in Canadian reactors. Part of the scheme involves the burning of about 34 tons of nuclear weapons, decommissioned weapons material, that has been converted into fuel in about half a dozen commercial nuclear power reactors in the south eastern United States. 34 tons of plutonium translates into several thousand tons of spent fuel, once that material is burned up in those reactors.

So, in effect, the Department of Energy is directly sponsoring and, in fact, has entered into contracts with several different utility companies to commence the burning of decommissioned nuclear weapons in American reactors to produce a far more radioactive material than otherwise exists in the form of decommissioned nuclear weapons grade material.

At present, if it weren't burned in reactors, that material could be immobilized in a ceramic [glass] type of fashion, could be far less expensively stored, could be far less expensively insulated and isolated from saboteurs, from anyone who might want to make the bomb or make nuclear fuel out of it. Nonetheless, the Department of Energy is going ahead officially, formally and contractually to make high-level, heavily irradiated spent fuel, ultimately, out of it.

Response
The NWPA specifically directs DOE to be the lead agency in developing a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste. As part of its responsibilities, DOE has prepared this EIS, which analyzes the potential environmental impacts of the Proposed Action to construct, operate and monitor, and eventually close, a geologic repository at Yucca Mountain. Other DOE activities, such as those related to the disposition of surplus plutonium from dismantled nuclear weapons, are outside the scope of this EIS. The Department is responsible for the Surplus Plutonium Disposition Program.

DOE evaluated the potential environmental impacts of the Surplus Plutonium Disposition Program in the *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement* (DIRS 103215-DOE 1996) and the *Surplus Plutonium Disposition Final Environmental Impact Statement* (DIRS 118979-DOE 1999). The Surplus Plutonium Disposition EIS evaluates the disposition of 50 metric tons (55 tons) of surplus plutonium by fabricating as much as 33 metric tons (36 tons) into mixed-oxide fuel and irradiating that fuel in commercial nuclear power reactors and immobilizing as much as 17 metric tons (19 tons) in glass at the Defense Waste Processing Facility at the Savannah River Site. DOE has contracted with a consortium formed by Duke Engineering & Services, COGEMA, Inc., and Stone & Webster (DCS) to design, construct, and operate the mixed-oxide fuel fabrication facility and to irradiate the fuel in Duke Power Company's Catawba and McGuire reactors. This activity is independent of the one-time shipment of a small amount of mixed-oxide fuel [nine fuel rods containing less than 120 grams (4.2 ounces) of plutonium] to Canada in January 2000 under the Parallex Project. The latter activity was evaluated in the *Environmental Assessment for the Parallex Project Fuel Manufacture and Shipment* (DIRS 157153-DOE 1999).

Both the spent mixed-oxide fuel and immobilized plutonium are in the inventory of spent nuclear fuel and high-level radioactive waste that DOE would place in a monitored geologic repository at Yucca Mountain. The National Academy of Sciences has determined that both waste forms meet the Spent Fuel Standard. Waste forms meeting that standard would offer major nonproliferation and arms reduction benefits compared with leaving the material in storage in weapons-usable form (DIRS 100018-National Research Council 1995). There will not be a substantial increase in the amount of spent nuclear fuel generated by using the plutonium as mixed-oxide fuel because that fuel would replace mostly traditional low-enriched uranium fuel. Under the Preferred Alternative in the Surplus Plutonium Disposition EIS, the use of mixed-oxide fuel made from surplus plutonium would generate approximately 199 more low-enriched uranium fuel assemblies than would the use of only low-enriched uranium fuel in the designated commercial nuclear reactors (DIRS 118979-DOE 1999).

13 (8019)
Comment - EIS000817 / 0070
Two things happened that I think are relevant during the interim -- the MOX transport mess in Michigan with the Parallex Project for one. If that is representative of the way citizens and NEPA regulations are going to be treated in future radioactive shipments, then I foretell disaster. If things are going to be done in secret, without full notification of local authorities and citizens, then there is bound to be more and more opposition. Certainly an EIS was required for Parallex and not an EA. You can't segment such a huge project. It was all handled very badly.

Response
This EIS analyzes the potential environmental impacts of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain. Activities conducted for the Parallex Project are outside the scope of this EIS. However, DOE believes that it has evaluated the potential environmental impacts of the Parallex Project in the Environmental Assessment for the Parallex Project Fuel Manufacture and Shipment (DIRS 157153-DOE 1999), for which it issued a Finding of No Significant Impact. Although the Environmental Assessment evaluated the fabrication and transport of as much as 26.8 kilograms (59 pounds) of mixed oxide fuel, DOE made a one-time shipment of less than 120 grams (4.2 ounces) of plutonium in nine fuel rods to the Atomic Energy of Canada, Limited, test reactor at Chalk River, Ontario.

DOE has kept the public informed of its activities related to the Parallex Project, including holding four public meetings in Michigan to discuss its decision to use Sault Saint Marie, Michigan, as the crossing point from the United States into Canada. These meetings were held between October 26, 1999, and November 1, 1999, before the shipment of the mixed oxide fuel in early January 2000. Participants discussed modes of transport in the United States and Canada and other issues.

13 (8244)
Comment - EIS002286 / 0004
The DOE has not solved the waste problem permanently. Therefore, they should use their money-making industry that, you know, is involved in it. They are all getting paid to decide whether or not Yucca Mountain is going to go forth or not. They have decided, even if it does go forth, there is still going to be waste out there. What are we going to do with all the other waste? They say the site is for 70,000 metric tons. They have already said there's going to be over a hundred some odd metric tons. That's if the reactors continue for ten more years. What's going to stop them from making more reactors, and what's going to stop all the medical waste and all the waste attributed to weapons production?

Response
When Congress passed the Nuclear Waste Policy Act of 1982, it affirmed that the Federal Government is responsible for the permanent disposal of spent nuclear fuel and high-level radioactive waste. Radioactive medical wastes are classified as low-level radioactive waste, which would not be emplaced in the proposed repository. Congress envisioned more than one repository, prohibiting the Nuclear Regulatory Commission from approving a license for the emplacement of more than 70,000 metric tons of heavy metal (MTHM) in the first repository until a second repository is in operation [NWPA, Section 114(d)]. The total projected inventory of spent nuclear fuel and high-level radioactive waste is more than 70,000 MTHM. Emplacement of more than 70,000 MTHM at Yucca Mountain would require legislative action by Congress unless a second repository was in operation.

The National Energy Policy recommends the safe expansion of nuclear energy by establishing a national repository for nuclear waste, and by streamlining the licensing of nuclear powerplants (DIRS 156756-Cheney 2001). Moreover, it is reasonably foreseeable that Congress would take such a legislative action. Chapter 8 of this EIS analyzes cumulative impacts from the disposal at Yucca Mountain of all spent nuclear fuel and high-level radioactive waste projected to be produced through 2046 for which DOE would retain ultimate responsibility.

13 (8265)
Comment - EIS001950 / 0005
Even the current movement of LLRW is threatening all the people in the communities along current transportation routes. I have heard of 3 incidents involving waste trucks heading toward the test site in the last past 6 months. All

occurred within 150 miles of the test site boundaries, one involving a rip in the side of the truck and "Loss of Material."

Response

DOE acknowledges that incidents occur during the transport of radioactive materials, but emphasizes that occurrences have been rare and impacts have been minimal. In addition to using only shipping containers and contractors certified or licensed for transport of these materials, DOE and contractor personnel receive training in their handling and transport. DOE responds immediately to such incidents, thoroughly investigates their causes, and incorporates lessons learned into programs and procedures to reduce or minimize the potential for future occurrence.

This comment cites incidents during the transport of low-level radioactive waste. While not minimizing the seriousness of incidents involving such waste, DOE would transport spent nuclear fuel and high-level radioactive waste in containers that are much more robust than the Type A containers used for low-level waste. In addition to meeting the standards for Type A containers, Type B containers must provide a high level of assurance that, even in severe accidents, they would maintain their integrity with essentially no loss of the radioactive contents or serious impairment of the shielding, and maintain subcriticality capability. The DOE safety record demonstrates that transportation of spent nuclear fuel and high-level radioactive waste can occur safely. There has never been an accident involving transportation of these materials in the United States that resulted in a release of radioactive contents.

13 (8352)

Comment - EIS001627 / 0004

The space available for storage of spent nuclear fuel at the generating stations is limited. Even if some utilities are able to expand their own storage facilities, there will come a point when no additional storage is available and the operators will have to shut the reactors down permanently. As generation is taken off the market, the available supply is diminished and the prices for the remaining energy sources will increase. This will hit customers hard who are trying to replace the power lost with the closing of nuclear generators.

Response

In passing the Nuclear Waste Policy Act in 1982, Congress affirmed that the Federal Government is responsible for the permanent disposal of spent nuclear fuel and high-level radioactive waste. To that end, Congress, in the Nuclear Waste Policy Amendments Act of 1987, had directed the Secretary of Energy to determine whether to recommend that the President approve the Yucca Mountain site for development of a repository for the permanent disposal of these materials.

13 (8497)

Comment - EIS000817 / 0159

P. 7-43. I have not seen this NRC EIS for relicensing plants and wonder how they evaluated unloading casks and loading a replacement cask. I'd really like to see that, and frankly don't know how they did it since no cask has ever been unloaded. Surely if they relicense plants, this will have to be done. Relicensing any plant for 20 years would be a grave mistake and put an extra burden on waste storage by allowing more to be created -- following the major mistake all through nuclear history by creating more with no plan workable as to what to do with it forever! Pools are getting old, reactors are getting brittle -- it is a dangerous business to keep these aging plants going, I think. More and more waste creation makes decommissioning more and more of a problem and pushes it to future generations. Renewables are ready! Let's use them instead.

Response

Section 7.3 of the EIS states, "DOE based its estimates of the potential impacts from continued storage of commercial spent nuclear fuel on a representative site. The results of the analysis described in the previous section are consistent with the Nuclear Regulatory Commission's (NRC's) findings in its *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (DIRS 101899-NRC 1996). The Commission's EIS is available on the Yucca Mountain web site at http://www.ymp.gov, as well as in the reading rooms and libraries identified in Section D.8 of this EIS. For additional information concerning that EIS, please contact the Commission directly.

DOE is committed to the development and responsible use of all types of energy, including renewable energy sources such as geothermal, wind, solar, hydrogen, biomass, and hydropower. DOE's Office of Energy Efficiency and Renewable Energy is responsible for leading the Nation's efforts in the study of renewable energy sources. For information on the Office's activities, please visit its web site at http://www.eren.doe.gov, or write to U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, 1000 Independence Ave., S.W., Washington, DC, 20585.

13 (8550)
Comment - EIS002283 / 0002
One of my concerns is an issue called DU rounds. I am trying to get to the bottom and find out what these depleted uranium rounds are. I know we processed close to two million rounds of depleted uranium rounds now and turned them into weapons, and I am real concerned because I hope that's not what they are planning on doing with an awful lot of the rest of the nuclear waste. You know, that two million rounds of this stuff, we are talking about disposal of 70,000 tons.

I have a real ugly feeling knowing the history of the government and corporations like Wachenhut [Wackenhut Services, Inc.] that this is not good news. Those rounds -- you can't tell me that those rounds are safe. I just don't buy it. I don't buy it a bit.

Response
The rounds mentioned in the comment are nonexplosive metals fabricated from depleted uranium. Depleted uranium is the material, primarily uranium-238, remaining after the removal of the fissile isotope uranium-235 from uranium ore. In the United States, it occurs most often as depleted uranium hexafluoride, a compound of uranium and fluorine. The *Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride* (DIRS 152493-DOE 1999) describes the DOE depleted uranium inventory. DOE does not plan to dispose of depleted uranium in the proposed repository at Yucca Mountain.

13 (8682)
Comment - EIS001837 / 0034
The United States must get out of the business of producing massive quantities of enriched uranium (U.S. Enrichment Corporation) and selling it overseas. This act is akin to producing tobacco for foreign sales. You are hurting the children and the future of mankind. You know that it is harmful to the health so stop producing it and stop selling it overseas. Nuclear activist Jeff Wright exposed what the U.S. Enrichment Corporation is doing and this friend of PARDs is in jail today because our government has denied him his right to speak and redress the government over these issues, using as their excuse meeting disruption when he inadvertently goes over the meager three minutes which the officials allow citizens in this San Bernardino County to redress government.

Response
Thank you for your comment.

13 (9145)
Comment - EIS001971 / 0002
I spent a portion of autumn, 1999 in the Minnesota State Archives reviewing the record of the second site process with which Minnesota was fiercely engaged from 1983-1987. From the reports, comments and testimony submitted to the federal government (NRC, DOE & Congress) by Minnesota's Nuclear Waste Council and state agency staff, I got an excellent perspective on the interplay of political, technical and strategic factors in the siting process. A number of the critiques and recommendations that Minnesota made during that period could still be applied. Unfortunately, limited time and resources prevent me from utilizing insights from that review. My conscience has been sharpened, however, by reliving the 5-7 years when Minnesota faced, with similar resistance and fears, the prospect that Nevada now faces. During that time, Minnesota reviewed federal reports on primary and secondary containment, site characterization, and transportation. The state grappled with state's rights issues, even submitting an amicus brief on Nevada's suit, and attempted to support standards that Minnesotans knew that they might have to live with. I am well aware of the unresolved issues and inadequacies of the process.

Response
Thank you for your comment.

13 (9180)
Comment - EIS002123 / 0002
And most of my remarks today -- tonight are going to be taken from this article in the Las Vegas Sun dated Sunday, December 5, 1999, so this is very recent.

I don't suppose you can see it, but this is a picture, and you can see that it's highly technical. It says: "Engineers on-duty inside the live control room at the Calvert Cliffs Nuclear Plant in southern Maryland -- southern Maryland, Calvert Cliffs would send its solid waste to Yucca Mountain under a current proposal," and they've titled this called The Day of Reckoning, and I scratched out reckoning and I called it the Day of Infamy.

"Nuke plants running out of space as they wait for Yucca decision" and they start out by telling you how beautiful it is back in -- in Calvert Cliffs County, Maryland that you can -- oh, you can see the green forest and they're awash in red and gold and rust and the white-tailed deer dart into the woods and a bald eagle soars and sea breezes blow. "This beautiful setting seems a strange place to find one of the nastiest substances on earth, but nestled in this former Maryland tobacco farm is the state's only nuclear power plant where two 850 megawatt nuclear reactors generate electricity for 450,000 households and 35 to 40 tons of highly radioactive nuclear waste a year.

"The waste at Calvert Cliffs like any other produced by 103 reactors at 72 plants nationwide spent uranium fuel rods stored in pools of water inside the plant. The waste in a sample of the radioactive material bound for permanent storage Nevada." They've already decided that.

"Under a current proposal, Calvert Cliffs and the rest of the nation's plants want to store their waste in a single site, a geologic repository inside Yucca Mountain.

"The plants are running out of space," said Steven Ungelsbee, spokesman for the Nuclear Energy Institute, the industry's powerful lobbying arm." Get that word "lobbying" in there.

"The day of reckoning is here, and the glimpse inside Calvert Cliffs offers insight into the nuclear industry's campaign to make Nevada a nuclear burial ground." I wonder if they're talking about people. And you know, we hear from our opposition all the time how safe this stuff is. Okay. Can't see this picture, and by the way, I have a lot of these Xeroxed, so anyone that wants to come up get one afterwards, I'll be glad to share them with you.

Response
Thank you for your comment.

13 (9207)
Comment - EIS002140 / 0005
Worked on the coal-fired powerhouse. Talk about environmentally damaging. My God. I mean, they turn off the scrubbers at night so they can go ahead and shoot that stuff into the air and nobody can see it. It's absolutely horrible what coal-fired powerhouses do to the environment.

Response
Thank you for your comment.

13 (9440)
Comment - EIS010129 / 0002
When an airplane crashes it makes the news because it's, you know, a lot of people dying at the same time. But the same amount of people can die in the same day in a bunch of car accidents all around the country. So in some way this Yucca Mountain thing puts all of the problems of the nuclear waste that we all have to face because we're all using electricity, we're all benefiting from this environmental degradation and these problems, this cancer causing horrible stuff, this nuclear radioactive waste, we're all benefiting from that in our use of electricity.

It's a communal problem deal. We need to deal with it. And Yucca is that symbol of putting it all in one place like in an airplane crash versus car accidents or other methods of death that people have devised for themselves. So that is one reason I think that the people have gathered and are trying to do something about it. But we need to continue regardless of whatever happens to Yucca Mountain, we all need to focus on our lifestyle choices and our responsibility as other people said tonight.

And I'd also like to make the statement that the process needs to continue, that the freedom of speech forum needs to continue and it needs to be expanding to a real process where people have a say so in what we're going to do with our communal problem of nuclear waste.
And so this also is all sort of a warning, my statement, because we live in the most powerful empire that the world has ever known, having so much control over the rest of the planet. And this empire, the United States, has also been -- it doesn't just exercise its power and control through the threat of nuclear weapons and whatever else it can come up with and maintain the policy of our economy being God in this country.

But the United States, in addition to controlling the rest of the planet and having that influence, it also has done a masterful job of keeping us people in the United States from finding true fulfillment and love, because it behooves the interest of those who are in charge to control and to dominate the rest of the planet. And it behooves them to confuse the rest of us in the United States and make sure that this process does not go anywhere in terms of the people's voice having a say so in what we do with our communal problem of nuclear waste.

Response
Thank you for your comment.

13 (9827)
Comment - EIS001888 / 0404
[Clark County summary of comments it has received from the public.]

Environmental justice with regard to transportation must be considered in the NTS [Nevada Test Site] EIS.

Response
This comment is one of many the Clark County government collected over several years. The date of this comment, May 3, 1996, and its subject matter suggest that it was intended as a comment on the *Draft Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada*. DOE published the Final EIS on the Test Site in August 1996 (DIRS 101811-DOE 1996).

DOE is committed to the principles expressed in Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority and Low-Income Populations." The Department believes that its treatment of environmental justice in this Yucca Mountain EIS, in the Nevada Test Site EIS, and in all of its documents prepared under the National Environmental Policy Act adheres to these principles and is fair and appropriate.

13 (10660)
Comment - EIS002102 / 0004
In only 50 years of the nuclear age, nuclear waste has leaked out of its containment at the Hanford Nuclear Reservation in the State of Washington and is leaking into the Columbia River. Strontium-90 has been found where salmon spawn, and the prevailing current will make [its] way down the Columbia River and down the West Coast of the U.S. coast, high-level nuclear waste. Radioactive environmental contamination will threaten the health and gene pool of thousands of future generations and Dr. Jay Gould's book, "The Enemy Within" -- he cites breast cancer rates were going down prior to 1945. Then with the first atom bomb explosion, breast cancer rates went up yearly.

Response
DOE acknowledges that past activities at its sites produced environmental contamination, and understands the concern that continued or future activities at those sites could result in harmful health effects in the public. Although the scope of this EIS is limited to an analysis of the construction, operation and monitoring, and eventual closure of a geologic repository at Yucca Mountain, the issue of radiological exposure and its relationship to cancer and other health effects is pertinent and important.

The Environmental Protection Agency and Nuclear Regulatory Commission have established dose limits to ensure there would be no impacts to public health and safety that would pose an unacceptable societal risk. No containment, natural or engineered, can be guaranteed indefinitely. Some radionuclides or potentially toxic chemicals could eventually enter the environment outside the repository. However, long-term performance assessment (modeling) analysis shows that the combination of the natural barriers of the site and engineered barriers would keep such a release small enough to pose no serious impact on the health and safety of people or the environment.

The results of this analysis, described in Chapter 5 of the EIS, indicate that impacts for the 10,000-year evaluation period would be low and that health effects would be thousands of times less than natural incidences of health problems in the population. The impacts predicted by the analysis would be much lower than the Environmental Protection Agency or Nuclear Regulatory Commission limits. Appendix I of the EIS, the *Viability Assessment of a Repository at Yucca Mountain* (DIRS 101779-DOE 1998), and supporting documents contain details of the analysis methodology.

13 (10724)
Comment - EIS002170 / 0008
As they say, “humans, we could have been so great...but we suck.”

Too bad all of this wasn’t thought about before we jumped into this nuclear age. Too bad our species doesn’t have foresight and believes itself to be the caretakers of this beautiful planet. We certainly aren’t well adapted to the job even if it were ours, which it isn’t.

Do something right. I know everyone is thinking of trying to mitigate a bad situation. Think, think, think before any action is taken.

Response
Thank you for your comment.

13 (10728)
Comment - EIS000123 / 0002
DOE, with the Atomic Energy Commission, the Manhattan Project, when they got rid of the waste over there, they just dumped it over there.

They thought they were doing the proper methods over burial over at that area, just like we think we’re properly taking care of the nuclear waste now, but looking back in retrospect, this is out of an article that I wrote some years ago.

“It’s been fifty short years since the Manhattan Project was transferred to the Suburban Forest Reserve District and thirty years since its reactors, the related waste were buried.

“Scientists haven’t much knowledge about what lies below the earth. Records of buried waste are grossly incomplete and standards about what is considered dangerous have changed dramatically since then.

“Ironically scientists know so little about how our nuclear pioneers lived and worked here that they might as well have been digging into Inca ruins, not debris from a nuclear age library.”

Response
DOE recognizes that as science and engineering advance, better techniques and designs evolve. If there was a decision to implement the Yucca Mountain Repository, the design would incorporate the best science and engineering available, and would be in compliance with Nuclear Regulatory Commission and other applicable requirements. DOE would monitor the repository performance for at least 50 years after emplacement of the spent nuclear fuel and high-level radioactive waste to detect any anomalies.

13 (10777)
Comment - EIS000250 / 0011
And it is also the case that the nuclear industry is one of the most hugely subsidized industries in the history of the world in an economy that is supposed to be based on free market principles. It is really an insult to the people of this country that the industry receives the degree of subsidies that it does.

Response
Ratepayers and utilities are paying the cost for the disposal of commercial spent nuclear fuel, not the Federal Government. Commercial utilities pay a fee of 1 mil (one tenth of 1 cent) per kilowatt-hour of electricity generated by nuclear energy to cover disposal costs for commercial spent nuclear fuel. The scope of this EIS is to analyze the potential environmental impacts of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for disposal of spent nuclear fuel and high-level radioactive waste.

13 (10920)
Comment - EIS000244 / 0005
The impressive thing to me about, and I have seen films of this although I have never been in any of the demonstrations, is to see how powerfully strong these casks or storage containers are that they have been subject to train accidents and earthquakes and highway accidents and derailments, fire, et cetera, and puncture tests, and it seems like they pass all these tests very, very well. They really are very, very stout.

Response
As noted in this comment, casks for the transportation of spent nuclear fuel and high-level radioactive waste would be extremely robust and would be a major factor in ensuring the safety of the transportation of these materials. As discussed in Section J.1.4.2.1 of the EIS, nearly 100 percent of rail and truck accidents under the Proposed Action would not result in any release of radioactive material. Cask specifications and the stringent tests required to demonstrate that they meet these specifications are at 10 CFR Part 71. In addition to the testing requirements to demonstrate that the casks can withstand normal conditions of transport (10 CFR 71.71), there are even more rigorous requirements for testing (10 CFR 71.73) to demonstrate that the casks can withstand hypothetical accident conditions. Tests for normal conditions of transport subject the cask to heat, cold, reduced and increased external temperature, vibration, water spray, free drop, corner drop, compression, and penetration. Tests for hypothetical accident conditions include free drop (from a greater height than the normal condition test), crush, puncture, thermal (fire), and immersion.

13 (10946)
Comment - EIS000467 / 0008
As far as the necessity for the environment and jobs that nuclear power provides, nuclear energy industry ads are being challenged for being inaccurate in the newspapers and on the radio claiming to be emission free.

In the Great Lakes alone there are emissions emitted into the Great Lakes, uranium mining in the Great Lakes all of which has contributed to a growing inventory of radionuclides in the Great Lakes. All stages of the nuclear fuel chain are involved in this as well.

Response
Thank you for your comment.

13 (10958)
Comment - EIS001424 / 0003
The jobless/unemployment rate in the region of Southern Ohio (and Paducah, Ky.) is going to increase. About 22 percent of USEC's (United States Enrichment Corporation) workforce is scheduled for lay-off. USEC/DOE Portsmouth Gaseous Diffusion Plant located in Pike County of Ohio is the second largest employer in its congressional district. USEC/DOE Paducah Gaseous Diffusion Plant, Paducah, Ky. is the largest single employer in its congressional district. President of the Paper, Allied-Industrial, Chemical and Atomic Workers representing workers at Piketon, Ohio is quoted as saying:

'We will attempt to find transition work with the Department of Energy and seek an enhanced benefit package' for the people scheduled to lose their jobs beginning In July. ("USEC To Lay Off 850 Workers in Ohio, Kentucky," THE LEDGER INDEPENDENT, 4/4/00, A-4.)

What "transition" work is to be available from the Department of Energy has not yet been made public within the region. One hopes for clean-up funds for both Portsmouth and Paducah which employs union workers--rather than fund more studies and surveys! DOE Yucca Mountain must consider agency regulatory obligation to determine the suitability of the HLRW "permanent" repository. Privatizing the functions of former DOE sites--and DOE functions--appears to create swift changes in circumstances (i.e., social, economic, and technical regional benefits) in a global, competitive marketplace. International "understandings" and cooperative efforts appear to be subject to bottom line corporate profits and losses.

Bethesda, Md. based USEC was a federal agency set up to enrich uranium for commercial nuclear plants. It was privatized in 1998 to better compete in a global marketplace. Since being taken public in 1998, the company's stock price has fallen from $14.25 to $5.87 in trading Thursday. USEC officials say while the company is profitable, it is losing money on the Russian contract. The deal was set up by the U.S. government to keep Soviet-era warhead uranium away from rogue nations and terrorists. USEC has bought the uranium equivalent to 3,000 warheads. [The Ledger-Independent, 4/4/00, pg. A-4.]

Response
This EIS analyzes potential environmental impacts of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain, as well as the No-Action Alternative. Comments related to the Portsmouth and Paducah Gaseous Diffusion Plants are outside the scope of this EIS. However, DOE shares the commenter's concerns about continued employment and the economic health of communities surrounding former DOE sites. To that end, DOE established its Office of Worker and Community Transition that (1) establishes policy and provides funding for contractor work force restructuring activities; (2) develops policy for contractor labor relations, oversees the collective bargaining process, and assists field organizations in labor/management relations; (3) establishes policy for community transition and allocates funding to mitigate economic impacts; (4) assists field organizations reduce the costs of maintaining the DOE infrastructure; and (5) provides information and opportunities for participation in the decisionmaking process affecting the contractor work force and adjacent communities.

Developing and operating the proposed repository at Yucca Mountain would increase jobs in the region of influence. Section 4.1.6 of this EIS describes potential socioeconomic impacts from performance confirmation, construction, operation and monitoring, and closure activities.

13 (11056)
Comment - EIS000475 / 0011
According to LOW-LEVEL RADIOACTIVE WASTES, STATES ARE NOT DEVELOPING DISPOSAL FACILITIES, GAO/RCED-99-238 no disposal facility for commercially generated low-level radioactive waste has been sited in the past 18 years despite the "compact" regional system and $600,000.00 spent. Common "obstacles and impediments" in the siting process include:

...the controversial nature of nuclear waste disposal, which often manifests itself in the form of skepticism about and/or opposition to disposal facilities by members of the public and political leaders at all levels of government, Ref.: LOW-LEVEL RADIOACTIVE WASTES, GAO/RCED-99-238, Sept. 99, page 5.

Opening the LLRW market to private industry could result in construction of operating facilities which would meet the needs of the commercial LLRW generators.

Response
Thank you for your comment. This EIS analyzes a Proposed Action to construct, operate and monitor, and eventually close a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain, as well as the No-Action Alternative.

13 (11083)
Comment - EIS000309 / 0001
In other words, you work with the life giving natural resources rather than with life taking manmade resources. And if you never can catch up to the guide to tell him yourself and if the assistants are mostly unresponsive, you will just need to stop following them and work instead with the people around you to find a new direction in the light.

Response
Thank you for your comment.

13 (11149)
Comment - EIS000320 / 0001
I remember World War II, where we had about four to six million people killed. And for us who were in that war, when we looked at the atomic bomb, we thought, “At least the war’s going to be ended. Hurrah, you know, we’re going to save lives.” That’s one factor. The other factor is that I look at all the benefits that come from nuclear radiation. The woman talked about a small child that died from an inoperable cancer. I had a relative and two friends who were cured of cancer using irradiation. Approximately 3,000 people are saved each year treating cancer with radiation.

How many gas and chemical containers go down the railroad tracks that could be just as detrimental or more detrimental than radiation?

We keep talking about the potential accidents that could possibly happen if a cask should be ruptured. And yet we kill about 56,000 people per year in the United States with cars. Why don’t we outlaw cars? That’s a given, that’s a proven fact: every year we kill 55,000. But we may kill some people in a nuclear incident? I have a hard time comprehending that.

Response
Thank you for your comment and recognition that the risk of a potential accident from transporting spent nuclear fuel is extremely low.

13 (11457)
Comment - EIS010080 / 0005
They [nuclear-energy producers] sued the DOE and won in the Supreme Court and now they’re suing the EPA. The DOE and the EPA are you and me again! These same energy producers are holding our economy and us hostage. They could be manipulating power production and pipeline access to create an artificial shortage. Why are their profits doubling and tripling?

Response
Private commercial utilities and their ratepayers have paid approximately $9.8 billion in the Nuclear Waste Fund to pay for the development of a repository for the disposal of spent nuclear fuel and high-level radioactive waste. The Nuclear Waste Policy Act of 1982 specifies that the Federal Government is responsible for providing for the permanent disposal of spent nuclear fuel and high-level radioactive waste, and that the costs of this disposal should be the responsibility of the generators and owners of spent nuclear fuel and high-level radioactive waste. Commercial utilities pay a fee of 1 mil (one-tenth of 1 cent) per kilowatt-hour of electricity generated by nuclear energy to cover disposal costs for commercial spent nuclear fuel.

13 (11458)
Comment - EIS010080 / 0004
Ever since then, generous Congresses have given this industry subsidies and tax breaks, research and development funding and subsidized education. Congress also passed the Price Anderson bill, to limit liability in the event of a nuclear accident, while we have no insurance coverage.

Response
This EIS analyzes the potential environmental impacts of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain, as well as the No-Action Alternative. The Price-Anderson Act provides liability coverage for commercial activities operating under a license from the Nuclear Regulatory Commission and DOE activities. The Price-Anderson Act establishes a system of private insurance and Federal indemnification that generally ensures that up to $9.43 billion is available to compensate for damages suffered by the public from a “nuclear incident,” regardless of who causes the damage. The EIS has been revised to include more details about indemnification under the Price-Anderson Act (see Section M.8 of the Final EIS).

13 (11509)
Comment - EIS000454 / 0003
Jobs are very important, but clean, safe, morally acceptable jobs are what's important, not just any job. I very much support union members in their concern for jobs. But not just any job will do. If we get together and demand decent, morally acceptable jobs, maybe there will be enough of us together.

Response
Thank you for your comment.

13 (11735)
Comment - EIS010032 / 0001
We need two nuclear waste repositories with fast breeder reactors for recycling fuel rods, pellets and warhead material. They should be centrally located for closer access by eastern and western nuclear facilities; i.e., in coal mines of Wyoming and Kentucky for example. Coal mines are naturally radioactive. More radioactive heavy metal is released into the environment by burning coal than all the spent fuel rods now in storage. Each coal fired power plant releases 74 pounds of uranium U-235 every year which could be surreptitiously recapture [sic] enough material for two nuclear bombs. We have to get real and inform the public about the facts, soon.

Response
The scope of this EIS is limited to an analysis of the potential environmental impacts of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain, as well as the No-Action Alternative. The construction of nuclear waste repositories with fast breeder reactors for recycling fuel rods, pellets, and warhead material are beyond the scope of this EIS.

13 (12298)
Comment - EIS010138 / 0001
I would also request that the Department of Energy, when it does its Yucca Mountain tours, quit referring to the Amargosa area as the Amargosa Desert where nothing lives. 30 million people are fed by the milk that is produced in Amargosa. 25 percent of our state's milk production is produced in Amargosa. It's a vibrant, living community and they deserve better.

Response
Thank you for your comment.

13 (12368)
Comment - EIS010139 / 0004
I do have a good question. I know the S&ER was printed on recycled paper, I thank you for doing that. How much of it was post consumer recycled? There's a question.

Response
The Science and Engineering Report (DIRS 153849-DOE 2001) was printed on paper of at least 20-percent postconsumer recycled content.

13 (12583)
Comment - EIS000815 / 0005
Most of the waste generated at DOE's Hanford, WA site is in a form and configuration that provides reasonable assurances of safe, long-term isolation from the biosphere. The Hanford site is a desert with seven inches of annual rainfall. It is bordered on two sides by the Columbia River and surrounded by tens of thousands of square miles of desert. Physical and chemical tests of soils conducted during the 1950s and 1960s showed that the combination of dryness and ion exchange capacity of the soils would preclude significant transport of intensely radioactive materials until after full decay. Moreover, attempts to recover wastes from soil and old tanks would result in needless radiation exposure to workers, and compromise the integrity of stored wastes. Finally, although small amounts of radioactivity might move with ground water into the Columbia River, which flows alongside the Hanford site, the amounts would be much less than those released from routine operations during the 1950s and 1960s. These releases were monitored, and there was no indication of adverse consequences to humans or other life forms.

Operations to remove wastes from the soil and waste tanks at Hanford should be discontinued, except where there is evidence of danger. However, continuing surveillance should be maintained, in connection with other nuclear activities for the benefit of humans.

Response
The *Final Environmental Impact Statement for the Tank Waste Remediation System* (DIRS 103214-DOE 1996) evaluates the management of DOE Hanford Site wastes in soils and tanks. The purpose of this EIS is to provide information on potential environmental impacts that could result from a Proposed Action to construct, operate and monitor, and eventually close a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at the Yucca Mountain site.

13 (12874)
Comment - EIS010297 / 0001
I would like to have my patent considered for the Yucca Mountain Project, for the storage and dispossal [disposal] of your low level and high level Nuclear Waste, toxic chemicals and/or spent fuel. I also feel that to proceed with a full patented device, rather than a patent pending device, is the way that I would like to proceed. This device I believe will solve most of your problems at Yucca Mountain.

Response
Thank you for your comment. The scope of this EIS is limited to an analysis of the potential environmental impacts of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for disposal of spent nuclear fuel and high-level radioactive was at Yucca Mountain, and the No-Action Alternative. The commenter can contact the United States Patent and Trademark Office for information at http://www.uspto.gov/ or contact them by telephone at 1-800-786-9199 or 703-308-4357.

13 (13123)
Comment - EIS010298 / 0010
We need the Department of Energy to develop renewable, efficient, clean electrical power systems such as hydrogen fuel cells, and solar and wind generators.

Response
DOE is committed to the development and responsible use of all types of energy, including renewable energy sources such as geothermal, wind, solar, hydrogen, biomass, and hydropower. DOE's Office of Energy Efficiency and Renewable Energy is responsible for leading the Nation's efforts in the study of renewable energy sources. For information on the Office's activities, please visit its web site at http://www.eren.doe.gov, or write to U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, 1000 Independence Ave., S.W., Washington, DC 28585.

13 (13131)
Comment - EIS010236 / 0005
The electric power industry should make way for truly clean ways of generating electricity - solar, wind, hydrogen and hydrogen fuel cells. The longer nuclear and fossil fuel generators are subsidized by the federal government, the longer these great new technologies will be delayed.

Response
Ratepayers and utilities are paying the cost for the disposal of commercial spent nuclear fuel, not the Federal Government. Commercial utilities pay a fee of 1 mil (one-tenth of 1 cent) per kilowatt-hour of electricity generated by nuclear energy to cover disposal costs for commercial spent nuclear fuel. The Federal Government pays for waste generated and owned by the United States from taxpayer revenues as appropriated by Congress. The scope of this EIS is to analyze the potential environmental impacts of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for disposal of spent nuclear fuel and high-level radioactive waste.

13 (13200)
Comment - EIS010246 / 0010
The SDEIS reveals that Yucca Mountain would be the world's first solar and wind powered atomic waste dump. This begs the question: couldn't renewable energy be used to generate electricity in the first place, so that nuclear power can be phased out and no more high-level nuclear waste generated?

Response
The scope of this EIS is limited to an analysis of the potential environmental impacts of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain, and the No-Action Alternative. DOE is committed to the development and responsible use of all types of energy, including renewable energy sources such as geothermal, wind, solar, hydrogen, biomass, and hydropower. DOE's Office of Energy Efficiency and Renewable Energy is responsible for leading the Nation's efforts in the study of renewable energy sources. For information on the Office's activities, please visit its web site at http://www.eren.doe.gov, or write to U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, 1000 Independence Ave., S.W., Washington, DC 28585.

13 (13332)
Comment - EIS010129 / 0005
So there's also an opportunity that we have because despite the fact that we're in this most powerful empire in the history of the world, there's a weakness and that is that the United States still allows freedom of speech. And so if we don't exercise that and start listening to each other and go beyond just the freedom of speech and into dialogue and into further action based on the wisdom that we can come up with communally, then we can do a good job of taking care of each other despite the powers that be in the United States.

Response
Thank you for your comment.

13 (13340)
Comment - EIS010161 / 0002
I also forgot to mention at the DOE hearings in '93 in Concord I told of having heard of missing plutonium at the Concord Naval Weapons Station, which occurred at the time of the murder of Lieutenant Commander Peter Herlin in the aftermath of the Brian Wilson maiming where he lost his legs to a weapon train there. It was an unsolved murder.

My point here about that is the fact that none of my comments appeared in the environmental impact report on the use of Concord weapons station as a trans shipment point. And not so much the theory, the rumor, because I just presented it, having heard it from three different military sources, but the fact that my comments were not in that environmental impact report, not even as this lunatic thinks that these soldiers told him when the lieutenant commander was murdered that there was also missing plutonium from the base.

Response
The scope of this EIS is limited to an analysis of the potential environmental impacts of the Proposed Action to construct, operate and monitor, and eventually close a geologic repository for disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain, and the No-Action Alternative. Other issues identified by the commenter are beyond the scope of this EIS.

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CONVERSIONS

METRIC TO ENGLISH			ENGLISH TO METRIC		
Multiply	**by**	**To get**	**Multiply**	**by**	**To get**
Area					
Square meters	10.764	Square feet	Square feet	0.092903	Square meters
Square kilometers	247.1	Acres	Acres	0.0040469	Square kilometers
Square kilometers	0.3861	Square miles	Square miles	2.59	Square kilometers
Concentration					
Kilograms/sq. meter	0.16667	Tons/acre	Tons/acre	0.5999	Kilograms/sq. meter
Milligrams/liter	1[a]	Parts/million	Parts/million	1[a]	Milligrams/liter
Micrograms/liter	1[a]	Parts/billion	Parts/billion	1[a]	Micrograms/liter
Micrograms/cu. meter	1[a]	Parts/trillion	Parts/trillion	1[a]	Micrograms/cu. meter
Density					
Grams/cu. cm	62.428	Pounds/cu. ft.	Pounds/cu. ft.	0.016018	Grams/cu. cm
Grams/cu. meter	0.0000624	Pounds/cu. ft.	Pounds/cu. ft.	16,025.6	Grams/cu. meter
Length					
Centimeters	0.3937	Inches	Inches	2.54	Centimeters
Meters	3.2808	Feet	Feet	0.3048	Meters
Kilometers	0.62137	Miles	Miles	1.6093	Kilometers
Temperature					
Absolute					
Degrees C + 17.78	1.8	Degrees F	Degrees F – 32	0.55556	Degrees C
Relative					
Degrees C	1.8	Degrees F	Degrees F	0.55556	Degrees C
Velocity/Rate					
Cu. meters/second	2118.9	Cu. feet/minute	Cu. feet/minute	0.00047195	Cu. meters/second
Grams/second	7.9366	Pounds/hour	Pounds/hour	0.126	Grams/second
Meters/second	2.237	Miles/hour	Miles/hour	0.44704	Meters/second
Volume					
Liters	0.26418	Gallons	Gallons	3.78533	Liters
Liters	0.035316	Cubic feet	Cubic feet	28.316	Liters
Liters	0.001308	Cubic yards	Cubic yards	764.54	Liters
Cubic meters	264.17	Gallons	Gallons	0.0037854	Cubic meters
Cubic meters	35.314	Cubic feet	Cubic feet	0.028317	Cubic meters
Cubic meters	1.3079	Cubic yards	Cubic yards	0.76456	Cubic meters
Cubic meters	0.0008107	Acre-feet	Acre-feet	1233.49	Cubic meters
Weight/Mass					
Grams	0.035274	Ounces	Ounces	28.35	Grams
Kilograms	2.2046	Pounds	Pounds	0.45359	Kilograms
Kilograms	0.0011023	Tons (short)	Tons (short)	907.18	Kilograms
Metric tons	1.1023	Tons (short)	Tons (short)	0.90718	Metric tons
ENGLISH TO ENGLISH					
Acre-feet	325,850.7	Gallons	Gallons	0.000003046	Acre-feet
Acres	43,560	Square feet	Square feet	0.000022957	Acres
Square miles	640	Acres	Acres	0.0015625	Square miles

a. This conversion is only valid for concentrations of contaminants (or other materials) in water.

METRIC PREFIXES

Prefix	Symbol	Multiplication factor	
exa-	E	1,000,000,000,000,000,000	$= 10^{18}$
peta-	P	1,000,000,000,000,000	$= 10^{15}$
tera-	T	1,000,000,000,000	$= 10^{12}$
giga-	G	1,000,000,000	$= 10^{9}$
mega-	M	1,000,000	$= 10^{6}$
kilo-	k	1,000	$= 10^{3}$
deca-	D	10	$= 10^{1}$
deci-	d	0.1	$= 10^{-1}$
centi-	c	0.01	$= 10^{-2}$
milli-	m	0.001	$= 10^{-3}$
micro-	µ	0.000 001	$= 10^{-6}$
nano-	n	0.000 000 001	$= 10^{-9}$
pico-	p	0.000 000 000 001	$= 10^{-12}$