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NUREG-2239

Environmental Impact Statement for Interim Storage Partners LLC's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel in Andrews County, Texas

Draft Report for Comment

Office of Nuclear Material Safety and Safeguards

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ABSTRACT

The U.S. Nuclear Regulatory Commission (NRC) prepared this draft environmental impact statement (EIS) in support of its environmental review of the Interim Storage Partners, LLC (ISP) license application to construct and operate a consolidated interim storage facility (CISF) for spent nuclear fuel (SNF) and Greater-Than-Class C waste, along with a small quantity of spent mixed oxide fuel. The proposed CISF would be located at the Waste Control Specialists (WCS) site in Andrews County, Texas. This draft EIS provides the NRC staff's evaluation of the potential environmental impacts of the proposed action and the No-Action alternative. The proposed action is the issuance of an NRC license authorizing a CISF to store up to 5,000 metric tons of uranium (MTUs) [5,500 short tons] for a license period of 40 years. ISP plans to subsequently request amendments to the license, that, if approved, would authorize ISP to store an additional 5,000 MTUs [5,500 short tons] for each of seven planned expansion phases of the proposed CISF (a total of eight phases) to be completed over the course of 20 years, to expand the facility to eventually store up to 40,000 MTUs [44,000 short tons] of SNF.

ISP's expansion of the proposed project (i.e., Phases 2-8) is not part of the proposed action currently pending before the agency. However, as a matter of discretion, the NRC staff considered these expansion phases in its description of the affected environment and impact determinations in this draft EIS, where appropriate, when the environmental impacts of the potential future expansion can be determined so as to conduct a bounding analysis for the proposed CISF project. For the bounding analysis, the NRC staff assumes the storage of up to 40,000 MTUs [44,000 short tons] of SNF.

After weighing the impacts of the proposed action and comparing to the No-Action alternative, the NRC staff, in accordance with 10 CFR § 51.71(f), sets forth its preliminary National Environmental Policy Act of 1969 (NEPA) recommendation regarding the proposed action. The NRC staff preliminarily recommend that, unless safety issues mandate otherwise, the proposed license be issued to ISP to construct and operate a CISF at the proposed location to temporarily store up to 5,000 MTUs [5,500 short tons] of SNF for a licensing period of 40 years (Phase 1). This preliminary recommendation is based on (i) the license application, which includes the environmental report (ER) and supplemental documents and ISP's responses to the NRC staff's requests for additional information; (ii) consultation with Federal, State, Tribal, and local agencies and input from other stakeholders; (iii) independent NRC staff review; and (iv) the assessments provided in this EIS.

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BACKGROUND

By letter dated April 28, 2016, the U.S. Nuclear Regulatory Commission (NRC) received an application from Waste Control Specialists, LLC (WCS) requesting a license to construct and operate a consolidated interim storage facility (CISF) for spent nuclear fuel (SNF) and Greater-Than-Class-C (GTCC) waste, comprised primarily of spent uranium-based fuel, along with a small quantity of spent mixed oxide (MOX) fuel (collectively referred to as SNF), at the WCS site in Andrews County, Texas, for a 40-year period. On April 18, 2017, WCS requested that the NRC's review of its license application be suspended. On June 22, 2017, the NRC Commission, in Commission Order CLI–17–10, directed staff to re-open the environmental impact statement (EIS) scoping period using established procedures if WCS requested that the NRC resume the review of the license application.

By letter dated June 8, 2018, Interim Storage Partners, LLC (ISP), a joint venture between WCS and Orano CIS, LLC (a subsidiary of Orano USA), requested that the NRC resume its review of the CISF license application under its new name, reflecting the organization of the joint venture. With this request, ISP submitted a revised license application, later updated on July 19, 2018, that included a revised Environmental Report (ER) and revised Safety Analysis Report (SAR). The proposed ISP CISF would provide an option for storing SNF from U.S. commercial nuclear power reactors for a period of 40 years. ISP submitted the license application in accordance with requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 72, Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater-Than-Class-C Waste. Accordingly, the NRC staff then prepared this EIS consistent with the National Environmental Policy Act of 1969 (NEPA), NRC's NEPA-implementing regulations contained in 10 CFR Part 51, Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions, and the NRC staff's guidance in NUREG–1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs."

The proposed action is NRC's issuance, under the provisions of 10 CFR Part 72, of a license authorizing the construction and operation of the proposed ISP CISF in Andrews County, Texas, for a period of 40 years. The proposed project area is situated approximately 0.6 kilometers (km) [0.37 mile (mi)] east of the Texas and New Mexico State boundary.

ISP requests authorization for the proposed project to store 5,000 metric tons of uranium (MTUs) [5,500 short tons] of SNF from decommissioned and decommissioning reactor sites, as well as from operating reactors prior to decommissioning for a 40-year license period. ISP anticipates to subsequently request amendments to the license, that if approved, would authorize ISP to store an additional 5,000 MTUs [5,500 short tons] for each of seven planned expansion phases of the proposed CISF (a total of eight phases) to be completed over the course of 20 years. At full capacity, the facility could eventually store up to 40,000 MTUs [44,000 short tons]. Thus, for the purpose of this EIS, the proposed action refers to ISP's proposed "Phase 1," as described in ISP's license application documents. ISP's expansion of the proposed project (i.e., Phases 2-8) is not part of the proposed action currently pending before the agency. However, the NRC staff considered these expansion phases in its description of the affected environment and impact determination, where appropriate, when the NRC staff was able to evaluate the environmental impacts of the potential future expansion so as to conduct a bounding analysis for the proposed CISF project. The NRC staff conducted this analysis as a matter of discretion because ISP provided the analysis of the environmental impacts of the future anticipated expansion of the proposed facility as part of its license application. For the bounding analysis, the NRC staff assumes the storage of up to 40,000 MTUs [44,000 short tons]. Future expansion phases would require license amendment requests for which NEPA environmental reviews would be conducted. The NRC staff would use the bounding analysis documented in this EIS to facilitate the NEPA reviews for the subsequent expansion license amendments if the NRC staff determines that the bounding analysis is applicable. The EIS refers to the proposed action as Phase 1, and evaluations of the potential full build-out include Phases 1-8.

The scope of the EIS includes an evaluation of the radiological and nonradiological environmental impacts from the construction, operation, and decommissioning of the consolidated interim storage of SNF at the proposed CISF location and the No-Action alternative, as well as mitigation measures to either reduce or avoid adverse effects. It also includes the NRC staff's recommendation regarding the proposed action.

PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the proposed ISP CISF is to provide an option for storing SNF, GTCC, and a small quantity of MOX from nuclear power reactors before a permanent repository is available. These waste materials would be received from operating, decommissioning, and decommissioned reactor facilities.

The proposed CISF is needed to provide away-from-reactor SNF storage capacity that would allow SNF, GTCC, and small quantities of MOX fuel to be transferred from existing reactor sites and stored for the 40-year license term before a permanent repository is available. Additional away-from-reactor storage capacity is needed, in particular, to provide the option for away-from-reactor storage so that stored SNF at decommissioned reactor sites may be removed so the land at these sites is available for other uses. This definition of purpose and need reflects the Commission's recognition that, unless there are findings in the safety review or findings in the NEPA environmental analysis that would lead the NRC to reject a license application, the NRC has no role in a company's business decision to submit a license application to operate a CISF at a particular location.

THE PROJECT AREA

The proposed project area is situated approximately 0.6 km [0.37 mi] east of the Texas and New Mexico State boundary at a location in Andrews County, Texas, that is approximately 52 km [32 mi] west of Andrews, Texas, and 8 km [5 mi] east of Eunice, New Mexico (EIS Figure 2.2-1).

The proposed CISF would be built and operated on an approximate 130-hectares (ha) [320-acres (ac)] project area within a 5,666-ha [14,000-ac] parcel of land that ISP joint venture member WCS in Andrews County, Texas, controls. In addition, construction of the rail sidetrack, site access road, and construction laydown area would contribute an additional area of disturbed soil such that the total disturbed area for construction of the proposed CISF would be approximately 133.4 ha [330 ac]. The approximate 130-ha [320-ac] owner-controlled area (OCA) project area would be located north of WCS's existing waste-management facilities that ISP controls through a long-term lease from WCS (EIS Figure 2.2-2). The fenced, protected area {41-ha [100-ac]} would be approximately centered within the OCA. Access to the protected area would be restricted and security would be maintained. The storage pads, storage systems, and support facilities and infrastructure for receipt, transfer, and storage of the SNF waste canisters would be located inside the protected area.

Facility Construction, Operations, and Decommissioning

Development of the proposed CISF would take place in three stages: construction, operation, and decommissioning. During the construction stage of the proposed action, activities would include construction of one storage pad (in the southeastern portion of the protected area) and the other major components of the proposed CISF, including the cask-handling building, the security and administration building, and the rail sidetrack. Soil would be further excavated for construction of each subsequent phase; however, for the proposed action (Phase 1), the largest amount of soil would be excavated to accommodate the proposed facility and associated infrastructure. Therefore, subsequent impacts from construction activities of later phases, if NRC authorizes, would be anticipated to be less than those associated with the proposed action (Phase 1). ISP estimates that a maximum of 50 construction workers would be directly involved in construction of the proposed CISF, which ISP estimates would take approximately 1 year to complete.

If authorized by the NRC, Phases 2-8 of the proposed CISF would include construction of additional storage pads, each capable of storing an additional 5,000 MTU [5,500 short tons]. Construction of Phases 2-8 would allow receipt and storage of SNF from future decommissioned and decommissioning reactors, as well as from operating reactors prior to decommissioning. ISP stated its intent that construction of Phases 2-8 would occur over a 20-year period after license issuance.

ISP would commence the operations stage of the proposed CISF about 3 months after completion of construction. During CISF operations, transportation casks containing canisters of SNF would be shipped via rail and arrive at the proposed CISF site on the rail sidetrack. Upon arrival, casks would be surveyed and inspected, moved to a cask-transfer building, transported in a transfer cask to the storage pad area, and installed in the appropriate storage configuration. When a geologic repository becomes available, the SNF stored at the proposed CISF would be removed and sent to the repository for disposal. Removal of the SNF from the proposed CISF, or defueling, would involve similar activities to those associated with shipping SNF from nuclear power plants and Independent Spent Fuel Storage Facilities (ISFSIs) and emplacement of SNF at the proposed CISF project, and would be accomplished by reversing the order of operations used for the receipt of SNF. Defueling is considered part of the operations stage of the proposed project.

At the end of the license term of the proposed CISF project, once the SNF inventory is removed, the facility would be decommissioned such that the proposed project area and remaining facilities could be released for unlicensed use and the license terminated. For the decommissioning stage, after removal of all SNF from the proposed CISF, the principal activities involved in decommissioning would include (i) initial characterization surveys to identify any areas of contamination; (ii) decontamination and/or disassembly of contaminated components; (iii) waste disposal; and (iv) final radiological status surveys. Because the exact nature of decommissioning cannot be predicted at this stage of the project, the information presented in the EIS represents the best available description of the activities envisioned for decommissioning the proposed CISF, and the impacts evaluation is based on currently available information and plans. Pursuant to 10 CFR 72.54 requirements, ISP would need to submit a final decommissioning plan for NRC review and approval prior to license termination. The final decommissioning plan would include information on site preparation and organization;

procedures and sequences for removal of systems and components; decontamination procedures; design, procurement, and testing of any specialized equipment; identification of outside contractors to be used; procedures for removal and disposal of any radioactive materials; and a schedule of activities. Once received, the NRC staff would undertake a separate evaluation and NEPA review and prepare an environmental assessment or EIS, as appropriate.

ALTERNATIVES

The NRC environmental review regulations that implement NEPA in 10 CFR Part 51 require the NRC to consider reasonable alternatives, including the No-Action alternative, to a proposed action. The alternatives have been established based on the purpose and need for the proposed project. Under the No-Action alternative, the NRC would not approve the ISP license application for the proposed CISF. The No-Action alternative would result in ISP not constructing or operating the proposed CISF. As further detailed in EIS Section 2.3, other alternatives considered at the proposed CISF project, but eliminated from detailed analysis include storage at a government-owned CISF, alternative design and storage technologies, and an alternative location. These alternatives were eliminated from detailed study, because they either would not meet the purpose and need of the proposed project or have not been sufficiently developed.

SUMMARY OF ENVIRONMENTAL IMPACTS

This EIS includes the NRC staff analysis that considers and weighs the environmental impacts from the construction, operation, and decommissioning of the proposed CISF project and for the No-Action alternative. This EIS also describes mitigation measures for the reduction or avoidance of potential adverse impacts that (i) the applicant has committed to in its license application, (ii) would be required under other Federal and State permits or processes, or (iii) are additional measures the NRC staff identified as having the potential to reduce environmental impacts, but that the applicant did not commit to in its application.

NUREG–1748 categorizes the significance of potential environmental impacts as follows:

> SMALL: The environmental effects are not detectable or are so minor that they would neither destabilize nor noticeably alter any important attribute of the resource.

> MODERATE: The environmental effects are sufficient to alter noticeably but not destabilize important attributes of the resource.

> LARGE: The environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

Chapter 4 of the EIS presents a detailed evaluation of the environmental impacts from the proposed action and the No-Action alternative on resource areas at the proposed CISF. For each resource area, the NRC staff identifies the significance level during each stage of the proposed project: construction, operations, and decommissioning.

Impacts by Resource Area and CISF Stage

Land Use

Construction: Impacts would be SMALL. Approximately 133.4 ha [330 ac] of land disturbance would occur under the proposed action (Phase 1). The approximate 133.4 ha [330 ac] of land disturbance for full build-out (Phases 1-8) from the construction stage would be relatively minor, accounting for a small percentage of the WCS site: 2.4 percent, leaving the remainder of the WCS property for other uses. For all phases, ISP has committed to mitigation measures, such as stabilizing disturbed areas with natural landscaping and protecting undisturbed areas with silt fencing and straw bales to reduce the impacts of surface disturbance during construction. The continuation of prohibited grazing within the fenced 130 ha [320 ac] OCA for the proposed action (Phase 1) and for full build-out (Phases 1-8), would have no impact on local livestock production, because there would continue to be abundant open land available for grazing outside of the WCS site. Likewise, because abundant open land would remain available around the outside of the WCS site, impacts to recreational activities would be minor. Current and future oil and gas development around the proposed project area would continue and would likely fluctuate depending on the oil and gas demand. The use of mitigation measures, such as the limited construction footprint, site stabilization, wetting of roads, and use of existing rights-of-way to limit ground disturbance for water, electric, and natural gas lines would reduce land disturbance. Therefore, the NRC staff concludes that the land use impacts during the construction stage for the proposed action (Phase 1) would be SMALL, and potential impacts for full build-out (Phases 1-8) would also be SMALL.

Operations: Impacts would be SMALL. As with construction, both for the proposed action (Phase 1), and for full build-out (Phases 1-8), cattle grazing would continue to be prohibited on the WCS site, and fencing would be in place. Because of the abundance of land for grazing surrounding the WCS site and because WCS privately owns the proposed CISF site, the impact on land use would not be significant; therefore, no additional land use impact would result from the operations stage of the proposed CISF beyond that for construction. Operation of the proposed CISF would not preclude access to rights-of-way for maintenance of existing infrastructure within the much larger WCS site. Therefore, the NRC staff concludes that land use impacts associated with the operations stage for the proposed action (Phase 1) and for full build-out (Phases 1-8) of the proposed CISF project would be SMALL.

Decommissioning: Impacts would be SMALL. At the end of decommissioning, ISP (in coordination with WCS) may choose to either remove all the storage modules, the storage pads, and, at the discretion of ISP, the cask handling and administration buildings and associated infrastructure or leave the facilities and infrastructure in place. The ISP lease of the proposed CISF project area from WCS would cease, and control of the land would return to WCS. Because the land use impacts for decommissioning do not exceed those for construction or operation of the proposed CISF and the land is privately owned, the NRC staff concludes that the land use impact associated with the decommissioning stage for the proposed action (Phase 1) and for full build-out (Phases 1-8) of the proposed CISF project would be SMALL.

Transportation

Construction: Impacts would be SMALL. During the construction stage of the proposed CISF, trucks would be used to transport construction supplies and equipment to the proposed project area. The regional and local transportation infrastructure that would serve the proposed CISF project would be accessed from State Highway 18, which connects the cities of Hobbs and Eunice, New Mexico, and Texas State Highway 176, which travels past the proposed project area between the cities of Eunice, New Mexico, and Andrews, Texas.

The NRC staff's construction traffic impact analysis considered the volume of estimated construction traffic from supply shipments, waste shipments, and workers commuting and determined the estimated increase in the applicable annual average daily traffic counts on the roads used to access the proposed project area. ISP estimated the number of supply shipments during the construction of the proposed action (Phase 1) would be 50 round trips per day, so the NRC staff estimated the increase in traffic from these shipments would be 100 truck trips considering travel in each direction to and from the proposed CISF project area. The volume of daily truck traffic this amount of shipping generates would increase the existing traffic on Texas State Highway 176 of 2,624 vehicles per day by approximately 4 percent and increase the truck traffic by approximately 7 percent. Therefore, the supply shipments for construction of the proposed action (Phase 1) would have a minor impact on daily traffic on Texas State Highway 176 near the proposed CISF. In addition to construction supply shipments, during construction of Phase 1 (the proposed action), an estimated peak construction work force of 50 workers would commute to and from the proposed CISF project area using individual passenger vehicles and light trucks on a daily basis. ISP expects that the construction workforce would vary over time and would range from 20 to 50 workers. Based on the proposed phased approach to construct full build-out (Phases 1-8) of the proposed CISF (i.e., constructing sequential phases over time), this intermittent construction worker commuting volume would occur for at least a period of 20 years. During peak construction activities, these workers could account for an increase of 100 vehicles per day (50 vehicles each way) on Texas State Highway 176 and nearby connecting roads during construction of any single phase. This increase amounts to an approximate 4 percent increase in average daily vehicle traffic on Texas State Highway 176 and nearby connecting roads resulting from the proposed CISF construction. Based on this analysis, workforce commuting during the construction stage of the proposed action (Phase 1) would have a minor impact on the daily Texas State Highway 176 traffic near the proposed CISF project area. For the construction stage of Phases 2-8, buildings and infrastructure would already be constructed, so the same or a smaller construction worker commuting volume would occur compared to the construction phase of the proposed action (Phase 1) and would contribute the same or less transportation impacts. Therefore, the NRC staff concludes that the transportation impacts from the construction stage of the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

<u>Operations</u>: Impacts would be SMALL. During operations of the proposed CISF, ISP would continue to use roadways for supply and waste shipments, in addition to workforce commuting. Additionally, ISP proposes using the national rail network for transportation of SNF from nuclear power plants and ISFSIs to the proposed CISF and eventually from the CISF to a geologic repository, when one becomes available. The operations impacts the NRC staff evaluated include traffic impacts from shipping equipment, supplies, and produced wastes, and from workers commuting during CISF operations. Other impacts evaluated included the radiological and nonradiological health and safety impacts to workers and the public under normal and accident conditions from the proposed nationwide rail transportation of SNF to and from the proposed CISF.

The NRC staff's traffic impact analysis for the operations stage of the proposed CISF considered the volume of estimated operations traffic from supply shipments, waste shipments, and workers commuting, then determined the estimated increase in the applicable annual average daily traffic counts on the roads used to access the proposed project area. ISP estimated that the operations workforce would include 45 to 60 regular employees. This workforce would commute to and from the proposed CISF project area using individual passenger vehicles and light trucks on a daily basis. These workers could account for an increase of 120 vehicles per day (60 vehicles each way) on Texas State Highway 176 and nearby connecting roads during the operations stage of the proposed action (Phase 1). This would increase the existing daily traffic on Texas State Highway 176 of 2,624 vehicles per day by approximately 4 percent over the proposed CISF Phase 1 operation. Based on this analysis, the commuting workforce during the operations stage of the proposed action (Phase 1) would have a minor impact on the daily traffic near the proposed CISF project area. During the operations stage of Phases 2-7, construction of subsequent phases would occur concurrently with operations; therefore, up to an additional 50 construction workers would be commuting during the same time period (100 trips in each direction) along with 50 construction supply shipments (100 trips in each direction). Therefore, the total workforce commuting during operations (combined with construction of next phases) could add 320 vehicles per day (160 vehicles each way) to the existing Texas State Highway 176 traffic during operations. This would increase the existing daily traffic on Texas State Highway 176 (EIS Section 3.3) of 2,624 vehicles per day by approximately 12 percent. Because Phase 8 is the last planned phase, no concurrent construction and operation would take place, and the commuting workforce and supply shipment impact on traffic would be reduced and is bounded by the impact from Phases 2-7. Therefore, the NRC staff concludes that the proposed traffic impacts from CISF operations on Texas State Highway 176 near the proposed CISF project from the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

During operation of any project phase, SNF would be shipped from existing storage sites at nuclear power plants or ISFSIs to the proposed CISF. These shipments must comply with applicable NRC and U.S. Department of Transportation (DOT) regulations for the transportation of radioactive materials in 10 CFR Parts 71 and 73 and 49 CFR Parts 107, 171–180, and 390–397, as appropriate to the mode of transport. The NRC staff evaluated the radiological and nonradiological health impacts to workers and the public from this project-specific transportation, considering both incident-free and accident conditions.

The potential radiological health impacts to workers and the public from incident-free transportation of SNF to and from the proposed CISF project would occur from exposures to the radiation emitted from the loaded transportation casks that are within specified regulatory limits. Radiation doses to workers involved in transportation of SNF would be limited to an annual dose of 0.05 Sv [5 rem] or less. The estimated occupational health effects estimates for the proposed action (Phase 1), including fatal cancer, nonfatal cancer, and severe hereditary effects were low (sufficient to conclude most likely zero). For all phases (i.e., full build-out), the estimated number of occupational health effects is 0.49 (a small fraction of the estimated 440,000 baseline health effects within the same population). The NRC impact analysis also included estimates of in-transit, incident-free public doses to residents along the route, to occupants of vehicles sharing the route, and to residents near SNF transportation stops. All of the estimated public health effects from the proposed incident-free SNF transportation during the operations stage of the proposed action (Phase 1) and the operations stage of Phases 2-8 are low (most likely zero). An estimate of the maximally exposed public individual located 30 m [98 ft] from the rail track who is exposed to the direct radiation emitted from all approximately 3,400 passing rail shipments of SNF at full build-out under normal operations resulted in an accumulated dose of 0.019 mSv [1.9 mrem].

The NRC staff also evaluated the potential occupational and public health impacts of the proposed SNF transportation under accident conditions. Based on an ISP analysis of cask response to transportation accident conditions, releases of SNF would not be expected from the proposed SNF shipments under accident conditions. Under accident conditions with no release, the highest estimated dose consequence to an emergency responder that spent 10 hours at 3 meters [3.3 yards] from the SNF cask was 1.6 mSv [160 mrem]. ISP also evaluated maximally exposed individual dose risks and collective dose risks to the public from the transportation of SNF under accident conditions involving a release under a variety of accident configurations. The highest reported individual public dose risk was 2.62×10^{-11} Sv [2.62×10^{-9} rem] once an accident has occurred. Therefore, when the NRC staff scales the result by the probability of an accident occurring (1.1×10^{-7} rail accidents per km), the shipment distance for ISP's longest route {5,043 km [3,134 mi]} and the total number of proposed shipments over the duration of the project (3,400), the resulting maximum individual dose risk is low at 4.9×10^{-11} Sv [4.9×10^{-9} rem]. Additionally, the highest collective public dose risk ISP reported, assuming all shipments take the longest SNF transportation route, was also low at 4.59×10^{-9} person-Sv [4.59×10^{-7} person-rem]. The estimated health effects risks were negligible for the proposed action (Phase 1) and for full build-out (Phase 1-8).

The nonradiological impacts to workers and the public associated with incident-free SNF transportation include typical occupational injuries and public traffic fatalities (e.g., accidents at rail crossings) and fatalities involving individuals trespassing on railroad tracks. For the proposed action (Phase 1) and considering the occupational fatality and injury rates for workers involved in transportation and warehousing, the NRC staff estimated that there would be a low number of additional injuries (1.1) and fatalities (3.1×10^{-3}). For each of the operations stages of Phases 2-8, the same estimated annual injuries and fatalities would apply. If all operations stages for the full build-out (Phases 1-8) were conducted over a period of 20 years, the cumulative total injuries and fatalities would still be low (22 injuries and 6.2×10^{-2} fatalities).

The potential impacts to the public from transportation accidents resulted in an estimated 0.19 (less than one) fatalities for shipping all SNF from reactors to the proposed CISF for the proposed action (Phase 1). During the operations stage of Phases 2-8, the potential fatalities to members of the public from any rail accidents during Phases 2-8 were conservatively estimated to be 1.6 fatalities for shipping all SNF from reactors to the proposed CISF.

Based on the NRC staff evaluation of the radiological and nonradiological health impacts to workers and the public from this project-specific transportation, considering both incident-free and accident conditions, the impact would be SMALL.

Removal of the SNF from the proposed CISF, or defueling, would contribute to additional transportation impacts that would be similar in nature to the impacts evaluated for shipping SNF from nuclear power plants and ISFSIs to the proposed CISF project and emplacing the canisters, as would occur earlier in the operations stage. These shipments of SNF from the CISF to a repository would involve different routing and shipment distances than from the nuclear power plants and ISFSIs to the proposed CISF project. Additional impact analyses were conducted of the radiological and nonradiological health and safety impacts to workers and the public under normal and accident conditions from the national rail transportation of SNF from the proposed CISF project to a repository, based on an approach similar to the approach applied in the analysis of the SNF shipments to the proposed CISF. All of the estimated radiological health effects to workers and the public from the proposed SNF transportation under incident-free and accident conditions are low (likely to be zero). The nonradiological impacts for the repository shipments would be less than the impacts from the incoming SNF shipments. Therefore, the NRC staff concludes that the radiological and nonradiological impacts to workers and the public from SNF transportation from the CISF project to a geological repository during the defueling activities of the operations stage of the proposed action (Phase 1) and full build-out (Phase 1-8) would be SMALL.

Decommissioning: Impacts would be SMALL. During the decommissioning stage of the proposed CISF project, the primary transportation impacts would be traffic impacts from the commuting workforce. Based on the low levels of decommissioning-related transportation (EIS Section 2.2.1.5), the NRC staff concludes that the decommissioning transportation impacts during the decommissioning stage of the of proposed action (Phase 1), and at full build-out (Phases 1-8) would be negligible. Therefore, transportation impacts during the decommissioning stage of the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

Geology and Soils

Construction: Impacts would be SMALL. Impacts to geology and soils during the construction stage for the proposed action (Phase 1) and Phases 2-8, would include soil disturbance, soil erosion, and potential soil contamination from leaks and spills of oil and hazardous materials. Mitigation measures and Texas Pollutant Discharge Elimination System (TPDES) permit requirements ISP implements (including spill prevention and cleanup plans) will limit soil loss, avoid soil contamination, and minimize stormwater runoff impacts. Additionally, construction of the proposed CISF would not impact seismicity, subsidence, and sinkholes. Therefore, the NRC staff concludes that the potential impacts to geology and soils from the construction stage for the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

Operations: Impacts would be SMALL. The operations stage of the proposed action (Phase 1) and Phases 2-8 would not be expected to impact underlying bedrock or soil, because storage structures built during construction are passive systems and designed to contain radiological materials. The applicant would be expected to implement the Spill Prevention, Control, and Countermeasures (SPCC) Plan to minimize the impacts of potential soil contamination, and stormwater runoff would be regulated under TPDES permit requirements. ISP would also implement mitigation measures for spill prevention and stormwater management. Operation of the proposed CISF project would not be expected to impact or be impacted by seismic events or sinkhole development. Criteria would be incorporated into the facility design to prevent damage from seismic events such as earthquakes. Therefore, the NRC staff concludes that the potential impacts to geology and soils associated with the operations stage for the proposed action (Phase 1) and for full build-out (Phases 1-8) of the proposed CISF project would be SMALL.

Decommissioning: Impacts would be SMALL. During decommissioning of the proposed action (Phase 1) and Phases 2-8, contaminated soils would be disposed at approved and licensed waste disposal facilities. If any portions of the proposed CISF require dismantling during decommissioning, soil disturbance could occur from the use of heavy equipment, such as bulldozers and graders, to demolish SNF storage facilities, buildings, and associated infrastructure. This soil disturbance would be limited to areas previously disturbed during the construction and operations stages. Mitigation measures used to reduce soil impacts during construction would be applied during decommissioning. Decommissioning impacts to geology and soil would be bounded by those during the construction stage, and similarly would be minimal. Therefore, the NRC staff concludes that the potential impact of decommissioning on geology and soils for the proposed action (Phase 1) and full build-out (Phases 1-8) of the proposed CISF would be SMALL.

Surface Waters and Wetlands

Construction: Impacts would be SMALL. During the construction stage of the proposed action (Phase 1) and Phases 2-8, clearing, cut-and-fill operations, and grading of the site for the SNF pads, buildings, the rail sidetrack, and associated infrastructure would cause temporary surface disturbances, resulting in soil erosion and sediment runoff into nearby drainages. During construction activities, ISP would implement soil erosion and sediment-control best management practices (BMPs), including sediment fences, earthen berms, and diversion ditches, to reduce adverse impacts on surface water such as soil erosion and sedimentation of natural drainages. Leaks and spills of fuels and lubricants from construction equipment and stormwater runoff from impervious surfaces resulting from the proposed facility construction could impact surface water quality. To prevent spills and leaks and to minimize any adverse environmental impacts, ISP would develop and implement an SPCC Plan. Additionally, ISP would develop and implement a Stormwater Pollution Prevention Plan (SWPPP), as the Texas Commission on Environmental Quality (TCEQ) requires, which would further minimize adverse impacts from spills or leaks and construction activities by prescribing additional BMPs, such as designated washout areas; designation of vehicle and equipment maintenance areas; and areas for collection of oil, grease, and hydraulic fluids. ISP also states that the proposed project area is not located in a floodplain. There are no jurisdictional wetlands identified within or in the immediate vicinity of the proposed project area. Furthermore, soil and water in surface depressions near the site that would potentially receive stormwater runoff from the proposed CISF are highly mineralized and therefore are not favorable for the development of aquatic or riparian habitat.

Because ISP would (i) implement mitigation measures to control erosion, stormwater runoff, and sedimentation; (ii) develop and comply with an SPCC Plan; and (iii) obtain the required TPDES permit to address potential impacts for discharge to surface water and provide mitigation, as needed, to maintain water quality standards, the NRC staff concludes that the potential impacts to surface waters during the construction stage of the proposed action (Phase 1) would be SMALL. As additional phases are added, ISP would implement BMPs appropriate for each size increase in the footprint of the proposed facility and would implement storage pad designs that would adequately direct drainage over impervious surfaces during each phase addition up to full build-out (Phases 1-8), and, therefore, impacts from the construction phase for full build-out (Phases 1-8) would also be SMALL.

Operations: Impacts would be SMALL. For the proposed action (Phase 1) and Phases 2-8 operations stage, the primary impact to surface water would be from runoff, although the amount of impervious cover would increase for each additional phase (Phases 2-8). The design and construction of the SNF storage systems and environmental monitoring measures make the potential for a release of radiological material from the proposed CISF project very low during operations. To minimize potential impacts to surface water from stormwater runoff, ISP would (i) implement mitigation measures to control soil erosion, stormwater runoff, and sedimentation; (ii) develop and comply with an SPCC Plan; (iii) obtain a required TPDES permit to address potential impacts of point-source, stormwater discharge to surface water; and (iv) develop a SWPPP prescribing mitigation as needed to maintain water quality standards. The adjacent large drainage depression would have adequate capacity to accept runoff from a 100-year, 24-hour storm event, and conditions in this depression are not favorable for development of an aquatic or riparian habitat. Therefore, the NRC staff concludes that the potential impacts to surface waters and wetlands during the operations stage of the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

Decommissioning: Impacts would be SMALL. During the decommissioning stage for the proposed action (Phase 1) and Phases 2-8, ISP would implement mitigation measures to control erosion, stormwater runoff, and sedimentation. ISP's required TPDES permit and SWPPP would ensure that stormwater runoff would not contaminate surface water. Therefore, the NRC staff concludes that the potential impacts to surface waters and wetlands during decommissioning for the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

Groundwater

Construction: Impacts would be SMALL. For the construction stage of the proposed action (Phase 1), potable water for construction of the proposed CISF would be supplied by the City of Eunice Water and Sewer Department, which would support the water demands of all support buildings**.** Excavation of site soils for construction of the SNF pads is not expected to encounter groundwater, because shallow groundwater is discontinuous and deeper groundwater is at sufficient depth {over 18 m [60ft]} below the 3 m [10 ft] excavation depth. TPDES permit requirements and implementation of BMPs would protect groundwater quality. Specifically, TPDES permit requirements would provide controls on the amounts of pollutants entering ephemeral drainages as well as specify mitigation measures and BMPs to prevent and clean up spills. Construction of Phases 2-8 requires less water than construction of the proposed action (Phase 1) because all facilities and infrastructure for the proposed CISF project would already have been built. Similar to the proposed action (Phase 1), the excavation of soils to construct Phases 2-8 would not be expected to encounter groundwater, and the TPDES permit and other applicable permits and plans acquired for the proposed action (Phase 1) would continue to protect the groundwater quality. In addition to consumptive use for construction, concurrent operations consume a small amount of water. Therefore, the NRC staff concludes that the impacts to groundwater during the construction stage of the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

Operations: Impacts would be SMALL. For the proposed action (Phase 1) and Phases 2-8 operations stage, because of (i) the design and construction of the SNF storage systems, (ii) the SNF being composed of dry material, and (iii) geohydrologic conditions and the depth of the groundwater, and the discontinuity of shallow groundwater, potential radiological contamination of groundwater is unlikely during operations. TPDES industrial stormwater permit requirements provide controls on the amounts of pollutants entering ephemeral drainages that may recharge shallow groundwater at the site and specifies mitigation measures and BMPs to prevent and clean up spills. In addition, ISP has committed to reduce consumptive use of potable water (i.e., using water conservation practices), which would further minimize impacts to groundwater availability. The operations stage of Phases 2-8 would have the same impacts and mitigation measures as the operations stage of the proposed action (Phase 1) and have approximately the same consumptive water use demand. Therefore, the NRC staff concludes that the impacts to groundwater during the operation of the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

Decommissioning: Impacts would be SMALL. During decommissioning of the proposed action (Phase 1) and Phases 2-8, infiltration of stormwater runoff and leaks and spills of fuels and lubricants could potentially affect the groundwater quality. However, ISP's required TPDES industrial stormwater permit would set limits on the amounts of pollutants entering ephemeral drainages. ISP also committed to developing and implementing an SPCC Plan to minimize and prevent spills. The TPDES permit and SWPPP would specify additional mitigation measures and BMPs to prevent and clean up spills. Additionally, radiological decommissioning activities would have little to no groundwater impacts, since no groundwater would be used during the surveying and no contaminated groundwater recharge would be expected. Therefore, the NRC staff concludes that the potential impacts to groundwater during the decommissioning stage for the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

Ecological Resources

Construction: Impacts would be SMALL to MODERATE. Potential ecological disturbances during construction of the proposed action (Phase 1) and Phases 2-8 could include habitat loss from land clearing, noise and vibrations from heavy equipment and traffic, fugitive dust, collisions of wildlife with power lines, increased soil erosion from wind and surface water runoff and stockpiling soil, sedimentation of downstream environments, exposure to light at night, and the presence of construction personnel. During the construction stage of the proposed action (Phase 1) and Phases 2-8, ISP proposes to minimize the construction footprint, to the extent practicable, to mitigate impacts to vegetation disturbance during construction of subsequent phases. For both the proposed action (Phase 1) and Phases 2-8, to mitigate disturbance impacts to vegetation, ISP proposes to use mitigation measures for soil stabilization and sediment control, which would include using earth berms, dikes, and sediment fences, as necessary, to limit runoff. Disturbed areas would be stabilized as part of construction work with native grass species, pavement, and crushed stone to control erosion, and eroded areas that may develop would be repaired. During the construction stage of the proposed action (Phase 1) and Phases 2-8, the applicant would monitor for and repair leaks and spills of oil and hazardous material from operating equipment, minimize fugitive dust, and conduct most construction activities during daylight hours. To comply with its obligation under Section 7 of the Endangered Species Act (ESA), the NRC evaluated whether the proposed CISF project may affect Federally listed species, species proposed to be listed under the ESA, or their critical habitat, as well as other sensitive or protected species. In its analysis, the NRC staff evaluated the potential impacts to the Texas horned lizard and the dunes sagebrush lizard, which may be present at the proposed CISF project area during the construction stage of the proposed facility. The small amount of potential habitat that is present at the proposed CISF necessary for dunes sagebrush lizard survival, the small amount of disturbance planned in that habitat for fences, and mitigation measures that ISP commits to implement (e.g., stabilizing and revegetating disturbed areas) would limit impacts to lizards. Furthermore, the proposed CISF project area is not located within the lesser prairie-chicken designated focal area or connectivity zone.

The proposed action (Phase 1) construction impacts would be expected to contribute to the change in vegetation species' composition, abundance, and distribution within and adjacent to the proposed CISF project area and, per BLM, it may take decades to establish mature, native plant communities following vegetation removal. Because of changes to the ecosystem function of the vegetative communities, the NRC staff concludes that impacts to vegetation from the proposed action (Phase 1) within and around the CISF project area for construction could noticeably alter, but not destabilize, the vegetative communities at the proposed CISF project area, resulting in a MODERATE impact for vegetative species. However, the removal of vegetation for the proposed action (Phase 1) within the region of the Apacherian-Chihuahuan mesquite upland scrub ecological system would not be noticeable and would have a SMALL impact on vegetation in the regional ecosystem. The combined area of soil disturbance from the construction of full build-out (Phases 1-8), the rail sidetrack, site access road, and construction laydown area, would be approximately 133.4 ha [330 ac] of land. Because construction would occur over a number of years and there would be abundant habitat available around the proposed facility to support the gradual movement of wildlife, and because the CISF would have no effect on Federally listed threatened or endangered species, the NRC staff concludes that overall ecological impacts during the construction stage for the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL for wildlife and MODERATE for vegetation.

Operations: Impacts would be SMALL to MODERATE. For the operations stage of the proposed action (Phase 1), fewer effects to vegetative and wildlife communities would occur compared to the construction stage because the only planned land disturbance during the operations stage would be for movement of fences to support staggered construction of storage pads in later phases. During the operation of the proposed action (Phase 1) and Phases 2-8, disturbance of vegetation and habitat for wildlife would continue to alter noticeably, but not destabilize, the vegetative communities within the proposed project area, and therefore would result in a MODERATE impact on the vegetative communities within the proposed CISF project area. Land available for ecological resources would be committed for use by the proposed CISF project for the license term (i.e., 40 years). Additionally, material spills from transportation vehicles, maintenance equipment, and gasoline and diesel storage tanks could also occur during the operations stage, which could kill or damage vegetation or wildlife exposed to the spilled material. However, such spills are anticipated to be few, based on permit requirements and mitigation measures that would continue to be implemented. ISP would continue the mitigation measures implemented during the construction stage to limit potential effects on wildlife during the proposed action (Phase 1) and Phases 2-8 operations stage. For example, ISP stated that security lighting for all ground-level facilities and equipment would be down-shielded to keep light within the boundaries of the proposed CISF project during the operations stage, helping to minimize the potential for impacts. Thus, the potential impacts to vegetation and wildlife during the operations stage of the proposed action (Phase 1) and for full build-out (Phases 1-8) for the proposed CISF project would be SMALL for wildlife and MODERATE for vegetation.

Decommissioning: Impacts would be SMALL to MODERATE. Decommissioning at the facility for either the proposed action (Phase 1) or Phases 2-8 would potentially remove some vegetation and temporarily displace animals close to the CISF infrastructure. Direct impacts on vegetation during decommissioning of the proposed CISF would also include removal of existing vegetation from the area required for equipment laydown and disassembly. Although these disturbances would be temporary and limited to areas previously disturbed during the construction and operations stages, the NRC staff cannot predict the acreage that may be replanted during decommissioning. Therefore, the NRC staff conservatively assumes that all of the area disturbed from construction activities would remain disturbed during the decommissioning stage. The NRC staff recommends replanting the disturbed areas with native species after completion of the decontamination and decommissioning activities to reduce decommissioning impacts on vegetation communities and wildlife habitat. The establishment of mature, native plant communities in any disturbed areas may require decades. While vegetation becomes established, individual animals such as the dunes sagebrush lizard could experience temporary and limited potential impacts. The wildlife in the project area would have adapted to the existence of the proposed CISF during the post-construction operations stage and moved to habitat in nearby areas as needed. For these reasons, the NRC staff concludes that impacts to vegetation and wildlife during the decommissioning stage of the proposed action (Phase 1) and for full build-out (Phases 1-8) for the proposed CISF project would be SMALL for wildlife and MODERATE for vegetation.

Air Quality

Construction: Impacts would be SMALL. The proposed action (Phase 1) construction consists of building the storage modules and pad for 5,000 MTU [5,500 short tons] of SNF and the associated infrastructure for the proposed CISF (e.g., the site access road, cask-transfer building, and rail sidetrack). These activities represent peak-year emissions and primarily generate combustion emissions from mobile sources as well as fugitive dust from clearing and grading of the land and vehicle movement over unpaved roads. ISP conducted air dispersion modeling, which indicated that when the project emissions and background levels are combined, the levels remain below the National Ambient Air Quality Standards (NAAQS) for all pollutants. With respect to proximity of receptors, the nearest resident is located approximately 6 km [3.8 mi] to the west of the proposed CISF. The distance between the proposed CISF and the nearest residence reduces the potential impacts because pollutants disperse as distance from the source increases. ISP has also committed to implement fugitive dust suppression measures (i.e., watering) to reduce impacts from earthmoving activities. Therefore, the NRC staff concludes that the potential impacts to air quality from the proposed action (Phase 1) peak-year emission levels would be minor. Similarly, the impact assessments for full build-out (Phases 1-8) are bounded by the proposed action (Phase 1) peak-year impacts. The proposed action (Phase 1) and full build-out (Phases 1-8) generate low levels of air emission criteria pollutants within and adjacent to attainment areas (40 CFR 81.344 and 40 CFR 81.332). Therefore, the NRC staff concludes that the air quality impacts during the construction stage for the proposed action (Phase 1) and for full build-out (Phase 1-8) would be SMALL

Operations: Impacts would be SMALL. For the proposed action (Phase 1) and full build-out (Phases 1-8) operations stage, the primary activity is receiving and loading SNF into modules. Combustion emissions from equipment used to conduct this activity are the main contributors to air quality impacts. Impacts during the operations stage are either the same as or bounded by those for the peak-year impact assessment and therefore SMALL for the proposed action (Phase 1) and full build-out (Phases 1-8).

Decommissioning: Impacts would be SMALL. The NRC staff anticipates that decommissioning activities would generate combustion emissions from mobile sources associated with equipment and transportation. However, the levels would be much less than those of the peak-year emissions and, considering air quality and proximity of emission sources to receptors, the impacts would also be the same. Therefore, the NRC staff concludes that the potential impacts to air quality from decommissioning of the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

Noise

Construction: Impacts would be SMALL. For the proposed action (Phase 1) and Phases 2-8, noise would result from traffic entering and leaving the project area and from earthmoving and construction activities. For the proposed action (Phase 1), expected noise levels generated during construction activities would be most noticeable in proximity to operating equipment such as excavators, heavy trucks, and bulldozers. ISP estimated noise levels for the proposed action (Phase 1) construction based on noise levels from construction equipment and additional noise sources related to mechanical equipment associated with the security and administration building and the cask-handling building and noise from vehicle backup alarms. For the proposed action (Phase 1) construction stage, potential noise increases would be most noticeable within and directly adjacent to the proposed CISF [30.8 and 20.3 decibels (dBA), respectively] (EIS Table 4.8-1). Potential noise increases would be less noticeable (1.3 to

7.8 dBA) at nearby industrial facilities (e.g., National Enrichment Facility (NEF) operated by URENCO USA, Sundance Services, and Permian Basin Materials) (EIS Table 4.8-1). As described in EIS Section 3.8, the U.S. Environmental Protection Agency (EPA) recommended sound level for industrial sites is 70 dBA. The estimated total sound level for the proposed action (Phase 1) construction within and around the proposed CISF is below the EPA guideline of 70 dBA for industrial use. For the proposed action (Phase 1), because of the distance from the proposed CISF project area to the nearest residential noise receptor {approximately 6 km [3.8 mi] west of the proposed CISF project area}, the residential receptor is not expected to perceive an increase in noise levels because of construction activities. Additionally, noise impacts from constructing Phases 2-8 would be bounded by the noise impact from initial construction stage. Therefore, the NRC staff concludes that the noise impacts from construction of the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

<u>Operations</u>: Impacts would be SMALL. For both the proposed action (Phase 1) and Phases 2-8, noise generated during the operations phase would be primarily contained within the cask-handling building. Noise levels to onsite (outside the cask-handling building) and offsite receptors would be less than during the construction stage and would be mitigated by keeping sound-abatement controls on operating equipment in proper working condition, using recommended hearing protection for activities where shift-average sound levels exceed 80 dBA, and adherence to OSHA regulatory limits for noise to workers. Train traffic associated with SNF shipments would be infrequent and result in only short-term noise. Traffic noise from commuting workers would not noticeably increase noise levels to sensitive receptors along local highways. Therefore, the NRC staff concludes that the noise impacts from operation of the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

<u>Decommissioning</u>: Impacts would be SMALL. Noise sources (e.g., heavy equipment and trucks) and impacts would be similar to those associated with the construction stage; therefore, the NRC staff concludes that the noise impacts from the decommissioning stage for the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

<u>Historic and Cultural Resources</u>

<u>Construction</u>: Impacts would be SMALL. The construction of the proposed action (Phase 1) would include multiple areas where excavation would be required to accommodate the proposed facility. The proposed action (Phase 1) and Phases 2-8 would encompass approximately 130 ha [320 ac] of land north of the existing WCS low-level Radioactive Waste (LLRW) facility in Andrews County, Texas. The area of potential effects (APE) would coincide with the footprint of ground disturbance for the construction stage (e.g., cask-transfer building, storage pads, access roads, and rail sidetrack). The NRC staff anticipates that because of construction activities, the largest area would be disturbed during the construction stages of full build-out (Phases 1-8). In addition, construction of the rail sidetrack, site access road, and construction laydown area would contribute an additional area of disturbed soil such that the total disturbed area for construction of the proposed CISF would be approximately 133.4 ha [330 ac]. Therefore, the land disturbed during the construction stage at full build-out represents the upper bound of potential effects to the direct APE, and the direct APE is an approximate 133.4-ha [330-ac] parcel of privately owned land corresponding to the area of land disturbance from the proposed project.

No archaeological materials were observed in the portion of the direct APE surveyed during the Class III Cultural Resource Surveys the applicant conducted in May 2015 and November 2019. The closest known archaeological resources to the proposed CISF project are located immediately outside the 1.6 km [1 mi] buffer (i.e., the indirect APE) in New Mexico and consist of five prehistoric sites excavated in 2003 prior to the construction of a nearby uranium-enrichment facility (i.e., URENCO NEF). These archaeological resources, however, are at a distance where construction and operation activities for the proposed action (Phase 1) and full-build-out (Phase 1-8) would have no impact. ISP has also committed to an inadvertent discovery plan for human remains or other items of archeological significance during construction. Work would cease immediately upon discovery and the appropriate agency would be notified. Therefore, the NRC staff concludes that the construction stage of the proposed action (Phase 1) and full build-out (Phases 1-8) representing the direct APE would not affect cultural and historic resources, and impacts would be SMALL.

<u>Operations</u>: Impacts would be SMALL. During operations of the proposed action (Phase 1) and Phases 2-8, no new ground disturbance is anticipated beyond that associated with maintenance and traffic around the facility. Because no historic or cultural resources have been identified in the direct APE and operations would not disturb additional land, the NRC staff concludes that the operation of the proposed facility for the proposed action (Phase 1) and full build-out (Phases 1-8) would not affect cultural and historic resources, and impacts would be SMALL.

<u>Decommissioning</u>: Impacts would be SMALL. For the decommissioning stage, the total land disturbed for decommissioning would not be greater than that disturbed during the construction stage; therefore, the NRC staff concludes that decommissioning of the proposed facility for the proposed action (Phase 1) and full build-out (Phases 1-8) would not affect cultural and historic resources, and impacts would be SMALL.

<u>Visual and Scenic Resources</u>

<u>Construction</u>: Impacts would be SMALL. As part of the proposed action (Phase 1), the construction stage would alter the natural state of the landscape through the introduction of proposed new buildings, infrastructure, and SNF storage modules. However, the absence of regional or local high quality scenic views in the area, lack of a unique or sensitive viewshed, and the presence of nearby industrial properties and structures would result in minimal visual and scenic impact. For Phases 2-8, the additional impact to visual and scenic resources would be from the addition of SNF storage systems and pads, which would increase the overall footprint of the facility. However, considering existing structures associated with nearby industrial properties and activities (e.g., the Permian Basin Materials quarry, the WCS LLRW disposal facilities, the Lea County Landfill, NEF, and Sundance Services), the proposed CISF structures would be similar to current conditions and no more intrusive than those already existing in the area. Therefore, the NRC staff concludes that the impact to visual and scenic resources resulting from construction of the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

<u>Operations</u>: Impacts would be SMALL. For both the proposed action (Phase 1) and Phases 2-8, the facilities built during the construction stage (particularly the cask-transfer building) of the initial phase would continue to impact the visual and scenic resources. However, SNF shipments would be relatively infrequent; therefore, the overall visual impact of operating the proposed CISF would be the same or less than from the construction stage. Additionally, dust control measures (e.g., water application) would be implemented to reduce visual impacts from fugitive dust during operation activities. Therefore, the NRC staff concludes that the impacts to visual and scenic resources from the operations stage of the proposed action (Phase 1) and for full build-out (Phases 1-8) would be SMALL.

Decommissioning: Impacts would be SMALL. Decommissioning activities would be similar to those occurring during the construction stage. Equipment used to decontaminate and/or dismantle contaminated components or conduct waste disposal activities and final radiological status surveys would result in temporary visual contrasts. Visual and scenic resources may be affected by fugitive dust emissions from decommissioning activities, but mitigation measures would continue to be implemented. Therefore, the NRC staff concludes that impacts to visual and scenic resources from decommissioning the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

Socioeconomics

Construction: Impacts would be SMALL to MODERATE. The NRC staff anticipates that economic impacts could be experienced throughout the 3-county region of influence (ROI) for the construction stage of the proposed action (Phase 1) and during concurrent construction and operations stages at the proposed CISF project. While the NRC staff anticipates that impacts on employment, housing, and public services would be SMALL, impacts on population growth would be MODERATE, and MODERATE and beneficial for local finance. The NRC staff recognizes that not all individuals in the ROI are likely to be affected equally; however, most community members would share, to some degree, in the economic growth the proposed CISF project would be expected to generate. Peak employment with concurrent construction and operations of the proposed action (Phase 1) together with subsequent Phases 2-8 (if approved) is 110 workers per year. Furthermore, the NRC staff estimates a population growth from new residents moving into the area would result in a population increase of 0.12 percent, which would have a MODERATE impact. Therefore, the NRC staff concludes that socioeconomic impacts resulting from construction of the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL for employment, housing, and public services; MODERATE for population growth; and MODERATE and beneficial for local finance.

Operations: Impacts would be SMALL to MODERATE. Because the size of the operations workforce would be smaller than during the construction stage or peak of construction and operation, the NRC staff determines that there would not be a noticeable impact on public services during the operations stage. Therefore, impacts to socioeconomic resources for the proposed action (Phase 1) and full build-out (Phase 1-8) would be SMALL for population, employment, housing, and public services. Impacts on local finances would be SMALL to MODERATE and beneficial, depending on the number of new businesses and residents moving into the ROI and the percentage of revenues that the proposed CISF would contribute to local finances over the 40-year license term.

Decommissioning: Impacts would be SMALL to MODERATE. Potential environmental impacts on socioeconomics could result from hiring additional workers compared to the operations stage of the proposed action (Phase 1) and full build-out (Phases 1-8) to conduct radiological surveys; potentially decontaminate equipment, materials, buildings, roads, rail, and other onsite structures; clean up areas; and dispose of wastes. Differences between decommissioning of the proposed action (Phase 1) and subsequent phases would include the number of radiological surveys conducted and amount of decontaminating (if necessary) needed. The number of workers required for decommissioning the proposed CISF would also depend on the number of radiological surveys conducted and amount of decontamination needed. However, the NRC staff assumes that the workforce needed for decommissioning the proposed CISF for the proposed project (Phase 1) and for Phases 2-8 would not be greater than the NRC staff assumption for peak employment; thus, there would be no increased demand for housing and public services during the decommissioning stage. Therefore, the NRC staff concludes that socioeconomic impacts resulting from decommissioning of the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL for population, employment, housing, and public services. Impacts on local finances would be SMALL to MODERATE and beneficial, depending on the number of new businesses and residents moving into the ROI and the percentage of revenues that the proposed CISF would contribute to local finances.

Environmental Justice

Construction, Operation, and Decommissioning: The NRC staff considered the potential physical environmental impacts and the potential radiological health effects from constructing, operating, and decommissioning the proposed action (Phase 1) and full build-out (Phases 1-8), to identify means or pathways for the proposed project to disproportionately affect minority or low-income populations. No means or pathways have been identified for the proposed action (Phase 1) or full build-out (Phases 1-8) to disproportionately affect minority or low-income populations. Because land access restrictions are already in place that limit hunting, and no fish or crops on the land are available for consumption, the NRC staff concludes that there is minimal, if any, risk of radiological exposure through subsistence consumption pathways. Moreover, adverse health effects to all populations, including minority and low-income populations, are not expected under the proposed action, because ISP is expected to maintain current access restrictions; comply with license requirements, including sufficient monitoring to detect radiological releases; and maintain safety practices following a radiation protection program that addresses the NRC safety requirements in 10 CFR Parts 72 and 20 (EIS Section 4.12.1).

After reviewing the information presented in the license application and associated documentation, considering the information presented throughout the EIS, and considering any special pathways through which potential environmental justice populations could be more affected than other population groups, the NRC staff did not identify any high and adverse human health or environmental impacts and concludes that no disproportionately high and adverse impacts on potential environmental justice populations would exist.

Public and Occupational Health

Construction: Impacts would be SMALL. Construction activities at the proposed CISF would include clearing and grading for roads; excavating soil, building foundations, and assembling buildings; constructing the rail sidetrack, and laying fencing. Workers and the public could be exposed to low levels of background radiation or nonradiological emissions during the construction stage. Background radiation exposures could result by direct exposure, inhalation, or ingestion of naturally occurring radionuclides during construction activities. ISP has proposed implementing dust control measures (e.g., watering), to reduce and control fugitive dust emissions. Therefore, the NRC staff estimates that the direct exposure, inhalation, or ingestion of fugitive dust would not result in an increased radiological hazard to workers and the general public during the construction stage of the proposed action (Phase 1) and full build-out (Phases 1-8) of the proposed CISF project.

Nonradiological impacts to construction workers during the construction stage of the proposed action (Phase 1) and full build-out (Phases 1-8) of the proposed CISF project would be limited to the normal hazards associated with construction (i.e., no unusual situations would be anticipated that would make the proposed construction activities more hazardous than normal for an industrial construction project). The proposed CISF project would be subject to Occupational Safety and Health Administration (OSHA) General Industry Standards

(29 CFR Part 1910) and Construction Industry Standards (29 CFR Part 1926). These standards establish practices, procedures, exposure limits, and equipment specifications to preserve worker health and safety. Because the construction activities at the proposed CISF during any phase would be typical and subject to applicable occupational health and safety regulations, there would be only minor impacts to worker health and safety from construction-related activities. Therefore, the NRC staff concludes that the nonradiological occupational health effects of the construction stage of the proposed action (Phase 1) and the construction stage of full build-out (Phases 1-8) would be minor.

In summary, the NRC staff concludes that public and occupational health impacts from radiological and nonradiological activities from the construction stage of the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

Operations: The radiological and nonradiological impacts from normal operations would be SMALL. Operational activities at the proposed CISF would include the receipt, transfer, handling, and storage of canistered SNF. During these activities, the radiological impacts would include expected occupational and public exposures to low levels of radiation. ISP estimated occupational radiation exposures during proposed operations involving the proposed SNF receipt and transfer operations for both vertical and horizontal storage configurations. Among the configurations evaluated, most of the calculated collective worker receipt and transfer dose estimates were above 0.01 person-Sv [1.0 person-rem]. The highest receipt and transfer dose estimate would be associated with the transfer of a NUHOMS 24PT1 Dry Shielded Canister from a MP187 Cask and into a horizontal storage module. Per individual canister, the collective dose estimate for the entire crew was 0.01097 person-Sv [1.097 person-rem] and the maximum individual occupational dose was 4.5 mSv [450 mrem]. The NRC staff reviewed the ISP's occupational dose calculations and found them to be based on acceptable methods, assumptions, and input parameters that would not be expected to underestimate calculated doses. Because the occupational doses can be maintained within the NRC 0.05 Sv/yr [5 rem/yr] occupational dose limit specified in 10 CFR 20.1201(a), the NRC staff concludes that the radiological impacts to workers during the operations stage of the proposed action (Phase 1) and the operations stages of full build-out (Phases 1-8) would be minor.

Nonradiological impacts to operations workers would be limited to the normal hazards associated with CISF operations. The proposed CISF would be subject to OSHA's General Industry Standards (29 CFR Part 1910), which establish practices, procedures, exposure limits, and equipment specifications to preserve worker health and safety. Because the operation activities at the proposed CISF project would be typical and subject to applicable occupational health and safety regulations, there would be only small impacts to nonradiological worker health and safety. Therefore, the NRC staff concludes that the nonradiological occupational health impacts of the operations stage of the proposed action (Phase 1) and full build-out (Phases 1-8) would be minor.

The NRC staff concludes that public and occupational health impacts from radiological and nonradiological activities from the operations stage of the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

Decommissioning: Impacts would be SMALL. Based on the effective containment of SNF during operations under normal conditions, the existing radiological and nonradiological controls, and decommissioning planning, the NRC staff concludes that public and occupational health impacts from radiological and nonradiological activities from the decommissioning stage of the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

Waste Management

Construction: Impacts would be SMALL. The construction stage of the proposed CISF would produce nonhazardous, hazardous, and sanitary liquid waste streams, but not LLRW. The proposed action (Phase 1) would generate a volume of 2,378 metric tons [2,621 short tons] of nonhazardous solid waste over the 2.5-year construction stage, whereas construction of Phases 2-8 would generate approximately 2,330 metric tons [2,568 short tons] of nonhazardous solid waste annually, over the license term. The NRC staff considers that the amount of nonhazardous solid waste that the construction stage would generate for the proposed action (Phase 1) and full build-out (Phases 1-8) would be minor in comparison to the capacity of the landfills to dispose of such waste. Additionally, the proposed action (Phase 1) construction stage would involve limited activities that generate hazardous waste. The construction stage of the proposed action (Phase 1) and Phases 2-8 would generate approximately 0.5 metric tons [0.53 short tons] of hazardous waste annually with a total volume for full build-out (Phases 1-8) construction of approximately 9.6 metric tons [10.6 short tons]. Based on this volume of hazardous waste, the applicant expects to be classified as a Conditionally Exempt Small Quantity Generator (CESQG), and ISP would store and dispose the hazardous waste in accordance with applicable State and Federal requirements.

During the construction stage of the proposed action (Phase 1) and full build-out (Phases 1-8), the proposed facility would be estimated to generate approximately 57,000 liters [15,000 gallons] of sanitary liquid waste monthly. The NRC staff considers that the amount of liquid sanitary waste the CISF construction stage would generate is relatively minor in comparison to the capacity of publicly owned treatment works to process such waste.

Based on the amounts of nonhazardous solid waste, hazardous solid waste, and sanitary liquid waste the proposed CISF would generate relative to the available capacity for disposal of these wastes, and considering the mitigation measures that ISP has proposed to implement, the NRC staff concludes that the potential impacts to waste management resources during construction for both the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

Operations: Impacts would be SMALL. The operations stage of all phases would be expected to produce nonhazardous, hazardous, liquid sanitary, and LLRW. The amount of nonhazardous solid waste the proposed action (Phase 1) or individual subsequent phases (Phases 2-8) would generate during the operations stage is approximately 48 metric tons [53 short tons] annually, and these volumes would be relatively minor in comparison to the disposal capacity of the nearby landfill. The proposed action (Phase 1) would involve limited activities that generate hazardous waste, such as the use of solvents or other chemicals during operations. ISP estimates that the operations stage would generate up to 1.2 metric tons [1.32 short tons] per year of hazardous waste. As stated previously, based on this volume of waste, ISP expects to be classified as a CESQG. The NRC staff considers the amount of hazardous waste that the operations stage for the proposed action (Phase 1) and full build-out (Phases 1-8) would generate to be minor in comparison to the capacity for disposing of such waste. Similar to the construction stage, the proposed action (Phase 1) and full build-out (Phases 1-8) would generate 57,000 liters [15,000 gallons] of sanitary liquid waste monthly, and these amounts are relatively minor in comparison to the capacity of publicly owned treatment works to process such waste. The operations stage for the proposed action (Phase 1) and full build-out (Phases 1-8) would generate limited amounts of LLRW {approximately 11.7 m^3 [15.2 yd^3] annually}, which would be disposed at the WCS LLRW facility. LLRW would consist of contamination survey rags, anticontamination garments, and other health physics materials.

The amount of LLRW that would be generated for any phase is minor in comparison to the available capacity for disposing LLRW.

Based on the limited waste streams produced and the capacity available to disposition the various waste streams, the NRC staff considers the impact from all waste streams for the proposed action (Phase 1) and full build-out (Phases 1-8) for the operations stage to be SMALL.

Decommissioning: Impacts would be SMALL. The decommissioning stage would generate nonhazardous solid waste, hazardous solid waste, sanitary liquid wastes, and LLRW. The decommissioning stage of the proposed action (Phase 1) would generate approximately 9 metric tons [10 short tons] of nonhazardous solid waste and Phases 2-8 would generate approximately 64 metric tons [70 short tons]. The NRC staff considers the amount of nonhazardous solid waste the CISF would generate during the decommissioning stage to be minor in comparison to the capacity of the landfill.

The NRC staff assumes that any additional hazardous waste generated for decommissioning of the proposed action (Phase 1) and full build-out (Phases 1-8) would be equal to or less than hazardous waste produced as part of the operations stage {1.2 metric ton per year [1.32 short tons]} because of the limited waste-generating activities that would occur during the decommissioning stage. As in prior stages, ISP anticipates being classified as a CESQG.

Like the operations stage, both the proposed action (Phase 1) and full build-out (Phases 1-8) would generate 57,000 liters [15,000 gallons] of liquid sanitary waste monthly, which the NRC staff considers to be relatively minor in comparison to the capacity of publicly owned treatment works to process such waste.

For LLRW, decommissioning would generate 11.2 tons [12.3 short tons] for the proposed action (Phase 1) and 78.05 metric tons [86.03 short tons] of waste for full build-out (Phases 1-8), which would be disposed at the WCS LLRW facility. The NRC staff considers the amount of LLRW the decommissioning stage of the proposed action (Phase 1) and full build-out (Phases 1-8) would generate to be minor in comparison to available disposal capacity for LLRW.

Based on the amounts of nonhazardous solid waste, hazardous waste sanitary liquid waste, and LLRW the proposed CISF would generate relative to the available capacity for disposal of these wastes, the NRC staff concludes that the potential impacts to waste management resources during decommissioning for the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

CUMULATIVE IMPACTS

Chapter 5 of the EIS provides the NRC staff's evaluation of potential cumulative impacts from the construction, operations, and decommissioning of the proposed CISF, considering other past, present, and reasonably foreseeable future actions in the vicinity of the proposed project. Cumulative impacts from past, present, and reasonably foreseeable future actions were considered and evaluated in the EIS regardless of what agency (Federal or non-Federal) or person undertook the action. The NRC staff determined that the proposed project would contribute SMALL to MODERATE incremental impacts to the SMALL to MODERATE cumulative impacts that exist in the area (due primarily to oil and gas exploration activities, nuclear facilities, and potential energy projects), resulting in SMALL to MODERATE overall cumulative impacts.

SUMMARY OF COSTS AND BENEFITS OF THE PROPOSED ACTION

The cost-benefit analysis in the EIS compares the costs and benefits of the proposed action to the No-Action alternative using various scenarios and discounting rates. The proposed project would generate costs and benefits, both from an environmental and economic perspective. For the environmental costs and benefits, the key distinction between the proposed CISF and the No-Action alternative is the location where the impacts occur. Under the proposed action (Phase 1), the environmental impacts of storing SNF would occur at the proposed CISF site, and environmental impacts would continue to occur at the nuclear power plant and ISFSI sites whose licensees did not transfer all fuel to the proposed CISF. Under the No-Action alternative, environmental impacts from storing SNF would continue to occur at the generation site ISFSIs, and new impacts would not occur at the proposed CISF site. In addition, because the proposed CISF would involve two transportation campaigns (shipment from the nuclear power plants and ISFSIs to the proposed CISF and from the proposed CISF to a repository), compared to one shipping campaign under the No-Action alternative, the No-Action alternative results in a net reduction in overall occupational and public exposures from the transportation of SNF because of the lower overall distance traveled.

The regional benefits of building the proposed CISF would be increased employment, economic activity, and tax revenues in the region around the proposed site. For both the proposed action (Phase 1) and full build-out (Phases 1-8), the NRC staff compared the proposed CISF costs to the No-Action alternative costs. In all cases for the proposed action (Phase 1), the No-Action alternative costs exceed the proposed action (Phase 1) costs (i.e., a net benefit for the proposed CISF). Similarly, for full build-out (Phases 1-8), all cases resulted in a net benefit for the proposed CISF.

NO-ACTION ALTERNATIVE

Under the No-Action alternative, the NRC would not approve the ISP license application for the proposed CISF in Andrews County, Texas. The No-Action alternative would result in ISP not constructing or operating the proposed CISF. No concrete storage pad or infrastructure (e.g., rail sidetrack or cask-handling building) for transporting and transferring SNF to the proposed CISF would be constructed. SNF destined for the proposed CISF would not be transferred from commercial reactor sites (in either dry or wet storage) to the proposed facility. In the absence of a CISF, the NRC staff assumes that SNF would remain onsite in existing wet and dry storage facilities and be stored in accordance with NRC regulations and be subject to NRC oversight and inspection. Site-specific impacts at each of these storage sites would be expected to continue as detailed in generic or site-specific environmental analyses. In accordance with current U.S. policy, the NRC staff also assumes that the SNF would be transported to a permanent geologic repository when such a facility becomes available. Inclusion of the No-Action alternative in the EIS is a NEPA requirement and serves as a baseline for comparison of environmental impacts of the proposed action.

PRELIMINARY RECOMMENDATION

After weighing the impacts of the proposed action and comparing to the No-Action alternative, the NRC staff, in accordance with 10 CFR 51.71(f), sets forth its preliminary NEPA recommendation regarding the proposed action. The NRC staff preliminarily recommends that, unless safety issues mandate otherwise, the proposed license be issued to ISP to construct and operate a CISF at the proposed location to temporarily store up to 5,000 MTUs [5,500 short tons] of SNF for a licensing period of 40 years (Phase 1). This preliminary recommendation is based on (i) the license application, which includes the ER and supplemental documents and ISP's responses to the NRC staff's requests for additional information; (ii) consultation with Federal, State, Tribal, and local agencies and input from other stakeholders; (iii) independent NRC staff review; and (iv) the assessments provided in this EIS.

ABBREVIATIONS/ACRONYMS

10 CFR	Title 10 of the *Code of Federal Regulations*
AADT	annual average daily traffic
ac	acre
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey
ALARA	as low as reasonably achievable
APE	area of potential effects
APLIC	Avian Power Line Interaction Committee
AUMs	animal unit months
BcB	Blakeney and Conger
BEA	Bureau of Economic Analysis
BGEPA	Bald and Golden Eagle Protection Act
BISON-M	Biota Information System of New Mexico
BLM	U.S. Bureau of Land Management
BLS	Bureau of Labor Statistics
BMPs	best management practices
BP	before present
C	Celsius
CCA	Candidate Conservation Agreement
CCAA	Candidate Conservation Agreement Assurances
CCDs	Census County Divisions
CEQ	Council on Environmental Quality
CESQG	Conditionally Exempt Small Quantity Generator
CGP	Construction General Permit
CHB	cask-handling building
CISF	consolidated interim storage facility
cm	centimeter
CMEC	Cox McLain Environmental Consulting, Inc.
CNWRA®	Center for Nuclear Waste Regulatory Analyses
CO_2e	carbon dioxide equivalents
COR	Contracting Officer Representative
CPI	Consumer Price Index
CTS	Canister Transfer System
CWF	Compact Waste Disposal Facility
dBA	decibel
DCSS	Dry Cask Storage System
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EA	environmental assessment
EIS	environmental impact statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ER	Environmental Report
ESA	Endangered Species Act of 1973

F	Fahrenheit
FEP/DUP	Fluorine Extraction and Depleted Uranium Deconversion Plant
FR	*Federal Register*
FRN	*Federal Register* notice
FSER	Final Safety Evaluation Report
FTE	full-time equivalents
ft	feet
ft/s^2	feet per second squared
FWF	Federal Waste Disposal Facility
FWS	U.S. Fish and Wildlife Service
GCRP	U.S. Global Climate Research Program
GEIS	Generic Environmental Impact Statement
GHG	Greenhouse Gas
GMUs	Game Management Units
GTCC	Greater-Than-Class-C
ha	hectares
HELMS	Hardened Extended-Life Local Monitored Surface Storage
HEPA	high-efficiency particulate air
HLW	high-level radioactive waste
HOSS	Hardened Onsite Storage Systems
hr	hour
HSM	high storage module
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
IIFP	International Isotopes Fluorine Products Inc.
in	inches
IPA	important plant areas
IPaC	Information Planning and Conservation
ISFSI	independent spent fuel storage installation
ISP	Interim Storage Partners, LLC
km	kilometers
km^2	square kilometers
kph	kilometers per hour
LCED	Lea County Economic Development Corporation
LCF	latent cancer fatalities
L_{dn}	day night average sound level
LLRW	Low-Level Radioactive Waste
µm	micrometers
m^3	cubic meter
m	meter
mi	miles
mi^2	square mile
mm	millimeters
mrem	millirem
mph	miles per hour

m/s^2	meters per second squared
mSv	millisieverts
MBTA	Migratory Bird Treaty Act
MCL	maximum contaminant level
MDC	Minimum Detectable Concentration
MMI	Modified Mercalli Intensity
MOU	Memorandum of Understanding
MOX	mixed oxide
MRDS	Mineral Resource Data System
MTUs	metric tons of uranium
NAAQS	National Ambient Air Quality Standards
NAC	NAC International
NAGPRA	National American Graves Protection and Repatriation Act
NAICS	North American Industry Classification System
NCRP	National Council on Radiation Protection
NEF	National Enrichment Facility
NEPA	National Environmental Policy Act of 1969
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act of 1966
NM	New Mexico
NMDCA	New Mexico Department of Cultural Affairs
NMDGF	New Mexico Department of Game and Fish
NMDOT	New Mexico Department of Transportation
NMED	New Mexico Environmental Department
NMOSE	New Mexico Office of the State Engineer
NMSS	Office of Nuclear Material Safety and Safeguards
NMTRD	New Mexico Taxation and Revenue Department
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NWP	Nuclear Waste Partnership, LLC
NWPA	Nuclear Waste Policy Act of 1982, as amended
NWS	National Weather Service
OAG	Ogallala–Antlers–Gatuña
OCA	owner-controlled area
OMB	Office of Management and Budget
OSHA	Occupational Safety and Health Administration
OSLDs	optically stimulated luminescence dosimeters
OWL	Oilfield Water Logistics
PFS	Private Fuel Storage
PFSF	Private Fuel Storage Facility
PM	particulate matter
PMP	probable maximum precipitation
ppm	parts per million
PSD	Prevention of Significant Deterioration

PSHA	probabilistic seismic hazard analysis
RAIs	requests for additional information
RCRA	Resource Conservation and Recovery Act
REMP	radiological environmental monitoring program
Rn	Radon
ROD	Record of Decision
ROI	region of influence
RRC	Railroad Commission of Texas
SAB	security and administration building
SAL	State Antiquities Landmarks
SAR	Safety Analysis Report
SER	Safety Evaluation Report
SGP CHAT	Southern Great Plains Crucial Habitat Assessment Tool
SHPO	State Historic Preservation Officer
SNF	spent nuclear fuel
SOP	Sulphate of Potash
SPCC	Spill Prevention, Control, and Countermeasures
Sv	sievert
SWPPP	Stormwater Pollution Prevention Plan
SwRI	Southwest Research Institute
TCEQ	Texas Commission on Environmental Quality
TCP	Traditional Cultural Property
TCPA	Texas Comptroller of Public Accounts
TDS	total dissolved solids
TEDE	total effective dose equivalent
THC	Texas Historical Commission
TLD	thermoluminescent dosimeters
TNMR	Texas-New Mexico Railroad
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks and Wildlife Department
TRU	transuranic
TSC	transportable storage canister
TSCA	Toxic Substances Control Act
TWDB	Texas Water Development Board
TXNDD	Texas Natural Diversity Database
U.S.	United States
USACE	U.S. Army Corps of Engineers
USCB	U.S. Census Bureau
USDA	United States Department of Agriculture
VCC	vertical concrete cask
VCT	Vertical Cask Transporter
VRM	Visual Resource Management
WCS	Waste Control Specialists
WIPP	Waste Isolation Pilot Plant
WOTUS	Waters of the U.S.

yd^3	cubic yard
yr	year

1 INTRODUCTION

1.1 Background

By letter dated April 28, 2016, the U.S. Nuclear Regulatory Commission (NRC) received an application from Waste Control Specialists, LLC (WCS) requesting a license to construct and operate a consolidated interim storage facility (CISF) for spent nuclear fuel (SNF) and Greater-Than-Class-C (GTCC) waste, comprised primarily of spent uranium-based fuel, along with a small quantity of spent mixed oxide (MOX) fuel, at the WCS site in Andrews County, Texas (WCS, 2016) for a 40-year period. The WCS site consists of waste management facilities regulated by the State of Texas.

On November 14, 2016, the NRC published a Notice of Intent (NOI) to prepare an environmental impact statement (EIS) for the proposed action in the *Federal Register* (FR). In the same notice, the NRC announced the opening of the scoping period. The NRC subsequently extended the scoping period two times, with a final closing date of April 28, 2017. On April 18, 2017, however, WCS requested that the NRC's review of its license application be suspended (WCS, 2017). On June 22, 2017, the NRC Commission, in Commission Order CLI–17–10 (NRC, 2017d), directed staff to re-open the EIS scoping period using established procedures if WCS requested that the NRC resume the review of the license application.

> **Spent nuclear fuel (SNF)**
> Nuclear reactor fuel that has been removed from a nuclear reactor because it can no longer sustain power production for economic or other reasons.
>
> **Greater-Than-Class-C waste (GTCC)**
> Low-level radioactive waste that exceeds the concentration limits of radionuclides established for Class C waste in 10 CFR 61.55
>
> **Mixed oxide (MOX) fuel**
> A type of nuclear reactor fuel (often called "MOX") that contains plutonium oxide mixed with either natural or depleted uranium oxide, in ceramic pellet form. Using plutonium reduces the amount of highly enriched uranium needed to produce a controlled reaction in commercial light water reactors.

By letter dated June 8, 2018, Interim Storage Partners, LLC (ISP), a joint venture between WCS and Orano CIS, LLC (a subsidiary of Orano USA), requested that the NRC resume its review of the proposed CISF license application (ISP, 2018a) under its new name, reflecting the organization of the joint venture. With this request, ISP submitted a revised license application, later updated on July 19, 2018 (ISP, 2018b), that included a revised Environmental Report (ER) (ISP, 2020a) and revised Safety Analysis Report (SAR) (ISP, 2018c). The proposed ISP CISF would provide an option for storing SNF from U.S. commercial nuclear power reactors for a period of 40 years. ISP submitted the license application in accordance with requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 72, Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater-Than-Class C Waste. Accordingly, the NRC staff then prepared this EIS consistent with the National Environmental Policy Act of 1969 (NEPA), NRC's NEPA-implementing regulations contained in 10 CFR Part 51, Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions, and the NRC staff's guidance in NUREG–1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs" (NRC, 2003). Section 51.20(b)(9) of 10 CFR requires the NRC staff to prepare an EIS for the issuance of a license pursuant to 10 CFR Part 72 for the storage of spent nuclear fuel in an independent spent fuel storage installation (ISFSI) at a site not occupied by a nuclear power reactor.

1.2 Proposed Action

The proposed action is NRC’s issuance, under the provisions of 10 CFR Part 72, of a license authorizing the construction and operation of the proposed ISP CISF at the WCS site in Andrews County, Texas (EIS Figure 1.2-1), as discussed in more detail in EIS Section 2.2. ISP is requesting authorization to store up to 5,000 metric tons of uranium (MTUs) [5,500 short tons] in canisters for a license period of 40 years (ISP, 2020a).

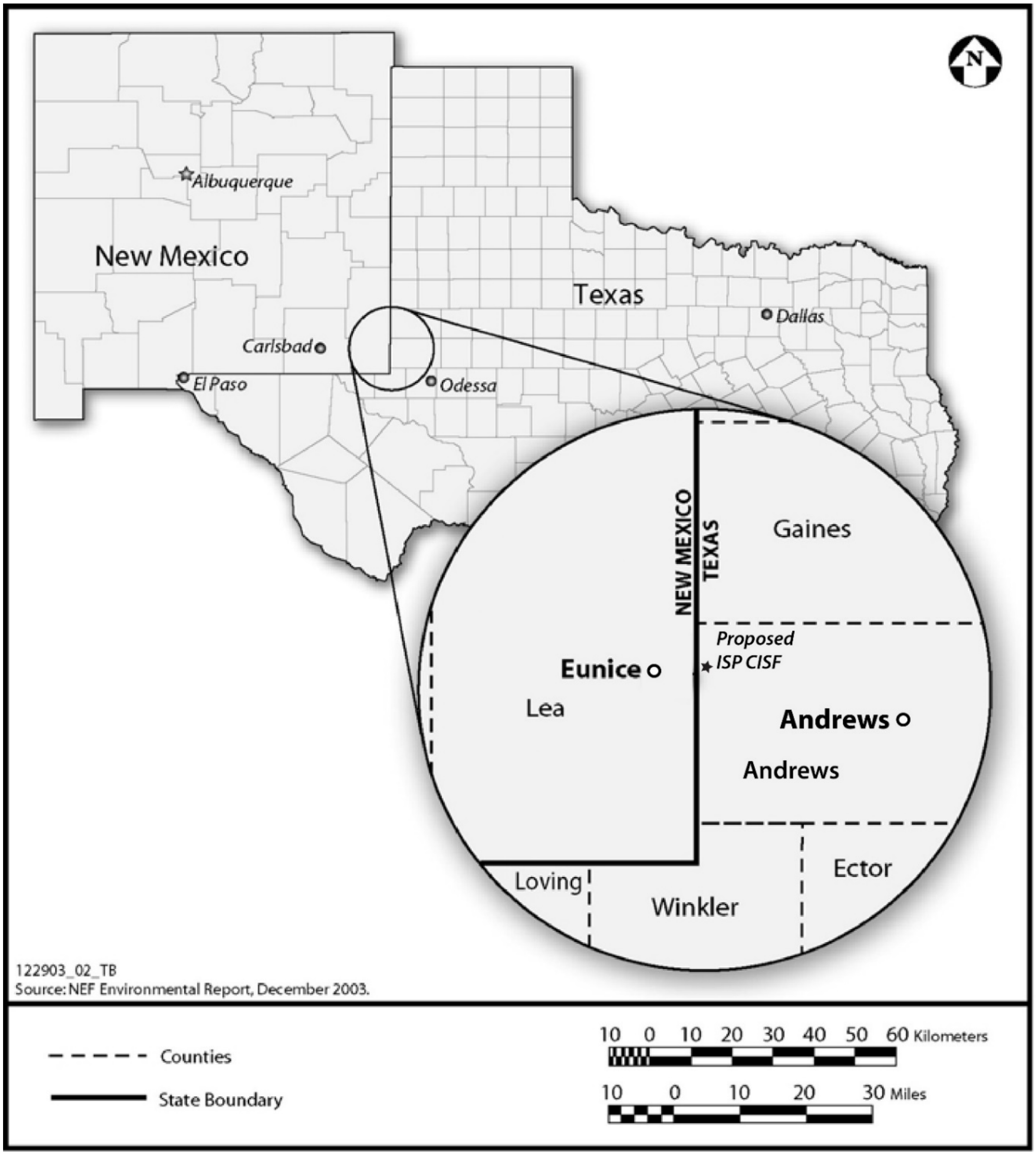

Figure 1.2-1 Location of Proposed ISP CISF in Andrews County, Texas

ISP plans to subsequently request amendments to the license, that if approved, would authorize ISP to store an additional 5,000 MTUs [5,500 short tons] for each of seven planned expansion phases of the proposed CISF (a total of eight phases) to be completed over the course of 20 years. At full capacity, the facility could eventually store up to 40,000 MTUs [44,000 short tons] (ISP, 2020a). ISP has requested that the NRC license the proposed CISF to operate for a period of 40 years (ISP, 2020a). Thus, for the purpose of this EIS, the proposed action refers to ISP's proposed "Phase 1," as described in ISP's license application documents.

ISP's expansion of the proposed project (i.e., Phases 2-8) is not part of the proposed action (i.e., Phase 1) currently pending before the agency. Future expansion phases would require license amendment requests for which NEPA environmental reviews would be conducted. The NRC staff would use the bounding analysis documented in this EIS to facilitate the NEPA reviews for the subsequent expansion license amendments if the NRC staff determines that the bounding analysis is applicable. The EIS refers to the proposed action as Phase 1, and evaluations of the potential full build-out include Phases 1-8. The NRC staff conducted this analysis as a matter of discretion because ISP provided the analysis of the environmental impacts of the future anticipated expansion of the proposed facility as part of its license application (ISP, 2020a, 2018a,b). For the bounding analysis, the NRC staff assumes the storage of up to 40,000 MTUs [44,000 short tons]. During operation, the proposed CISF would receive SNF from decommissioned reactor sites, as well as from operating reactors prior to decommissioning. The CISF would serve as an interim storage facility before a permanent geologic repository is available.

The NRC has previously licensed a consolidated spent fuel storage installation (the Private Fuel Storage facility in Toelle County, Utah), and NRC regulations continue to allow for licensing private away-from-reactor interim spent fuel storage installations (e.g., the G.E. Morris facility in Morris, Illinois) under 10 CFR Part 72.

1.3 Purpose and Need for the Proposed Action

The purpose of the proposed ISP CISF is to provide an option for storing SNF, GTCC, and a small quantity of MOX fuel from commercial nuclear power reactors before a permanent repository is available. These waste materials would be received from operating, decommissioning, and decommissioned reactor facilities.

The proposed CISF is needed to provide away-from-reactor storage capacity that would allow SNF, GTCC, and small quantities of MOX fuel to be transferred from reactor sites and stored for the 40-year license term, before a permanent repository is available. Additional away-from-reactor storage capacity is needed, in particular, to provide the option for away-from-reactor storage so that stored SNF at decommissioned reactor sites may be removed and the land at these sites could be made available for other uses.

The Nuclear Waste Policy Act of 1982 required the Federal government to site, build, and operate a geologic repository for high-level radioactive waste (HLW) and spent fuel by the mid-1990s. Several factors contributed to the delay, but in 2013, the U.S. Department of Energy (DOE) reaffirmed the Federal government's commitment to the ultimate disposal of the spent fuel and predicted that a repository would be available by 2048 (DOE, 2013). The delay in the availability of a Federal repository for disposal of SNF has extended the SNF storage period at reactor sites. As a result, several decommissioned reactor sites exist where a facility for storing SNF is the only remaining structure licensed by NRC. This circumstance has delayed complete site decommissioning and prevented these sites from being put to other uses.

1.4 Scope of the Environmental Impact Statement

The scope of the EIS includes an evaluation of the radiological and nonradiological environmental impacts of (i) the consolidated interim storage of SNF, GTCC, and a small quantity of MOX fuel at the proposed CISF location and (ii) the No-Action alternative. This EIS also considers unavoidable adverse environmental impacts, the relationship between short-term uses of the environment and long-term productivity, and irreversible and irretrievable commitments of resources.

1.4.1 Public Participation Activities

On November 14, 2016, in accordance with 10 CFR 51.26, the NRC published in the FR an NOI to prepare an EIS and to conduct scoping for the WCS CISF license application (81 FR 79531). Through the NOI, the NRC invited potentially affected Federal, Tribal, State, and local governments; organizations; and members of the public to provide comments on the scope of the EIS. The NRC published a second *FR* notice (FRN) on January 30, 2017, that set March 13, 2017, as the closing date for the scoping period (82 FR 8771). This second FRN also announced two public scoping meetings: one to be held in Hobbs, New Mexico, on February 13, 2017, and the second in Andrews, Texas, on February 15, 2017. At these meetings, the NRC staff announced a third scoping meeting to be held in Rockville, Maryland, on February 23, 2017.

The NRC staff subsequently extended the closing date for scoping comments to April 28, 2017, in response to several requests for an extension (82 FR 14039). That FRN also provided notice of a fourth public scoping meeting to be held in Rockville, Maryland, on April 6, 2017. On September 4, 2018, the NRC staff reopened the scoping period for the ISP license application until October 19, 2018 (83 FR 44922). The October 19, 2018, closing date was subsequently extended to November 19, 2018, in response to several requests for an extension (83 FR 53115). The NRC considered comments received during this re-opened scoping period, along with all comments received during the previous period, in determining the scope of the EIS.

Written comments were accepted via the Federal rulemaking website (www.Regulations.gov) using Docket ID NRC–2016–0231, through email, fax, regular U.S. mail, and at the public scoping comment meetings. The purpose of the scoping process (83 FR 44922) is to:

- Ensure that important issues and concerns are identified early and are properly studied
- Identify alternatives to be examined
- Identify significant issues to be analyzed in depth
- Eliminate unimportant issues from detailed consideration
- Identify public concerns

The NRC staff determinations regarding the EIS's scope are documented in a Scoping Summary Report (NRC, 2019a).

Public Scoping Meetings

As discussed previously, the NRC staff hosted four public scoping meetings. The NRC staff's meeting slides, handouts, and project fact sheets were available in both English and Spanish at the scoping meetings, and these slides, handouts, and fact sheets, as well as the transcripts for each meeting, are available at NRC's public web page at https://www.nrc.gov/waste/spent-fuel-storage/cis/wcs/public-meetings.html.

To announce the four public scoping meetings, the NRC staff used a variety of methods, including social media (NRC's Facebook and Twitter accounts), electronic media [FRNs, NRC press releases, NRC's public meeting notification system website, and direct email notifications], and traditional media (newspapers and radio). During each meeting, future meetings were announced.

1.4.2 Issues Studied in Detail

To meet its NEPA obligations related to its review of the proposed CISF project, the NRC staff conducted an independent and detailed evaluation of the potential environmental impacts from construction, operation, and decommissioning of the proposed facility at the proposed location and of the No-Action alternative. This EIS provides a detailed analysis of the following resource areas:

- Land Use
- Transportation
- Geology and Soils
- Water Resources
    - Surface Water
    - Groundwater
- Ecology
    - Vegetation
    - Wildlife
    - Protected Species and Species of Concern
- Air Quality
- Noise
- Visual and Scenic Resources
- Historic and Cultural Resources
- Socioeconomics
- Environmental Justice
- Public and Occupational Health and Safety
- Waste Management

As part of the cumulative impacts analysis, the NRC also considers the effects the proposed project could have on global climate change. The analysis estimates the potential effect of the facility's greenhouse gas emissions based on a 40-year license term.

1.4.3 Issues Outside the Scope of the EIS

This EIS evaluates the environmental impacts of construction, operation, and decommissioning of the proposed CISF. Some issues and concerns raised during the public scoping process on the EIS were determined to be outside the scope of the EIS, and therefore, these issues and concerns are not addressed in the EIS (NRC, 2019a). These topics include (but are not limited to):

- Consideration of noncommercial SNF (e.g., foreign and defense wastes)
- Concerns about nuclear power and alternatives to nuclear power
- Consideration of environmental impacts of constructing and operating reprocessing facilities for commercial SNF
- Concerns associated with the Yucca Mountain licensing proceeding and national progress in developing a permanent repository
- Legacy issues from prior nuclear activities not in the vicinity of the proposed project
- Site-specific issues at other facilities

1.4.4 Relationship to the Continued Storage Generic Environmental Impact Statement (GEIS) and Rule

In September 2014, the NRC issued NUREG–2157, Continued Storage Generic Environmental Impact Statement (GEIS) (NRC, 2014) and updated its Continued Storage Rule at 10 CFR 51.23. The Continued Storage GEIS analyzed the environmental effects of the continued storage (i.e., beyond a facility's license term) of SNF at both at-reactor and away-from-reactor ISFSIs (NRC, 2014) and served as the regulatory basis for the Rule at 10 CFR 51.23. The Rule codified the NRC's generic determinations made in the GEIS regarding the environmental impacts of continued storage of SNF beyond the license term of a facility.

The GEIS is applicable for the period of time after the license term of an away-from-reactor ISFSI (i.e., a CISF) (NRC, 2014). Consistent with 10 CFR 51.23(c), this EIS serves as the site-specific review conducted for the construction and operation of the proposed CISF for the period of its proposed license term. In accordance with the regulation at 10 CFR 51.23(b), the impact determinations from the GEIS are deemed incorporated into this EIS only for the timeframe beyond the period following the term of the CISF license. Thus, those impact determinations are not reanalyzed in this EIS.

1.5 Applicable Regulatory Requirements

NEPA established national environmental policy and goals to protect, maintain, and enhance the environment and provided a process for implementing these specific goals for those Federal agencies responsible for an action. This EIS was prepared in accordance with the NRC's NEPA-implementing regulations at 10 CFR Part 51. In addition, pursuant to 10 CFR Part 72, the NRC regulations establish requirements, procedures, and criteria for the issuance of licenses to receive, transfer, and possess power reactor spent fuel, power reactor-related GTCC waste, and other radioactive materials associated with spent fuel storage in an ISFSI.

1.6 Licensing and Permitting

1.6.1 NRC Licensing Process

In April 2016, WCS submitted a license application to the NRC for the proposed CISF project at its existing hazardous and Low-Level Radioactive Waste (LLRW) storage and disposal site in Andrews County, Texas (WCS, 2016). The NRC initially conducts an acceptance review of a license application to determine whether the application is sufficient to begin a detailed technical review. On April 18, 2017, WCS requested that the NRC suspend its licensing review (WCS, 2017). On June 8, 2018, Interim Storage Partners, LLC (ISP), a joint venture of WCS and Orano CIS LLC (a subsidiary of Orano USA), requested that NRC resume the licensing process (ISP, 2018a). With this request, ISP submitted a revised license application.

The NRC staff's detailed technical review of ISP's license application is composed of both a safety review and an environmental review. These two reviews are conducted in parallel. The focus of the safety review is to assess compliance with the applicable regulatory requirements at 10 CFR Part 72. The environmental review has been conducted in accordance with the NRC's NEPA-implementing regulations at 10 CFR Part 51.

1.6.2 Status of ISP's Permitting With Other Federal and State Agencies

In addition to obtaining an NRC license for the proposed CISF project, the applicant is required to obtain all necessary permits and approvals from other Federal and State agencies during construction and operation of the proposed facility. EIS Table 1.6-1 lists the status of the required permits and approvals.

Table 1.6-1 Environmental Approvals for the Proposed CISF Project

Regulatory Agency	Description	Status
U.S. Nuclear Regulatory Commission (NRC)	Materials License SNM-1050 (10 CFR Part 72)	Under NRC Review
U.S. Nuclear Regulatory Commission (NRC)	Transportation Package Approval and Certification (10 CFR Part 71). Certificate of Compliance	71-9255: Issued 71-9255: Issued 71-9302: Issued 71-9235: Issued 71-9270: Issued 71-9356: Issued
U.S. Fish and Wildlife Service	Consultation Required	Complete (EIS Section 1.7.1)
Texas Parks and Wildlife Department	Consultation	Complete (EIS Section 1.7.1)
Texas Commission on Environmental Quality (TCEQ)	Texas Pollutant Discharge Elimination System (TPDES) Permit	Application will be submitted 1 year prior to start of construction
TCEQ	Construction General Permit (CGP TXR150000), including Notice of Intent (NOI) to TCEQ.	Will be submitted 90 days prior to start of construction
TCEQ	Stormwater Pollution Prevention Plan (SWPPP)	Will be submitted 90 days prior to start of construction
TCEQ	Spill Prevention, Control, and Countermeasures Plan (SPCC)	Will be submitted 90 days prior to start of construction
Texas Historical Commission (THC)	Notification Required	Notification has been made and ISP has received a "No Effects" Confirmation Letter from THC

Table 1.6-1 Environmental Approvals for the Proposed CISF Project		
Regulatory Agency	**Description**	**Status**
New Mexico Department of Cultural Affairs (NMDCA)	Notification Required for 1-mile buffer area around CISF disturbance.	Notification has been made and ISP has received a letter of concurrence from NMDCA
U.S. Army Corp of Engineering (USACE)	Notification Required under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899.	ISP has received a Determination of Nonjurisdiction from USACE (Dated 6/24/2019)
Tribal Organizations	None	NA
Local Law Enforcement Agency: Andrews Texas Police Department	Memorandum of Understanding	Draft Updates of Existing MOU will be executed 90 days prior to start of operations
Local Law Enforcement Agency: Andrews County, TX Sheriff's Office	Memorandum of Understanding	Draft Updates of Existing MOU will be executed 90 days prior to start of operations
Local Law Enforcement Agency: Eunice, NM Fire and Rescue	Memorandum of Understanding	Draft Updates of Existing MOU will be executed 90 days prior to start of operations
Local Law Enforcement Agency: Eunice, NM Police Department	Memorandum of Understanding	Draft Updates of Existing MOU will be executed 90 days prior to start of operations
City of Andrews, TX	Memorandum of Understanding	Draft Updates of Existing MOU will be executed 90 days prior to start of operations
Source: ISP, 2020a;Table 1.3-1 Page 1-7		

1.7 Consultation and Coordination

Federal agencies are required to comply with consultation requirements in Section 7 of the Endangered Species Act of 1973 (ESA), as amended, and Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended. The consultations conducted for the proposed ISP CISF project are summarized in EIS Sections 1.7.1 and 1.7.2. A list of the consultation correspondence is provided in EIS Appendix A. EIS Section 1.7.3 describes the NRC coordination with other Federal, State, and local agencies conducted during the development of this EIS.

1.7.1 Endangered Species Act of 1973 Consultation

The ESA was enacted to prevent the further decline of endangered and threatened species and to restore those species and their critical habitats. ESA Section 7 requires agencies to consult with the U.S. Fish and Wildlife Service (FWS) to ensure that actions they authorize, permit, or otherwise carry out, will not jeopardize the continued existence of any listed species or adversely modify designated critical habitats.

On February 3, 2017, the NRC staff requested information from FWS regarding Federally listed species (NRC, 2017a). On February 7, 2019, the NRC staff sent FWS a follow-up email with project status updates and asked whether the FWS intended to provide additional information for the NRC staff to consider. On February 7, 2019, the FWS provided the NRC staff with an email stating that FWS would not comment on the project but requested that a draft EIS be provided to FWS for review (FWS, 2019a). On November 12, 2019, the NRC staff obtained an official species list from the FWS Information Planning and Conservation (IPaC) website (FWS, 2020). This list is provided pursuant to Section 7 of the ESA and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action." The FWS official species lists are considered valid for 90 days (FWS, 2019b). The NRC staff will regularly request updated species lists during the EIS review process.

The NRC staff requested information on rare species, native plant communities, and animal aggregations from the Texas Parks and Wildlife Department (TPWD), Texas Natural Diversity Database (TXNDD) in November 2018; however, the TXNDD does not currently have any records for the proposed CISF project area (TPWD, 2018). By letter dated March 9, 2017, the TPWD submitted scoping comments on the proposed CISF project (TPWD, 2017). Further information on TPWD consultation is found in EIS Sections 3.6 and 3.6.2.

1.7.2 National Historic Preservation Act of 1966 Consultation

Section 106 of the NHPA requires Federal agencies to take into account the effects of their undertakings on historic properties and allow the Advisory Council on Historic Preservation (ACHP) an opportunity to review and comment on the undertaking. The ACHP is an independent Federal agency that promotes the preservation, enhancement, and productive use of our nation's historic resources. The NHPA-implementing regulations are found in 36 CFR 800, "Protection of Historic Properties." In implementing the Section 106 process, Federal agencies seek the views of consulting parties, including, as applicable, other Federal agencies, the State Historic Preservation Officer (SHPO), Indian Tribes, Tribal Historic Preservation Officers, local government leaders, the applicant, cooperating agencies, and the public. In accordance with 36 CFR 800.8, the NRC staff is complying with NHPA requirements for performing the Section 106 consultation in coordination with performing the NEPA environmental review.

The goal of Section 106 consultation is to identify historic properties the undertaking could potentially affect, assess the adverse effects of the undertaking on these properties, and seek ways to avoid, minimize, or mitigate any adverse effects on historic properties. As detailed in 36 CFR 800.2(c)(1)(i), the role of the SHPO in the Section 106 process is to advise and assist Federal agencies in carrying out their Section 106 responsibilities and cooperate with such agencies, local governments and organizations, and individuals to ensure that historic properties are taken into consideration at all levels of planning and development.

In developing this EIS, the NRC initiated consultation under NHPA Section 106 with the ACHP, the Texas SHPO, the New Mexico (NM) SHPO, and Indian Tribes. These Section 106 consultation efforts are described below.

Advisory Council on Historic Preservation

By letter dated May 6, 2019, the NRC staff notified the ACHP that an EIS is being prepared to document the NRC's independent assessment of the potential impacts from construction, operation, and decommissioning of the proposed CISF (NRC, 2019b). The letter informed ACHP that in preparing the EIS, the NRC staff would be using the NEPA process to comply with its obligations under Section 106 and that the environmental review would include analyses of potential impacts to historic and cultural resources.

State Historic Preservation Offices

The NRC initiated consultation with the Texas SHPO and NM SHPO by letters dated May 6, 2019 (NRC, 2019c,d). The letters requested information from the Texas SHPO and NM SHPO to facilitate the identification of historic and cultural resources that the proposed facility could affect. In a letter to the NRC dated May 28, 2019, the NM Deputy SHPO stated that if access to the proposed facility will be from New Mexico, or ground disturbance associated with construction of the facility will occur in New Mexico, the New Mexico Historic Preservation Division recommends that a professional archaeologist conduct an archaeological survey of the proposed area of potential effects (APE) (NM SHPO, 2019). The NM Deputy SHPO stated that the survey and report will need to be completed to meet New Mexico state standards. The NM Deputy SHPO stated that if there will be no ground disturbance from the proposed facility within New Mexico, no further work is necessary (NM SHPO, 2019).

In a letter to the NRC dated May 30, 2019, the Texas SHPO stated that because the proposed APE for the proposed CISF (undertaking) is different from the area where intensive archeological survey had been previously conducted (in May of 2015), the Texas SHPO found that an archeological survey was warranted for those portions of the current APE that do not overlap the previously surveyed areas. The Texas SHPO stated that the survey and report will need to be completed to meet Texas State standards (THC, 2019). In November 2019, ISP conducted additional archaeological investigations of the project areas not previously surveyed and submitted the report to the NRC on March 5, 2020 (ISP, 2020b). The NRC staff will continue to consult with the Texas SHPO and NM SHPO throughout the environmental review process to evaluate the effects of the proposed project on cultural and historical resources.

Indian Tribes

In letters dated February 1, 2017 (NRC, 2017b) and March 24, 2017 (NRC, 2017c), the NRC staff invited five Federally recognized Indian Tribes identified as having past religious or cultural ties to the project area in West Texas and southeast New Mexico to participate in the NHPA Section 106 process. In its letters, the NRC staff requested assistance in identifying and evaluating historic properties that the proposed action may affect, as described in WCS's original license application and supporting documentation submitted on April 28, 2016 (WCS, 2016). The Indian Tribes contacted were:

- Mescalero Apache Tribe
- Apache Tribe of Oklahoma
- Comanche Nation
- Kiowa Tribe of Oklahoma
- Ysleta del Sur Pueblo

In a letter dated March 13, 2017, Mr. Javier Loera, Ysleta Del Sur Pueblo Tribal Historic Preservation Officer, stated that the Tribe had no comments on the proposed CISF project (Ysleta Del Sur Pueblo, 2017). The Tribe believed that the project would not adversely affect traditional, religious, or culturally significant sites of the Pueblo and had no opposition to the proposed project. However, the Tribe requested consultation should any human remains or other items of archeological significance unearthed during the project be determined to fall under the National American Graves Protection and Repatriation Act (NAGPRA) guidelines.

In a letter dated June 29, 2017, Mr. Theodore E. Villicana, Comanche Nation Historic Preservation Office, stated that the location of the proposed CISF project had been cross-referenced with Comanche Nation site files (Comanche Nation, 2017). Mr. Villicana indicated that "No Properties" that may potentially contain prehistoric or historic archeological materials significant to the Comanche Nation had been identified.

No other responses from the Indian Tribes were received.

In letters dated May 6, May 7, and May 28, 2019 (NRC, 2019e, f, g), the NRC staff requested assistance from seven Federally recognized Indian Tribes in identifying and evaluating historic properties that the proposed CISF project may affect, as described in ISP's revised license application and supporting documentation submitted on June 8, 2018 (ISP, 2018a). The Indian Tribes contacted included the five Tribes contacted in 2017 and two additional Tribes: the Tonkawa Tribe of Oklahoma, and the Wichita and Affiliated Tribes.

In a Tribal response form dated October 7, 2019, the Comanche Nation noted that it did not have a comment or concern at this time but did request to be updated on the project (Comanche Nation, 2019). To date, the NRC staff has not received any other responses from the Indian Tribes contacted in May 2019.

In addition, the NRC staff notified two Tribes (the Lipan Apache Tribe of Texas and the Texas Band of Yaqui Indians) of the ISP CISF license application (NRC, 2019h). These Tribes are not Federally-recognized Indian Tribes but have been honored or acknowledged by the State of Texas Senate or House of Representatives for their history and contributions within the State. Pursuant to 36 CFR 800.2(c)(5), certain individuals and organizations with a demonstrated interest in the undertaking may participate as consulting parties because of the nature of their legal or economic relation to the undertaking or affected properties, or their concern with the undertaking's effects on historic properties. In contacting these two Tribes, the NRC staff requested that the Tribes indicate whether they have a determined interest in the undertaking and wish to participate as a consulting party.

The Texas Band of Yaqui Indians returned a Tribal response form dated June 11, 2019, to indicate their interest to consult on the CISF project (Texas Band of Yaqui Indians, 2019). By email dated August 16, 2019, the NRC staff sought additional information regarding the Texas Band of Yaqui Indian's interest in consulting (NRC, 2019i). To date, the NRC staff has not received a response to this email.

1.7.3 Coordination with Other Federal, State, and Local Agencies

The NRC staff interacted with Federal, State, and local agencies during preparation of this EIS to gather information on potential issues, concerns, and environmental impacts related to the proposed CISF project. The consultation process has included discussions with U.S. Department of Agriculture-Natural Resource Conservation Service (NRCS), Texas

Commission on Environmental Quality (TCEQ), and local organizations (e.g., county commissioners and mayor's office staff).

Coordination with Federal and State Agencies

As part of information-gathering activities at the beginning of the EIS process, the NRC staff met with NRCS staff on February 13, 2017, and with staff of the TCEQ on February 15, 2017 (NRC, 2019j). Discussions with NRCS staff focused on soil resources and land use in and around the proposed CISF site. Discussions with TCEQ staff covered a variety of topics, including: TCEQ regulatory oversight of Resource Conservation and Recovery Act (RCRA) solid and hazardous waste disposal activities at the WCS site; TCEQ stormwater discharge and air permits for disposal facilities at the WCS site; the site hydrogeology; emergency response; and oil and gas activities in the vicinity of the WCS site.

Coordination with Localities

The NRC staff met separately with the Mayor's Office for the City of Eunice, New Mexico and with the Mayor's Office for the City of Hobbs, New Mexico on February 13, 2017; with the City of Andrews, Texas Mayor's Office on February 15, 2017; and with the City of Monahans Mayor's Office on February 16, 2017, to provide a brief overview of the NRC environmental review process and, when possible, address any questions or concerns by members of these local agencies. The NRC staff also met with the Andrews Economic Development Corporation (February 13, 2017) and the Economic Development Board of Lea County (February 14, 2017) (NRC, 2019j).

1.8 References

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10 CFR 51.26. Code of Federal Regulations, Title 10, *Energy*, § 51.26, "Scoping - Environmental Impact Statement and Supplement to Environmental Impact Statement." Washington, DC: U.S. Government Publishing Office.

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2 PROPOSED ACTION AND ALTERNATIVES

2.1 Introduction

Interim Storage Partners, LLC (ISP), a joint venture between Waste Control Specialists LLC (WCS) and Orano CIS LLC, submitted a revised license application, dated June 8, 2018, and updated on July 9, 2018, to the U.S. Nuclear Regulatory Commission (NRC) (ISP, 2018a). The license application included a revised Safety Analysis Report (SAR) (ISP, 2018b) and a revised Environmental Report (ER) (ISP, 2020). By the application, ISP requests authorization to construct and operate a Consolidated Interim Storage Facility (CISF) for spent nuclear fuel (SNF) and reactor-related Greater-Than-Class-C (GTCC) radioactive waste along with a small amount of mixed oxide (MOX) fuel at the WCS site in Andrews County, Texas. ISP prepared the license application in accordance with requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 72, Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater-Than-Class C Waste.

Descriptions of the proposed action (i.e., the NRC's issuance, under the provisions of 10 CFR Part 72, of a license to ISP, authorizing the construction and operation of the CISF for a period of 40 years) and possible alternatives to the proposed action are provided in the following sections that were used in developing the Environmental Impact Statement (EIS). The alternatives the NRC staff initially considered include (i) the No-Action alternative, as required by the National Environmental Policy Act of 1969 (NEPA), as amended; and (ii) those alternatives that were initially considered but later eliminated from detailed analysis (with reasons for elimination). Under the No-Action alternative, the NRC would not issue the license authorizing construction and operation of the proposed CISF.

2.2 Alternatives Considered for Detailed Analysis

2.2.1 Proposed Action

ISP is requesting authorization from the NRC to store 5,000 metric tons of uranium (MTU) [5,500 short tons] of SNF, GTCC, and a small amount of MOX fuel, which would originate from commercial nuclear reactor facilities in the United States (ISP, 2020) for a 40-year period at the WCS site in Andrews County, Texas.

If the NRC grants a license, ISP anticipates subsequently requesting amendments to its license to store an additional 5,000 MTUs [5,500 short tons] in the expansion of the proposed CISF in each of the seven following phases. ISP's current plans are to submit the amendment requests and to complete the seven expansion phases over the course of 20 years following issuance of the NRC license (ISP, 2020). Should the CISF achieve its full proposed expansion, the facility would be designed, constructed, and operated to store up to 40,000 MTUs [44,000 short tons]. During operation, the CISF would receive SNF, GTCC, and MOX fuel from decommissioned and decommissioning reactor sites, as well as from operating reactors prior to decommissioning. ISP's plan to expand the proposed project (i.e., Phases 2-8) is not part of the proposed action currently pending before the agency. Future expansion phases would require license amendment requests for which NEPA environmental reviews would be conducted. The NRC staff would use the bounding analysis documented in this EIS to facilitate the NEPA reviews for the subsequent expansion license amendments if the NRC staff determines that the bounding analysis is applicable. The EIS refers to the proposed action as Phase 1, and evaluations of the potential full build-out include Phases 1-8. The NRC staff conducted this analysis as a matter of discretion because ISP provided the analysis of the environmental impacts of the future anticipated expansion of the proposed facility as part of its license application (ISP, 2020).

In its license application, ISP has requested that NRC license the proposed CISF to operate for a period of 40 years (ISP, 2020). ISP stated that it may seek to renew the license for an additional 20 years, for a total 60-year operating life (ISP, 2020). Renewal of the license beyond an initial 40 years would require ISP to submit a license renewal request, which would be subject to an NRC safety and environmental review at that time.

By the end of the license term of the proposed CISF, the NRC staff expects that the SNF stored at the proposed facility would have been shipped to a permanent geologic repository. This expectation of repository availability is consistent with the NRC's analysis in Appendix B of NUREG–2157, *"Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel,"* (NRC, 2014). In that analysis, the NRC concluded that the reasonable period for the development of a repository is approximately 25 to 35 years (i.e., the repository is available by 2048) based on experience in licensing similarly complex facilities in the United States and national and international experience with repositories already in progress (NRC, 2014).

2.2.1.1 Site Location and Description

The proposed project area is situated about 0.6 km [0.37 mi] east of the Texas and New Mexico state boundary at a location in Andrews County, Texas, that is approximately 52 kilometers (km) [32 miles (mi)] west of Andrews, Texas, and 8 km [5 mi] east of Eunice, New Mexico (EIS Figure 2.2-1). The proposed CISF would be built and operated on an approximately 130-hectare (ha) [320-acre (ac)] project area within a 5,666-ha [14,000-ac] parcel of land that is controlled by ISP joint venture member WCS in Andrews County, Texas (ISP, 2020). In addition, construction of the rail sidetrack, site access road, and construction laydown area would contribute an additional area of disturbed soil such that the total disturbed area for construction of the proposed CISF would be approximately 133.4 ha [330 ac]. The project area would be located north of WCS's existing waste management facilities (EIS Figure 2.2-1) and controlled by ISP through a long-term lease from WCS (ISP, 2020).

Within the land WCS controls in Andrews County, WCS currently operates waste management facilities on approximately 541 ha [1,338 ac] (EIS Figure 2.2-2). These facilities are licensed by the Texas Commission on Environmental Quality (TCEQ) and include

- The Texas Compact Disposal Facility. This facility serves the Texas Compact (Texas and Vermont) and is authorized to dispose Class A, B, and C Low-Level Radioactive Waste (LLRW) under Texas Radioactive Materials License No. R04100, Amendment No. 30 (TCEQ, 2016a).

- The Federal Waste Disposal Facility. This facility serves the U.S. Department of Energy (DOE) and is also authorized to dispose Class A, B, and C LLRW and Mixed Low-Level Waste (MLLW) under Texas Radioactive Materials License No. R04100, Amendment No. 30 (TCEQ, 2016a).

- The Byproduct Material Disposal Facility. This facility is authorized to dispose byproduct materials under Texas Radioactive Materials License No. R05807 Amendment No. 10 (TCEQ, 2016b).

Figure 2.2-1 Location of Proposed CISF Project Area in Andrews County, Texas

Figure 2.2-2 Site Layout (modified from ISP, 2018b)

- A landfill for disposal of hazardous waste, including Resource Conservation and Recovery Act (RCRA) regulated waste and low activity radioactive waste. This facility operates under Hazardous Waste Permit No. 50358 (TCEQ, 2005).

A rail line encompasses the existing WCS waste management facilities (EIS Figure 2.2-2) and is currently used to transport LLRW to the WCS site. The rail line extends from the WCS facilities to Eunice, New Mexico, located approximately 8 km [5 mi] west of the WCS site, where it connects with the Texas New Mexico Railroad. WCS controls, operates, and maintains the rail line from its site to Eunice, New Mexico (ISP, 2020).

The proposed CISF would be constructed within an approximate 130-ha [320-ac] owner-controlled area (OCA) north of WCS's existing waste management facilities (EIS Figure 2.2-2). The OCA currently consists of vacant, undeveloped land covered with native vegetation. The topography of the OCA is relatively flat, with elevations across the OCA ranging from approximately 1,041 meters (m) [3,416 feet (ft)] in the south to approximately

1,065 m [3,496 ft] in the north. The fenced protected area [41 ha (100 ac)] would be approximately centered within the OCA. Access would be restricted and security would be maintained for the protected area (ISP, 2020). The protected area would contain the storage pads, storage systems, and support facilities and infrastructure for receipt, transfer, and storage of the SNF waste canisters.

2.2.1.2 SNF Storage Systems

For the proposed action (Phase 1), ISP proposes to store SNF in six existing dual-purpose canister-based dry cask storage systems (DCSS) TN Americas or NAC International (NAC) designed (ISP, 2018b). The 6 DCSS (3 from TN Americas and 3 from NAC International) consist of 11 different SNF canisters and 5 different GTCC waste canisters stored in 5 overpacks (EIS Table 2.2-1). SNF is stored horizontally in the TN Americas systems and vertically in the NAC International systems. EIS Figure 2.2-3 provides a schematic showing horizontal and vertical SNF storage.

The TN Americas and NAC International DCSS listed in EIS Table 2.2-1 have been previously approved by the NRC for independent storage of SNF, GTCC, and a small amount of MOX fuel, pursuant to requirements in 10 CFR Part 72. In addition, the NRC approved both the TN Americas and NAC International systems for storage of SNF transported in canisters pursuant to requirements in 10 CFR Part 71, Packaging and Transportation of Radioactive Material. The cask systems listed in Table 2.2-1 are further described in SARs that NRC docketed. Additional cask systems for storage would require a license amendment request review by the NRC. All NRC-approved dry spent fuel storage designs can be reviewed at https://www.nrc.gov/waste/spent-fuel-storage/designs.html.

The DCSS listed in EIS Table 2.2-1 are currently employed for storage of SNF at several commercial reactor facilities in the United States. ISP would initially store SNF from shutdown decommissioned reactor sites at the proposed CISF (ISP, 2020). EIS Figure 2.2-4 provides the name and location of the currently decommissioned reactor sites in the United States. Approximately 80 percent of the SNF currently stored at these shutdown decommissioned reactor sites (approximately 4,000 MTU [4,400 short tons]) is stored in either the TN Americas or NAC International DCSS listed in EIS Table 2.2-1.

Table 2.2-1 NRC-Approved Dry Cask Storage Systems for Phase 1 of the Proposed CISF

Cask System	NRC Docket No.	Canister	Overpack
NUHOMS® MP187 Cask System	71-9255 72-11 (SNM-2511)	FO-DSC	HSM (Model 80)
		FC-DSC	
		FF-DSC	
		GTCC Canister	
Advanced Standardized NUHOMS® System	71-9255 72-1029	NUHOMS® 24PT1	AHSM
Standardized NUHOMS® System	71-9302 72-1004	NUHOMS® 61BT	HSM Model 102
		NUHOMS® 61BTH Type 1	

Table 2.2-1 NRC-Approved Dry Cask Storage Systems for Phase 1 of the Proposed CISF

Cask System	NRC Docket No.	Canister	Overpack
NAC-MPC	71-9235 72-1025	Yankee Class	VCC
		Connecticut Yankee	
		LACBWR	
		GTCC-Canister-CY	
		GTCC-Canister-YR	
NAC-UMS®	71-9270 72-1015	Classes 1 thru 5	VCC
		GTCC-Canister-MY	
MAGNASTOR®	71-9356 72-1031	TSC1 thru TSC4	CC1 thru CC4
		GTCC-Canister-ZN	

Source: ISP, 2018b
DSC = dry shielded canister; HSM = horizontal storage module; AHSM = advanced horizontal storage module; VCC = vertical concrete cask; TSC = transportable storage container; CC = concrete cask; GTCC = Greater-Than-Class C

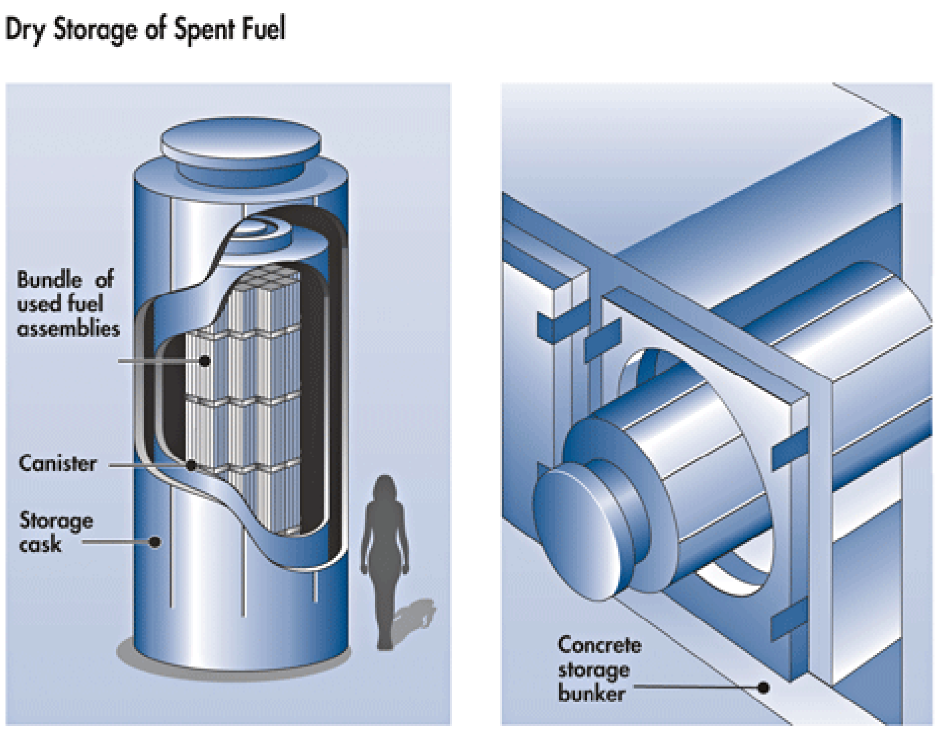

Figure 2.2-3 Schematic of Dry Cask SNF Storage Systems (from NRC website)

Figure 2.2-4 Decommissioned Reactor Sites in the United States (ISP, 2020)

2.2.1.3 Facility Description

The site plan for the proposed CISF is shown in EIS Figure 2.2-5. A fence would enclose the approximate 130-ha [320-ac] OCA, and a double fence would surround the approximate 41-ha [100-ac] protected or restricted-access area within the OCA. The protected area would be approximately centered within the OCA and would contain the storage pads, storage systems, and support facilities and infrastructure for receipt, transfer, and storage of the SNF waste canisters.

2.2.1.3.1 Construction

Under the proposed action (Phase 1), construction activities would include construction of the first storage pad (in the southeastern portion of the protected area) and the other major components of the proposed CISF, including the cask-handling building, the security and administration building, and the rail sidetrack. The objective of constructing the initial phase of the CISF (i.e., Phase 1) would be to provide an operational facility capable of storing 5,000 MTU [5,500 short ton] of SNF, GTCC, and a small amount of MOX fuel, which would originate from shutdown or decommissioned reactors (ISP, 2020). ISP estimates that a maximum of 50 construction workers would be directly involved in construction of Phase 1 of the proposed CISF (ISP, 2020), which ISP estimates would take approximately 1 year to complete.

If authorized by the NRC, Phases 2-8 of the proposed CISF would include construction of additional storage pads, each capable of storing an additional 5,000 MTU [5,500 short tons]. Construction of Phases 2-8 would allow receipt and storage of SNF from future decommissioned and decommissioning reactors, as well as from operating reactors prior to decommissioning.

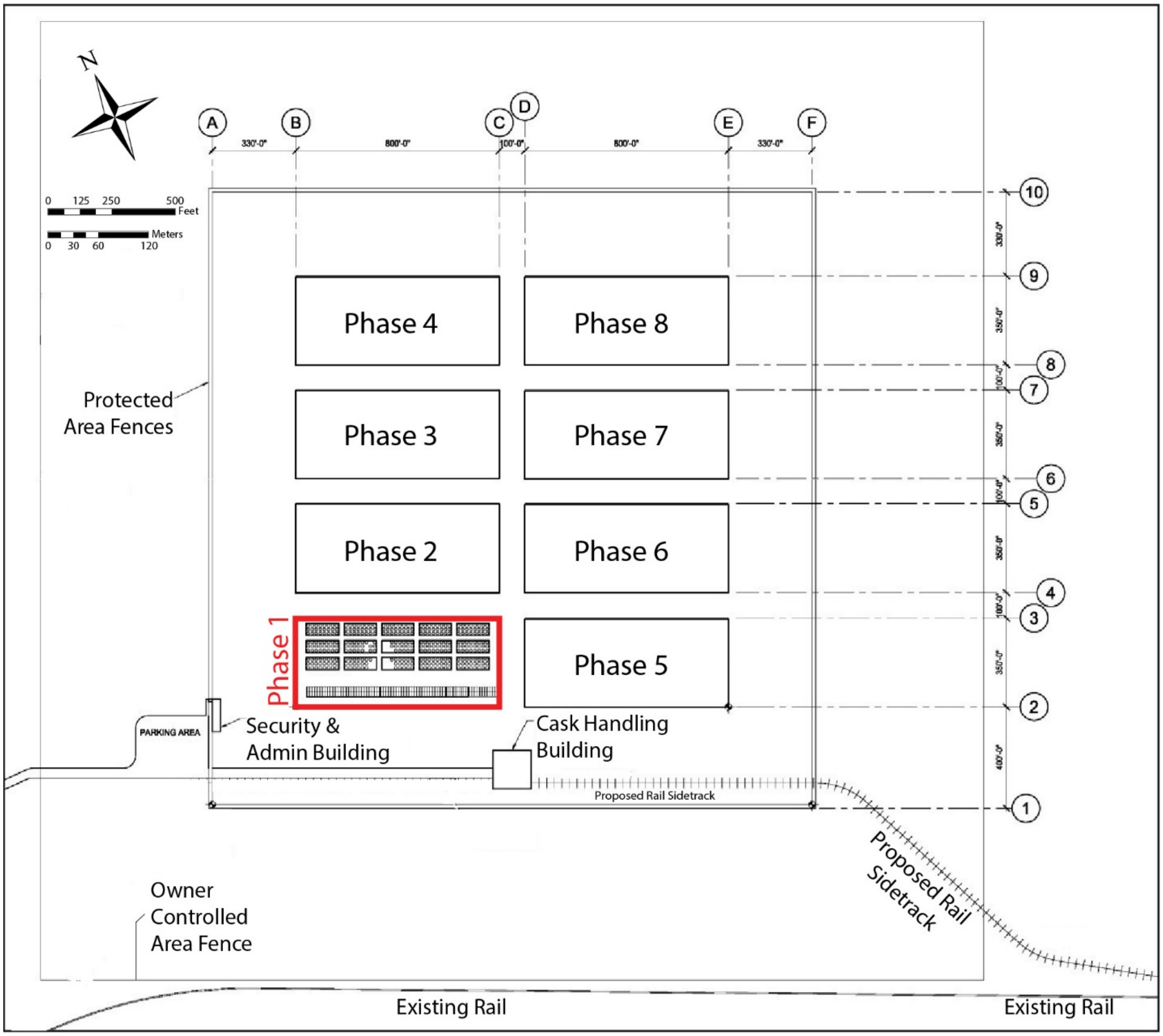

Figure 2.2-5 Proposed CISF Site Plan (Modified from ISP, 2020)

ISP stated its intent that construction of Phases 2-8 would occur over a 20-year period after license issuance (ISP, 2020).

Storage Pads

The storage pads would be conventional cast-in-place reinforced concrete mat foundation structures that would provide a level and stable surface for placement of the DCSS. Phase 1 of the proposed CISF (and each of the other phases, if approved) would encompass an area 107 m [350 ft] wide and 244 m [800 ft] long (EIS Figure 2.2-5). Within the area designated, there would be a concrete storage pad and vehicle approach apron. There would be a minimum of 100 m [330 ft] between the storage pads and the protected area fence. A conceptual drawing depicting the placement of the DCSS on the Phase 1 storage pad is shown in EIS Figure 2.2-6.

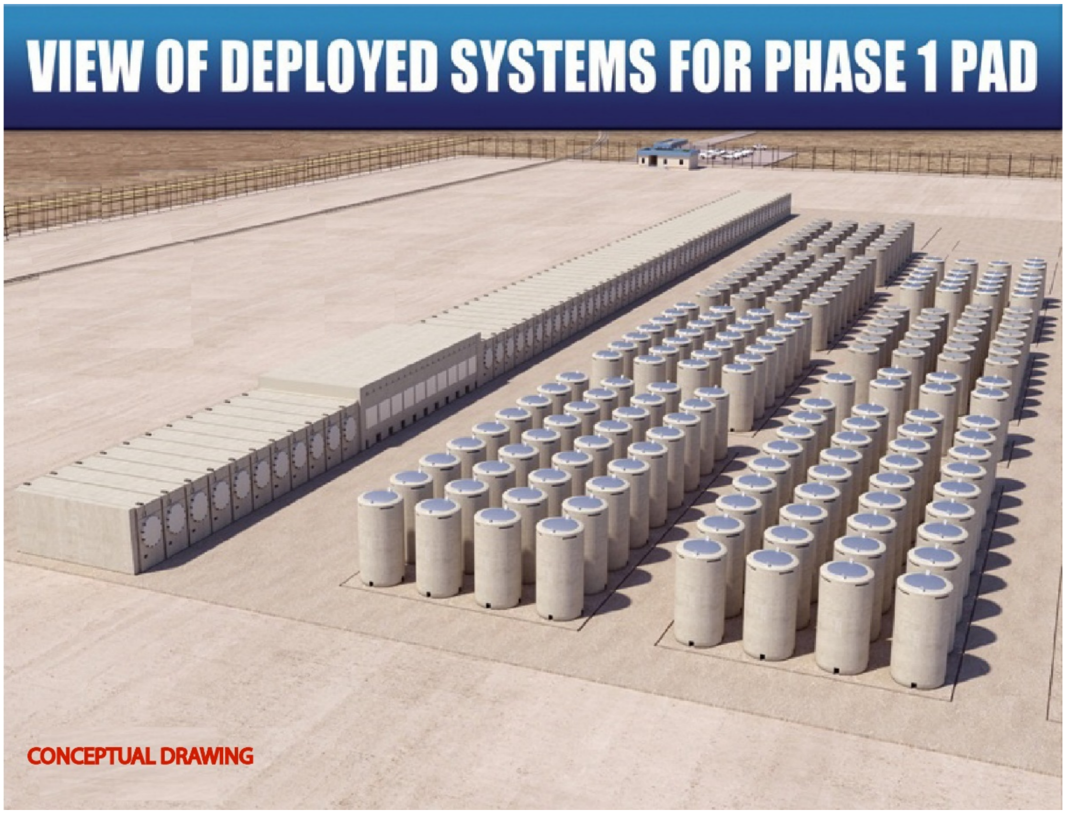

Figure 2.2-6 Conceptual Drawing of Deployed SNF Storage Systems for Phase 1 of the Proposed CISF (Modified from WCS)

Each concrete storage pad would be 46 to 91 cm [18 to 36 in] thick, depending on specific load conditions and structural design requirements of each approved DCSS. In accordance with guidance in NUREG–1567, Standard Review Plan for Spent Fuel Dry Storage Facilities (NRC, 2000), the storage pads would be designed to withstand normal operating loads, severe environmental loads, and extreme environmental loads (ISP, 2018b). SNF received from different reactor facilities would be stored separately on the pads to accommodate the different storage system designs, the characteristics of different fuel types received from the facilities, and different inspection requirements.

Cask-Handling Building

The cask-handling building (CHB) is where transportation casks containing SNF waste canisters would be received via rail car. The CHB would be located within the protected area between the southern boundary of the protected area fence and the storage pads (EIS Figure 2.2-5). The CHB would be approximately 40 m [130 ft] wide by 43 m [140 ft] long and would be approximately 21 m [70 ft] high (ISP, 2018b). The CHB would house two 100-metric ton [130-ton] overhead cranes for unloading transportation casks from rail cars. In addition to areas for unloading transportation casks and transferring canisters to storage overpacks and transport vehicles, the CHB would include areas for cask storage and for radiological surveys of casks and transport vehicles and their cleaning and decontamination, if contamination is discovered. The CHB would also include waste management and chemical storage areas to support cleaning and decontamination activities.

Security and Administration Building

The security and administration building (SAB) would be located along the western edge of the protected area (EIS Figure 2.2-5). The SAB would be an approximately 10 m [32 ft] wide by 38 m [125 ft] long single-story building. Employee and visitor access into the CISF would be controlled, along with control rail and vehicle access to the CISF facilities. The administration portion of the SAB would contain offices for operations, maintenance, and material control personnel. The administration portion of the SAB would also include a communication and tracking center; a training and visitor center, a health physics area; a records storage area; and a conference room; break room; and restrooms. The health physics area would have space for operation and equipment storage and accumulation of small quantities of LLRW in a waste management area. This LLRW may be produced by the incoming cask operational security inspections, radiation surveys, and decontamination, as necessary, as described in EIS Section 2.2.1.3.2. A covered outdoor area outside the protected area would provide a covered entrance for workers and visitors to access the SAB. A second covered outdoor area inside the protected area would provide shelter for emergency backup generators for the facility.

Rail Sidetrack

SNF deliveries to the proposed CISF would be made via a rail sidetrack that would be constructed adjacent to the existing rail line that encircles WCS's existing waste management facilities (EIS Figure 2.2-2). The existing rail line extends from the WCS facilities to Eunice, New Mexico, where it connects with the Texas New Mexico Railroad. The rail sidetrack would be approximately 1.6 km [1 mi] in length. Rail cars would travel east on the rail sidetrack and enter the west side of the CHB to be unloaded. Once SNF is unloaded from the rail car, the rail car would exit the east side of the CHB and travel east on the sidetrack before reconnecting to the existing rail line that encircles the current WCS facilities.

2.2.1.3.2 Operations

ISP would commence operations of the proposed CISF about 3 months after Phase 1 construction completion, which would take about 1 year to complete (ISP, 2020). ISP estimates that 30 workers distributed between three shifts per day would be directly involved in operating the proposed CISF (ISP, 2020). Operation of the proposed CISF would involve receiving, transferring, and storing the SNF waste as described in the following sections. A general discussion of canister transportation to the proposed CISF is included to provide a complete description of operational activities. Once a permanent geologic repository is available for SNF disposal, defueling operations at the proposed CISF would include transferring the storage canisters to shipping casks and transporting them to the permanent repository. Shipments away from the proposed CISF would be accomplished by reversing the order of operations used for the receipt of SNF at the proposed CISF.

Transportation of Storage Canisters to the Proposed CISF

ISP proposes to use dual-purpose canister-based systems for transportation and storage of the SNF. Canisters would be removed from storage overpacks at the originating site (i.e., the reactor site) and transferred to NRC-approved shipping casks for transportation to the proposed CISF. This process would be conducted under the originating site's 10 CFR Part 50 or 10 CFR Part 72 license, as applicable. Prior to shipment from the originating site, transportation casks would be surveyed to ensure that all transportation standards, including radiological contamination and dose limits, are satisfied pursuant to NRC regulation in 10 CFR Part 71 and

U.S. Department of Transportation (DOT) regulations in 49 CFR Part 173. In addition, prior to shipment from the originating site, ISP would verify that canisters shipped to the proposed CISF are following the terms, conditions of use, and technical specifications of NRC-approved DCSS to be used at the proposed CISF (ISP, 2018b).

Shipments would be transported via rail car. For originating sites without direct rail access, the transportation cask would be loaded onto a heavy-haul vehicle or barge and transported to a nearby rail line where the cask would be loaded onto a rail car for transportation to the proposed CISF. Shipments would be transported across the U.S. to Monahans, Texas, using rail lines operated primarily by the Union Pacific Railroad. From Monahans, shipments would be transported north to Eunice, New Mexico, on existing rail the Texas New Mexico Railroad owns and operates (EIS Figure 2.2-7). From Eunice, shipments would be transported east to the proposed CISF on the WCS-controlled and operated railroad spur. ISP estimates that approximately 3,400 loaded SNF canisters could be delivered to the CISF over the licensed operating period and has evaluated as many as 200 canisters shipped per year in their transportation impact analysis (ISP, 2020). Considering that ISP has proposed to ship up to 3,400 canisters over 8 phases, the NRC estimates approximately 425 canisters would be shipped, on average, for each phase.

<u>Receipt, Transfer, and Storage of SNF</u>

The proposed CISF would be designed and operated using a “start clean/stay clean” philosophy, meaning that it would be designed and operated as a radiological contamination-free facility (ISP, 2020). All components of the proposed CISF, including the transportation casks and storage canisters, are designed to minimize the potential for any contamination. Storage canisters are welded shut and sealed to prevent leaks and would not be opened during transportation to the proposed CISF or during storage. Transportation casks would be surveyed prior to shipment to the proposed CISF to ensure that all transportation standards are satisfied in accordance with NRC (10 CFR Part 71) and DOT (49 CFR Part 173) requirements. Transportation casks would not be shipped to the proposed CISF unless all appropriate NRC and DOT regulations are satisfied. Continual radiological monitoring of storage cask systems would be conducted throughout the license term of the facility to identify any potential contamination.

Transportation casks containing SNF waste canisters would be received via rail car at the CHB. After arrival in the CHB, transportation casks would undergo security inspections, radiation surveys, and decontamination, as necessary. Security inspections and radiation surveys would be conducted in accordance with requirements in 10 CFR Part 71. Once receipt is complete, the transportation casks would be unloaded from the rail car. Transportation casks would be removed from rail cars using a 100-metric-ton [130-ton] capacity overhead bridge crane. There would be a back-up overhead bridge crane inside the CHB to provide operational redundancy for unloading casks.

The operational transfer of SNF canisters from the transportation cask to a storage overpack or module would depend on the orientation of the DCSS. For horizontal storage systems (e.g., the TN Americas NUHOMS® systems listed in EIS Table 2.2-1), the overhead bridge crane would be used to lift the transportation cask horizontally from the rail car to a transfer trailer. The transfer trailer would then move the transportation cask from the CHB to the storage pad where the SNF canister would be directly inserted into a horizontal storage module (HSM). For vertical storage systems (e.g., the NAC International systems listed in EIS Table 2.2-1), the overhead bridge crane would be used to unload, upright, and place transportation casks under a

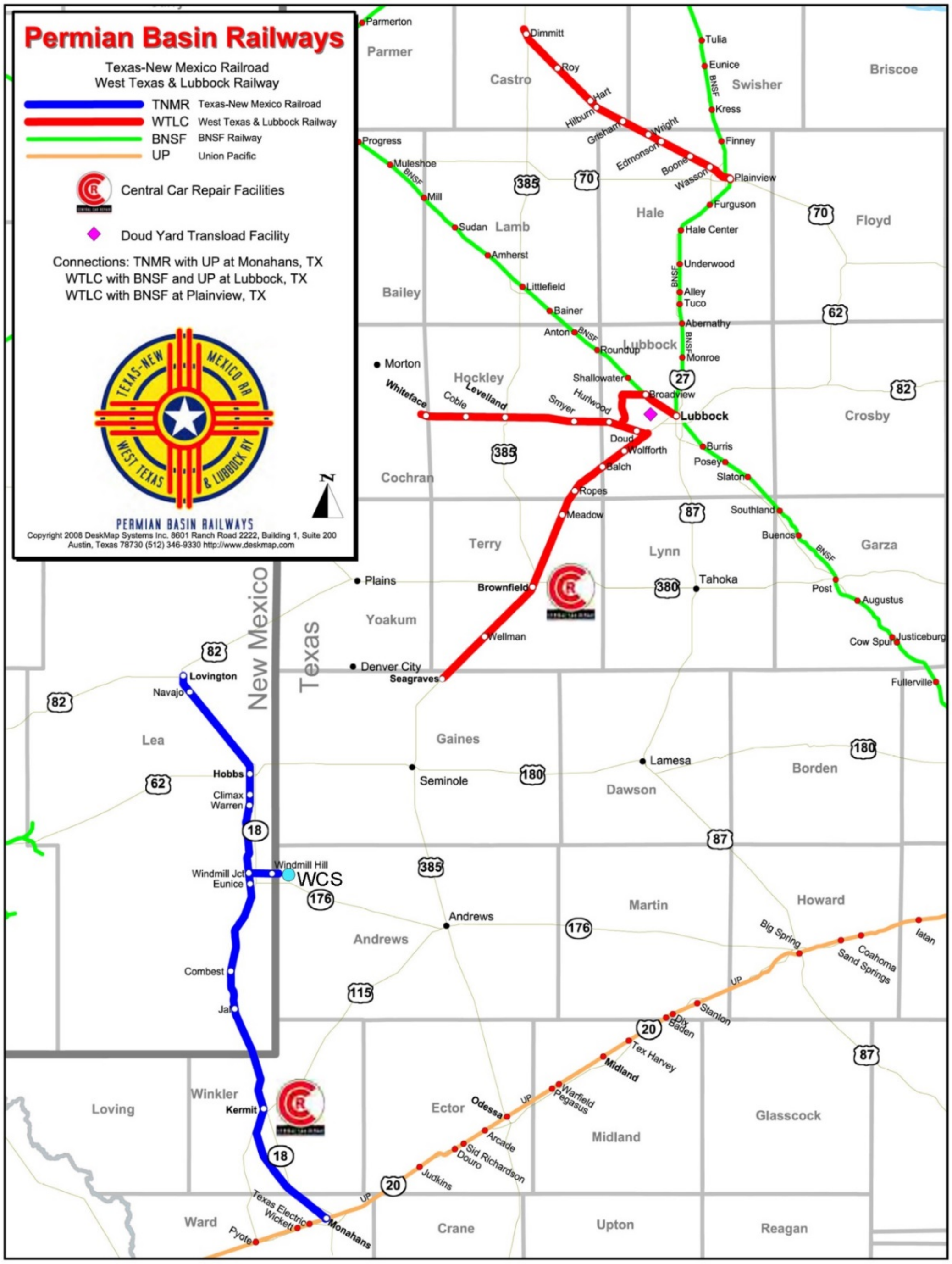

Figure 2.2-7 Location of Railroads in West Texas and Southeastern New Mexico (ISP, 2020)

Canister Transfer System (CTS). The CTS includes a shielded transfer cask and mobile gantry crane that is used to move the SNF canisters from the upright transportation cask to the vertical storage overpack. Once the SNF canister is transferred to the storage overpack, a Vertical Cask Transporter (VCT) would be used to move and place the overpack onto the storage pad.

Detailed descriptions, including illustrations, of the sequence of canister handling and transfer operations for horizontal and vertical storage systems listed in EIS Table 2.2-1 can be found in Appendices A through H of the SAR (ISP, 2018b).

2.2.1.3.3 Facility Closure and Decommissioning

At the end of its license term, the proposed CISF would be closed. As NRC regulations require, decommissioning of the proposed CISF would be required prior to closure of the facility and termination of the NRC license. The objective of decommissioning would be to identify and remove all radioactively contaminated materials with radioactive contamination levels above the applicable NRC limits for the site to be released for unrestricted use pursuant to 10 CFR 20, Subpart E, Radiological Criteria for License Termination.

In accordance with 10 CFR 72.30, Financial Assurance and Recordkeeping for Decommissioning, the ISP application must include a decommissioning funding plan for NRC review and approval and a proposed decommissioning plan. The decommissioning funding plan must contain information on how reasonable assurance will be provided that funds will be available to decommission the proposed CISF and a detailed cost estimate for decommissioning. ISP's decommissioning funding plan and cost estimate is contained in Appendix D of its license application for the proposed CISF (ISP, 2018a). This plan was developed following guidance in NUREG–1757, Vol. 3, Rev. 1, Consolidated NMSS Decommissioning Guidance – Financial Assurance, Recordkeeping, and Timeliness (NRC, 2012).

ISP's proposed decommissioning plan, which is contained in Appendix B of its license application (ISP, 2018a), is summarized in the following paragraphs. Because the exact nature of decommissioning cannot be predicted at this stage of the project, the information presented represents the best available description of the activities envisioned for decommissioning the proposed CISF. ISP would need to submit a final decommissioning plan for NRC review and approval prior to license termination, pursuant to 10 CFR 72.54 requirements. The final decommissioning plan would include information on site preparation and organization; procedures and sequences for removal of systems and components; decontamination procedures; design, procurement, and testing of any specialized equipment; identification of outside contractors to be used; procedures for removal and disposal of any radioactive materials; and a schedule of activities. The NRC approval process would require a safety review and an environmental review under NEPA.

After removal of all SNF from the proposed CISF, the principal activities involved in decommissioning would include (i) initial characterization surveys to identify any areas of contamination; (ii) decontamination and/or disassembly of contaminated components; (iii) waste disposal; and (iv) final radiological status surveys.

Prior to facility closure and decommissioning, the SNF contained inside sealed metal canisters remaining at the proposed CISF would be retrieved from their storage modules and transferred into licensed transportation casks for shipment to a permanent geologic repository. The SNF would remain inside these sealed canisters such that decontamination of the canisters is not expected to be necessary. Decommissioning activities would then be limited to radiological surveys and any necessary decontamination of storage casks, storage pads, or building structures. It is not anticipated that the storage casks or pads would have residual radioactive contamination, because (i) the SNF canisters would be surveyed and decontaminated at the generator facility and again when they arrive at the proposed CISF to ensure that there is no radiological contamination; (ii) the canisters remain sealed during transport to and storage at the proposed CISF; and (iii) the neutron flux levels the SNF generates would be sufficiently low that activation of the storage casks and pads would produce negligibly small levels of radioactivity, if any.

Following the removal of all SNF canisters stored at the proposed CISF, the storage modules and storage pads would be surveyed to determine their levels of residual radioactivity. ISP anticipates that the storage modules and storage pads would not be contaminated and would be left in place or removed as waste material. In the event the characterization surveys identify radiological contamination levels above applicable NRC limits for unrestricted use, conventional decommissioning techniques would be used to decontaminate areas of contamination and/or disassemble contaminated components. Contaminated components and wastes generated during decontamination would be sent to a disposal facility licensed to accept these wastes.

2.2.1.4 Emissions and Wastes

All stages of the proposed CISF (i.e., construction, operation, and decommissioning) would generate effluents and waste streams that must be handled and disposed properly. This section describes the various types and volumes of effluents or wastes that the proposed CISF would generate.

Nonradiological Gaseous or Airborne Particulate Emissions

The primary nonradiological emissions the proposed CISF may generate would be combustion emissions and fugitive dust. The main sources of the combustion emissions would be mobile sources and construction equipment. Combustion emissions are further categorized into nongreenhouse gases and greenhouse gases. The main sources of fugitive dust [e.g., particulate matter (PM) $PM_{2.5}$ and particulate matter PM_{10}] would be travel on unpaved roads and wind erosion from disturbed land. Particulate matter PM_{10} refers to particles that are 10 micrometers (μm) [3.9×10^{-4} inches] in diameter or smaller, and $PM_{2.5}$ refers to particles that are 2.5 μm [9.8×10^{-5} inches] in diameter or smaller.

EIS Table 2.2-2 contains the proposed action (Phase 1) estimated emission levels for each project stage (i.e., construction, operation, and decommissioning) as well as for peak-year emissions. Peak-year emissions represent the highest emission levels associated with the proposed action (Phase 1) for each individual pollutant in any one year and therefore also represent the greatest potential impact to air quality. For the proposed action (Phase 1), no stages overlap, so the peak year for each pollutant occurs during the stage with the highest emission levels for that pollutant. Construction activities would primarily generate combustion emissions from mobile sources as well as fugitive dust from clearing and grading of the land and vehicle movement over unpaved roads. Operation activities would primarily generate combustion emissions from equipment used to receive SNF and load it into modules or unload the SNF from the modules and remove the SNF from the proposed CISF. Decommissioning activities would be limited to radiological surveys and any necessary decontamination of storage casks, storage pads, or building structures (EIS Section 2.2.1.3.3). The applicant estimated the construction and operations stage emission levels but not the decommissioning stage emission levels. The NRC staff assumes that the operations stage emissions would bound the decommissioning stage emissions. For the proposed action (Phase 1), the construction stage would generate the peak-year emission levels for all of the pollutants identified in EIS Table 2.2-2.

Table 2.2-2 Estimated Proposed Action (Phase 1) Emission Levels of Various Pollutants for the Proposed CISF				
Pollutant	**Construction TPY***	**Operations TPY***	**Decommissioning TPY***	**Peak Year TPY***
Carbon Dioxide	7,121	370	370	7,121
Carbon Monoxide	41.36	2.15	2.15	41.36
Hazardous Air Pollutants	0.16	0.01	0.01	0.16
Nitrogen Oxides	23.93	0.31	0.31	23.93
Particulate Matter $PM_{2.5}$	0.34	0.01	0.01	0.34
Particulate Matter PM_{10}	0.98	0.01	0.01	0.98
Sulfur Dioxide	12.69	0.66	0.66	12.69
Volatile Organic Compounds	15.30	0.80	0.80	15.30

*Stands for metric tons per year. To convert to short tons per year, multiply by 1.10231.
Source: Interim Storage Partners, 2020

EIS Table 2.2-3 contains Phases 2-8 estimated emission levels for the various project stages and the peak year. The peak year for Phases 2-8 accounts for when any stages (regardless of phase) overlap. Construction stage emission levels for Phases 2-8 are estimated to be less than the proposed action (Phase 1) construction stage emission levels because Phases 2-8 emissions do not include the emissions associated with building all of the infrastructure needed to support the proposed CISF project. None of the subsequent expansion phase construction stages overlap with each other. For the operations stage, the primary activity that would generate air emissions would be loading and unloading of SNF. This loading and unloading of SNF during subsequent expansion operations stages would not overlap between phases because phases are operated sequentially. However, operations stages would overlap with construction stages (e.g., Phase 1 operations would overlap with Phase 2 construction). For Phases 2-8, the overlapping construction and operations stages generate the peak-year emission levels for the pollutants identified in EIS Table 2.2-3. As described in the preceding paragraph, the construction stage generates the peak-year emissions for the proposed action (Phase 1). The peak-year emission levels for Phases 2-8 (EIS Table 2.2-3) are less than the peak-year emission levels for Phase 1 (EIS Table 2.2-2). The way the stages overlap for full build-out (Phases 1-8) would be the same as the way the stages overlap for Phases 2-8 (i.e., subsequent construction stages overlap with operations stages). This means the peak-year emission levels for full build-out (Phases 1-8) are the same as the peak-year emission levels for Phases 2-8.

Table 2.2-3 Estimated Phases 2-8 Emission Levels of Various Pollutants for the Proposed CISF				
Pollutant	**Construction**	**Operations**	**Decommissioning**	**Peak Year**
	TPY*	**TPY***	**TPY***	**TPY***
Carbon Dioxide	2,932	370	370	3,302
Carbon Monoxide	17.03	2.15	2.15	19.18
Hazardous Air Pollutants	0.06	0.01	0.01	0.07
Nitrogen Oxides	9.44	0.31	0.31	9.75
Particulate Matter $PM_{2.5}$	0.12	0.01	0.01	0.13
Particulate Matter PM_{10}	0.15	0.01	0.01	0.16
Sulfur Dioxide	5.23	0.66	0.66	5.89
Volatile Organic Compounds	6.30	0.80	0.80	7.10

*Stands for metric tons per year. To convert to short tons per year, multiply by 1.10231.
Source: Interim Storage Partners, 2020

Waste Generation

This section summarizes the types and volumes of effluents or wastes that ISP estimates would be generated during all stages of the proposed CISF and the definitions of the types of waste that would be generated.

Quantities for each of the waste streams analyzed in this EIS (EIS Section 4.14) and produced during all phases of the proposed CISF are provided in EIS Table 2.2-4. Depending on the stage of the proposed CISF, different types and volumes of waste are produced, including nonhazardous, low-level radioactive waste (LLRW), hazardous, and sanitary wastes.

Table 2.2-4 Quantities of Different Types of Waste Generated by the Various Stages of the Proposed CISF*

Stage	Solid Waste			Liquid Waste
	Nonhazardous*	Low-Level Radioactive (LLRW)	Hazardous	Sanitary†
Construction – Phase 1 (5,000 MTU) [5,500 ton] capacity storage pad, cask handling building, security and administration building, and rail sidetrack	5,945 metric tons‡ (total for Phase 1)	none	1.2 metric tons (total for Phase 1)	681,818 liters/ year†
Construction– Phases 2-8	40,769 metric tons (total for Phases 2-8)	none	8.4 metric tons (total for Phases 2-8)	681,818 liters/year
Operation of Phase 1 capacity only (5,000 MTU) [5,500 ton] capacity, including use of rail sidetrack, and defueling)	48 metric tons/year	1.2 metric tons/year (11.7 m^3)**	1.2 metric tons/year	700,758 liters/year
Operation of Phases 2-8, including use of rail sidetrack, and defueling)	48 metric tons/year	1.2 metric tons/year (11.7 m^3)**	1.2 metric tons/year	700,758 liters/year
Decommissioning – Phase 1 (5,000 MTU) [5,500 ton] capacity storage pad, cask handling building, security and administration building, and rail sidetrack	9.07 metric tons (total for Phase 1)	11.15 metric tons (total for Phase 1)	0.15 metric tons (total for Phase 1)	360,000 liters/year
Decommissioning – Phases 2-8	63.5 metric tons (total for Phases 2-8)	78.05 metric tons (total for Phases 2-8)	1.05 metric tons (total for Phases 2-8)	360,000 liters/year

*As described in EIS Section 4.14.1, this table only includes waste streams to be analyzed in EIS Section 4.14.
**Volumes provided for nonhazardous waste were calculated as described in EIS Section 4.3.1
†This value is the system capacity rather than the waste-generation rate. To convert liters to gallons, multiply by 0.264.
‡To convert metric tons to short tons, multiply by 1.10231.
Source: Modified from (ISP, 2020)

Nonhazardous waste produced includes waste that is neither radioactive nor hazardous and is typically disposed of in a municipal landfill. For the proposed CISF, nonhazardous waste would include typical office/personnel waste and miscellaneous waste from construction of facilities and from fabrication of SNF storage systems. For disposal of nonhazardous waste, ISP has selected the nearby Lea County Landfill, a municipal landfill facility that has permits from the State of New Mexico to handle nonhazardous waste.

> **Nonhazardous waste**
> Waste that is neither radioactive nor hazardous and typically disposed in a landfill.
>
> **Low-level radioactive waste (LLRW)**
> A general term for a wide range of items that have become contaminated with radioactive material or have become radioactive through exposure to neutron radiation. The radioactivity in these wastes can range from just above natural background levels to much higher levels, such as those levels seen in parts from inside the reactor vessel in a nuclear power reactor.
>
> **Hazardous waste**
> A solid waste or combination of solid wastes that, because of its quantity, concentration, or physical, chemical, or infectious characteristics, may (i) cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness or (ii) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed, or otherwise managed (as defined in the Resource Conservation and Recovery Act, as amended, Public Law 94-5850).
>
> **Sanitary waste**
> Liquid or solid waste originating from humans and human activities.

For the proposed CISF, typical LLRW produced would include paper or cloth swipes, paper towels, protective clothing, used high-efficiency particulate air (HEPA) filters, and other similar job control wastes with low levels of radiological contamination. Based on fuel storage loading campaign experience, quantities of this waste produced are dependent on the number of casks loaded and is estimated to be limited. The use of NRC-certified storage casks at the proposed CISF project would fully contain the stored radioactive material. The proposed CISF is not expected to generate LLRW other than an estimated small amount of LLRW resulting from health physics activities. Any LLRW generated would be managed (e.g., handled and stored) in accordance with an NRC-approved and 10 CFR Part 20-compliant radiation protection plan, and consequently, the possibility of releases to the environment would be minimized. Disposal of LLRW would occur at the WCS LLRW disposal facility in Andrews County, Texas, which is adjacent to the proposed CISF and licensed by the TCEQ.

For the proposed CISF, limited quantities of hazardous wastes are expected to be generated from the potential use of small quantities of chemicals, solvents, and from any leaks resulting in spills of oil from operating equipment. These activities would be performed using proper handling procedures that would prevent releases of hazardous materials into the environment. Any hazardous waste generated from the proposed CISF would fall within State and Federal requirements applicable to a Conditionally Exempt Small Quantity Generator (CESQG). As such, for the proposed CISF, hazardous waste would be identified, stored, and disposed in accordance with State and Federal requirements applicable to CESQG. Disposal of hazardous waste the proposed CISF may generate would occur at the WCS RCRA Subtitle C Landfill adjacent to the proposed CISF and licensed by the TCEQ.

Sanitary waste produced from the proposed CISF would include waste from bathrooms, lavatories, mop sinks, and other similar fixtures located in the cask-transfer building, security building, and administrative building. Sanitary wastewater will be contained using onsite sewage collection tanks and underground digestion tanks similar to septic tanks but with no drain field. Sanitary waste management systems would be designed and operated in accordance with TCEQ and Federal standards. After testing the waste in the collection tanks to ensure that 10 CFR Part 20 release criteria and applicable State of Texas requirements are met, the sewage will be disposed at an offsite treatment facility. Stormwater runoff would be managed in accordance with a Texas Pollutant Discharge Elimination System (TPDES) permit.

2.2.1.5 Transportation

Throughout the facility lifecycle stages, ISP would use roadways for commuting workers, equipment, supply shipments, and any shipments of waste the proposed activities would generate. Additionally, during operations, ISP proposes using the national rail network for transportation of SNF from reactor sites to the proposed CISF and eventually from the CISF to a permanent geologic repository for disposal. A summary of the transportation shipments by stage is included in EIS Table 2.2-5.

Transportation During Construction of the Proposed CISF

During the construction stage of the proposed CISF and the associated rail sidetrack, ISP would use trucks to transport construction supplies and equipment to the proposed project area and to transport wastes (EIS Section 2.2.1.4) from the proposed project area. The volume of estimated construction traffic from supply shipments, waste shipments, and workers commuting was estimated from information provided in the application (ISP, 2020).

Table 2.2-5 Summary of Estimated Transportation by Proposed Project Stage, Phase, and Purpose

CISF Lifecycle Stage and Purpose	CISF Phase	Estimated Daily Vehicle Round Trips*
Construction		
Supplies and Wastes	Phase 1	50
Commuting Workers	Phase 1	50
Supplies and Wastes	Phase 2-8	50
Commuting Workers	Phase 2-8	50
Operations		
Wastes	Phase 1	0.1 (one every 10 days)
Commuting Workers	Phase 1	60
SNF Shipments	Phase 1	0.55 (one every 2 days)
Wastes	Phase 2-8	0.1 (one every 10 days)
Commuting Workers	Phase 2-8	110
SNF Shipments	Phase 2-8	0.55 (one every 2 days)
Decommissioning		
Wastes	Phase 1	negligible
Commuting Workers	Phase 1	negligible
Wastes	Phase 2-8	negligible
Commuting Workers	Phase 2-8	negligible

*Estimates of transportation vehicle round trips are based on information provided in the license application as described in this EIS Section 2.2.1.5 and EIS Section 4.3. No estimates are provided for departing SNF shipments, because the schedule for defueling depends on repository availability. The rate would be limited by the rate of canister loading and transfer capabilities at the proposed CISF. The estimated vehicle round trips for Phase 2-8 apply to any single phase within this group. With the exception of operations waste vehicle trips, all quantitative estimates are upper bound values. Therefore, actual project vehicle traffic could be less than the values reported in this table.

ISP estimated that approximately 50 shipments of construction supplies and wastes would occur per day during the approximate 30-month construction period for any single phase (ISP, 2020). For the construction stages of Phases 2-8, the NRC staff expects that the approximate volume of construction supplies and wastes would be less than that required for construction of the proposed action (Phase 1) because the proposed facilities and infrastructure (e.g., cask-handling facility, administration and security building, rail sidetrack) would already be built, and therefore construction would only be associated with additional storage pads. Therefore, the NRC staff considers the ISP estimates would bound the shipments of these materials during the construction of Phases 2-8.

In addition to the construction supply and waste shipments, an estimated peak construction workforce of 50 workers during any phase would commute to and from the proposed CISF construction site using individual passenger vehicles and light trucks on a daily basis (ISP, 2020). These workers could account for an increase of 50 vehicles going to and from the proposed project area each day during construction, for a total of 100 trips per day.

Transportation During Operation of the Proposed CISF

During operation of the proposed CISF, ISP would continue to use roadways for supply and waste shipments in addition to workforce commuting. Additionally, ISP anticipates that the national rail network would be used for transportation of SNF from reactor sites to the proposed CISF and eventually from the CISF to a permanent geologic repository for disposal.

The ER did not provide estimates of operations supply shipments; however, based on the nature of dry cask storage and the proposed operations, the NRC staff expects that the number of annual supply shipments would not substantially contribute to shipment estimates.

For waste shipments during the operations stage of the proposed action (Phase 1) and any of the subsequent Phases 2-8, ISP estimated the annual generation of nonhazardous solid waste that would need to be shipped offsite for disposal would be approximately 48 metric tons [53 tons] (ISP, 2019). The NRC staff converted ISP's waste estimate to a volume of 590 cubic meters (m^3) [770 (cubic yards (yd^3)] using available conversion factors for commercial municipal waste (EPA, 2016). Assuming a hauling capacity of 15 m^3 [20 yd^3] per truck, the NRC staff estimated 38 waste shipments would occur during operations per year or about one shipment every 10 days. LLRW and hazardous wastes would be generated in much smaller quantities during operations and would therefore not contribute significantly to the proposed shipping activity.

ISP estimated that the workforce for the operations stage of the proposed action (Phase 1) would include up to 60 regular employees. This workforce is assumed to commute to and from the proposed CISF project using separate passenger vehicles and light trucks on a daily basis (ISP, 2020). Construction of an additional phase (e.g., Phases 2-8) would occur concurrently with operations of previously constructed phases. ISP has estimated that, for each phase, 50 construction workers would commute to the site. Therefore, the combined total workforce commuting during operations could add a peak of 110 commuting workers and their vehicles traveling to and from the proposed project area each day.

During operation of any project phase, SNF would be shipped by rail from existing storage sites at nuclear power plants or ISFSIs to the proposed CISF. These shipments must comply with applicable NRC and DOT regulations for the transportation of radioactive materials in 10 CFR Parts 71 and 73 and 49 CFR Parts 107, 171–180, and 390–397, as appropriate to the mode of transport. For the operations stage of the proposed action (Phase 1), ISP proposes a bounding estimate of 200 canisters of SNF from reactors to the proposed CISF (ISP, 2020) over the course of a year, resulting in approximately one shipment every 2 days. During the operations stage of each additional phase (i.e., Phases 2-8), ISP estimates that up to 200 canisters would be shipped to the proposed CISF per year until the maximum of approximately 3,400 canisters has been shipped to the proposed CISF at full build-out (Phases 1-8) over a period of approximately 20 years or more within the 40-year license term. Based on the total number of canisters and phases, the NRC estimated the average number of canisters shipped per phase would be 425. When a repository becomes available, the daily number of SNF shipments to the repository would be determined by several factors but would be limited by the same loading and transfer capabilities at the CISF that factored into the ISP's maximum rate of SNF receipt (200 shipments per year, or approximately one shipment every 2 days).

Transportation During Decommissioning of the Proposed CISF

During the decommissioning stage of the proposed CISF project, ISP would use roadways for the transportation offsite of waste materials and for commuting workers.

Decommissioning activities would be limited based on the design and expected performance of the dry storage casks systems. Regarding the potential for LLRW shipments, the NRC staff expects that generated radioactive waste would be limited to small volumes because, as described in EIS Section 2.2.1.3.3, SNF canisters would remain sealed during storage, external contamination would have been limited by required surveys at the reactor site prior to shipment, and canister inspections would occur upon arrival at the proposed CISF project. Therefore, the volume of LLRW shipments would be very low during decommissioning activities. The workforce and resulting number of vehicles required for commuting during decommissioning is expected to be negligible.

2.2.2 No-Action Alternative

Under the No-Action alternative, the NRC would not approve ISP's license application for the proposed CISF in Andrews County, Texas. The No-Action alternative would result in ISP neither constructing nor operating the proposed CISF. Concrete storage pads and associated infrastructure (rail sidetrack and cask-handling building) for transporting and transferring SNF to the proposed CISF would not be constructed. Additionally, the NRC staff assumes that SNF that ISP considers in its license application to be destined for the proposed CISF would remain at commercial reactor or storage sites (in either dry or wet storage), be stored in accordance with NRC regulations, and be subject to NRC oversight and inspection. Site-specific impacts at each of these storage sites would be expected to continue as detailed in generic (NRC, 2013, 2005) or site-specific environmental analyses. In accordance with current U.S. policy, the NRC staff also assumes that the SNF would be transported to a permanent geologic repository, when such a facility becomes available. Inclusion of the No-Action alternative in the EIS serves as a baseline for comparison of environmental impacts of the proposed action (Phase 1).

2.3 Alternatives Eliminated from Detailed Analysis

2.3.1 Storage at a Government-Owned CISF the U.S. Department of Energy (DOE) Operates

The DOE is planning for an integrated waste management system to transport, store, and dispose of the nation's SNF and high-level radioactive wastes (https://www.energy.gov/ne/consent-based-siting/integrated-waste-management). Such an integrated waste management system would include facilities and other key infrastructure needed to safely manage SNF from commercial nuclear reactors. The DOE's planned integrated waste management system would include pilot interim storage facilities initially focused on accepting SNF from shutdown reactor sites, and full-scale CISFs that provide greater SNF storage capacity. Although this alternative meets the purpose and need for the proposed action (i.e., away-from-reactor optional SNF storage capacity), the DOE has not released detailed information concerning the planned SNF interim storage facilities, such as site locations, SNF transportation options and details, and facility design information, that would allow this alternative to be analyzed in detail. Because the DOE's integrated waste management system is in the planning stages and provides no siting, transportation, and facility design details that would be needed for a comparison of environmental impacts, this alternative was eliminated from detailed consideration.

2.3.2 Alternative Design or Storage Technologies

2.3.2.1 DCSS Design Alternatives

ISP considered other DCSS designs as an alternative to the proposed action (ISP, 2020). In addition to the TN Americas and NAC International DCSS to be used for the proposed action, the NRC has licensed and approved SNF DCSS that Holtec International and Energy Solutions own. These storage systems are in use at various reactor facilities in the U.S. The technical specifications and inspection requirements for these alternative storage systems would necessitate different site layouts, handling procedures for transport, and inspection schedules (ISP, 2020). Among the NRC-licensed and approved SNF storage systems, the NRC has determined that each of them meets appropriate safety regulations; thus, none is deemed technologically preferable to another. In the event that ISP requests a license amendment in the future to include additional storage design technologies, ISP would be required to submit appropriate design certifications and undergo any necessary safety and environmental reviews. The NRC staff determined that at this time, the prospect of the use of additional technology is too speculative to be considered as an alternative in this EIS.

2.3.2.2 Hardened Onsite Storage Systems (HOSS)

Hardened Onsite Storage Systems (HOSS) is a concept that aims to reduce the threat and vulnerability of currently deployed DCSS at nuclear reactor sites (Citizens Awareness Network, 2018) and is not an alternative site design for the proposed CISF. The primary components of HOSS include (i) constructing reinforced concrete and steel structures around each waste container; (ii) protecting each of these structures with mounds of concrete, steel, and gravel; and (iii) spacing the structures over a larger area (Citizens Awareness Network, 2018). The purpose of HOSS is to increase security and resistance to potential damage of DCSS from natural disasters, accidents, and attacks. As mentioned previously, HOSS is a generalized concept, and detailed plans that would allow NRC staff to conduct a detailed safety, environmental, and cost/benefit analysis are not available. Furthermore, HOSS does not meet the purpose and need for the proposed action (provide away-from-reactor optional SNF storage capacity). Therefore, this alternative was eliminated from detailed consideration.

2.3.2.3 Hardened Extended-Life Local Monitored Surface Storage (HELMS)

Hardened Extended-Life Local Monitored Surface Storage (HELMS) is a proposal that defines a strategy to enhance the safety of SNF DCSS (Citizens Oversight, 2018) but is not an alternative site design for the proposed CISF. The components of the HELMS strategy are defined as follows:

- Hardened—storage facilities having design features to resist nonnuclear attack.
- Extended Life—cask systems providing a 1,000-year design life (suggested dual-wall canister design).
- Local—cask systems located near companion nuclear plant (in-state or within regional consortia of states), but away from water resources, dense populations, and seismic zones.
- Monitored—each canister outfitted with an electronic monitoring system to detect cracks and radiation.
- Surface—SNF stored on surface (above ground) for cooling for at least the next 200 to 300 years.

The group Citizens Oversight and its founder, Raymond Lutz, filed a petition (NRC, 2018) with NRC for rulemaking under 10 CFR 2.802 regarding regulations and enforcement for spent fuel storage systems under 10 CFR Part 72, specifically requesting consideration of HELMS. Further, the HELMS proposal sets forth a set of criteria and general design recommendations for managing the nation’s commercially generated SNF (Citizens Oversight, 2018). However, the proposal does not include specific information about interim storage site locations, SNF transportation options and details, DCSS designs, and facility design information that would allow this alternative to be analyzed in detail in this EIS. Moreover, HELMS does not fully meet the purpose and need for the proposed action (provide away-from-reactor SNF storage capacity that would allow SNF to be transferred from existing reactor sites and stored for several decades before a permanent repository is available). As of January 23, 2020, NRC denied this petition (85 FR 3860). Therefore, this alternative was eliminated from detailed consideration in this EIS.

2.3.3 Location Alternative

The alternative sites considered in this EIS are the result of the ISP site-selection process. This section discusses that site-selection process and identifies the potential sites for the proposed CISF, and the criteria and weighting ISP used in the selection process. As discussed below, ISP undertook a site-selection process to identify possible locations for the proposed CISF (ISP, 2020). This evaluation process yielded four potential CISF sites.

Because many environmental impacts can be avoided or significantly reduced through a proper site selection, the NRC staff evaluated the ISP site-selection process to determine if a site ISP considered was environmentally preferable to the proposed Andrews County, Texas, site.

ISP Site-Selection Process

ISP developed and conducted a screening process to identify possible sites for the proposed CISF (ISP, 2020). To begin, the applicant identified seven states in the western and southwestern U.S. with basic characteristics (e.g., low population and arid to semi-arid climate) that it considered appropriate for a CISF site. ISP next eliminated five states (Arizona, California, Colorado, Nevada, and Utah) from consideration because of a lack of expressed political and community support for hosting a CISF.

The two remaining states (Texas and New Mexico) were selected for further evaluation, based on public statements from the respective State Governors in which support for hosting a CISF was expressed at the time of the screening process (ISP, 2020). ISP then considered 54 counties in Texas and 2 counties in New Mexico for additional consideration, of which the applicant selected 2 counties in Texas (Andrews and Loving Counties) and 2 counties in New Mexico (Lea and Eddy Counties), given previous expressions from those counties of a willingness to host a CISF.

ISP then assessed potential CISF locations within each of these four counties using a two-tier screening process. Under the first tier, ISP used five criteria (political support for the project; favorable seismological and geological characteristics; availability to rail access; land parcel size; and land availability) to qualitatively score each site, using a "Go/No Go" rating (ISP, 2020). Based on the results of the first-tier screening, shown in the ER Table 2.3-1 (ISP, 2020), the applicant advanced all four sites to the second tier of screening.

The second screening tier quantitatively, using a score of 1 to 10, evaluated the site selection criteria of the four sites, as well as using criteria that ISP termed "operational needs/considerations" and "environmental considerations." Within each of these criteria, the applicant identified subcriteria and gave percentage weights to both the criteria and the subcriteria. The criteria, subcriteria, and weights ISP used in this second-tier screening are provided in Tables 2.3-1a, 2.3-2, and 2.3-3 of the ER (ISP, 2020). The operational needs/considerations criteria were

- Utilities
- Construction Labor Force
- Operational Labor Force
- Transport Routes
- Amenities for Workforce

The environmental considerations were

- Environmental Protection
- Discharge Routes
- Proximity of Hazardous Operations / High-Risk Facilities
- Ease of Decommissioning
- Disposal of LLRW

Sections 2.3.4 to 2.3.7 of the ER provide ISP's discussion of the potential CISF site within each of the four counties relative to each of the operational needs/considerations and environmental considerations criteria (ISP, 2020). ISP's scoring of each potential site for each of the subcriteria is shown in Tables 2.3-2 and 2.3-3 of the ER, and the overall scores for each site provided in Table 2.3-4 of the ER (ISP, 2020).

The applicant's screening process determined that the Andrews County, Texas, site (i.e., the proposed CISF site on the WCS property) had the fewest environmental and operational impacts because of the availability of utilities, an established local nuclear-related labor culture, and an existing site railhead, along with readily available site characterization data and existing site infrastructure (ISP, 2020). The Andrews County, Texas, site received the highest overall score, with the Eddy County and Lea County sites in New Mexico tying for the next highest score, and the Loving County, Texas, site received the lowest overall score (ISP, 2020).

Conclusion

The NRC staff reviewed ISP's assessment process and determined that the ISP site-selection process has a rational, objective structure and appears reasonable. None of the three other potential CISF sites was clearly environmentally preferable to ISP's proposed site in Andrews County, Texas; therefore, no other site was selected for further analysis in this EIS.

2.4 Comparison of Predicted Environmental Impacts

In evaluation of environmental impacts in this EIS, the NRC staff uses the designations found in NUREG–1748 (NRC, 2003), which categorizes the significance of potential environmental impacts as follows:

> SMALL: The environmental effects are not detectable or are so minor that they would neither destabilize nor noticeably alter any important attribute of the resource considered.

> MODERATE: The environmental effects are sufficient to alter noticeably but not destabilize important attributes of the resource considered.

> LARGE: The environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource considered.

Chapter 4 presents the NRC staff's detailed evaluation of the environmental impacts from the proposed action (Phase 1) and the No-Action alternative on resource areas at the proposed CISF. EIS Table 2.4-1 compares the significance level (SMALL, MODERATE, or LARGE) of potential environmental impacts of the proposed action and the No-Action alternative. For each environmental resource area, the NRC staff identifies the significance level during each stage of the proposed project: construction, operations, and decommissioning.

Table 2.4-1 Summary of Impacts for the Proposed CISF Project

	Land Use		
	Proposed Action (Phase 1)	Full Build-out (Phases 1-8)	No-Action
Construction	SMALL	SMALL	NONE
Operation	SMALL	SMALL	NONE
Decommissioning	SMALL	SMALL	NONE
	Transportation		
	Proposed Action (Phase 1)	Full Build-out (Phases 1-8)	No-Action
Construction	SMALL	SMALL	NONE
Operation	SMALL	SMALL	NONE
Decommissioning	SMALL	SMALL	NONE

Table 2.4-1 Summary of Impacts for the Proposed CISF Project			
	Geology and Soils		
	Proposed Action (Phase 1)	Full Build-out (Phases 1-8)	No-Action
Construction	SMALL	SMALL	NONE
Operation	SMALL	SMALL	NONE
Decommissioning	SMALL	SMALL	NONE
	Surface Water		
	Proposed Action (Phase 1)	Full Build-out (Phases 1-8)	No-Action
Construction	SMALL	SMALL	NONE
Operation	SMALL	SMALL	NONE
Decommissioning	SMALL	SMALL	NONE
	Groundwater		
	Proposed Action (Phase 1)	Full Build-out (Phases 1-8)	No-Action
Construction	SMALL	SMALL	NONE
Operation	SMALL	SMALL	NONE
Decommissioning	SMALL	SMALL	NONE
	Ecology		
	Proposed Action (Phase 1)	Full Build-out (Phases 1-8)	No-Action
Construction	SMALL for wildlife and MODERATE for vegetation. "No Effect" on Federally listed species, and "No Effect" on any existing or proposed critical habitats.	SMALL for wildlife and MODERATE for vegetation. "No Effect" on Federally listed species, and "No Effect" on any existing or proposed critical habitats.	NONE
Operation	SMALL for wildlife and MODERATE for vegetation. "No Effect" on Federally listed species, and "No Effect" on any existing or proposed critical habitats.	SMALL for wildlife and MODERATE for vegetation. "No Effect" on Federally listed species, and "No Effect" on any existing or proposed critical habitats.	NONE
Decommissioning	SMALL for wildlife and MODERATE for vegetation. "No Effect" on Federally listed species, and "No Effect" on any existing or proposed critical habitats.	SMALL for wildlife and MODERATE for vegetation. "No Effect" on Federally listed species, and "No Effect" on any existing or proposed critical habitats.	NONE

Table 2.4-1 Summary of Impacts for the Proposed CISF Project			
	Air Quality		
	Proposed Action (Phase 1)	Full Build-out (Phases 1-8)	No-Action
Construction	SMALL	SMALL	NONE
Operation	SMALL	SMALL	NONE
Decommissioning	SMALL	SMALL	NONE
	Noise		
	Proposed Action (Phase 1)	Full Build-out (Phases 1-8)	No-Action
Construction	SMALL	SMALL	NONE
Operation	SMALL	SMALL	NONE
Decommissioning	SMALL	SMALL	NONE
	Historic and Cultural		
	Proposed Action (Phase 1)	Full Build-out (Phases 1-8)	No-Action
Construction	SMALL. Pending completion of consultation under NHPA Section 106, the NRC staff's preliminary conclusion is that the proposed project would have no effect on historic properties.	SMALL. Pending completion of consultation under NHPA Section 106, the NRC staff's preliminary conclusion is that the proposed project would have no effect on historic properties.	NONE
Operation	SMALL. Pending completion of consultation under NHPA Section 106, the NRC staff's preliminary conclusion is that the proposed project would have no effect on historic properties.	SMALL. Pending completion of consultation under NHPA Section 106, the NRC staff's preliminary conclusion is that the proposed project would have no effect on historic properties.	NONE
Decommissioning	SMALL. Pending completion of consultation under NHPA Section 106, the NRC staff's preliminary conclusion is that the proposed project would have no effect on historic properties.	SMALL. Pending completion of consultation under NHPA Section 106, the NRC staff's preliminary conclusion is that the proposed project would have no effect on historic properties.	NONE

Table 2.4-1 Summary of Impacts for the Proposed CISF Project			
	Visual and Scenic		
	Proposed Action (Phase 1)	Full Build-out (Phases 1-8)	No-Action
Construction	SMALL	SMALL	NONE
Operation	SMALL	SMALL	NONE
Decommissioning	SMALL	SMALL	NONE
	Socioeconomics		
	Proposed Action (Phase 1)	Full Build-out (Phases 1-8)	No-Action
Construction	SMALL impact for employment, housing, and public services; MODERATE for population growth; MODERATE and beneficial impact for local finance	SMALL impact for employment, housing, and public services; MODERATE for population growth; MODERATE and beneficial impact for local finance	NONE
Operation	SMALL impact for employment population growth, housing, and public services; SMALL to MODERATE and beneficial impact for local finance	SMALL impact for employment, population growth, housing, and public services; SMALL to MODERATE and beneficial impact for local finance	NONE
Decommissioning	SMALL impact for employment, population growth, housing, and public services; SMALL to MODERATE and beneficial impact for local finance	SMALL impact for employment, population growth, housing, and public services; SMALL to MODERATE and beneficial impact for local finance	NONE
	Environmental Justice		
	Proposed Action (Phase 1)	Full Build-out (Phases 1-8)	No-Action
Construction	No disproportionately high and adverse human health and environmental effects	No disproportionately high and adverse human health and environmental effects	No disproportionately high and adverse human health and environmental effects

Table 2.4-1 Summary of Impacts for the Proposed CISF Project			
Operation	No disproportionately high and adverse human health and environmental effects	No disproportionately high and adverse human health and environmental effects	No disproportionately high and adverse human health and environmental effects
Decommissioning	No disproportionately high and adverse human health and environmental effects	No disproportionately high and adverse human health and environmental effects	No disproportionately high and adverse human health and environmental effects
	Public and Occupational Health		
	Proposed Action (Phase 1)	Full Build-out (Phases 1-8)	No-Action
Construction	SMALL	SMALL	NONE
Operation	SMALL	SMALL	NONE
Decommissioning	SMALL	SMALL	NONE
	Waste Management		
	Proposed Action (Phase 1)	Full Build-out (Phases 1-8)	No-Action
Construction	SMALL	SMALL	NONE
Operation	SMALL	SMALL	NONE
Decommissioning	SMALL	SMALL	NONE

2.5 Preliminary Recommendation

After weighing the impacts of the proposed action and comparing to the No-Action alternative, the NRC staff, in accordance with 10 CFR 51.71(f), sets forth its preliminary NEPA recommendation regarding the proposed action. The NRC staff preliminarily recommends that, unless safety issues mandate otherwise, the proposed license be issued to ISP to construct and operate a CISF at the proposed location to temporarily store up to 5,000 MTUs [5,500 short tons] of SNF for a licensing period of 40 years (Phase 1). This preliminary recommendation is based on (i) the license application, which includes the ER and supplemental documents and ISP's responses to the NRC staff's requests for additional information; (ii) consultation with Federal, State, Tribal, and local agencies and input from other stakeholders; (iii) independent NRC staff review; and (iv) the assessments provided in this EIS.

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3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 Introduction

The proposed Interim Storage Partners, LLC (ISP) Consolidated Interim Storage Facility (CISF) would be located in Andrews County, Texas, approximately 52 kilometers (km) [32 mile (mi)] west of the City of Andrews, Texas, and about 0.6 km [0.37 mi] east of the Texas–New Mexico State line (EIS Figure 1.2-1). ISP proposes to build the initial phase (Phase 1, or the proposed action) and subsequent expansion phases (Phases 2-8), if approved, of the CISF (EIS Section 1.2) on an approximate 130-hectare (ha) [320-acre (ac)] project area within a 5,666-ha [14,000-ac] parcel of land that Waste Control Specialists, LLC (WCS) controls. In addition, construction of the rail sidetrack, site access road, and construction laydown area would contribute an additional area of disturbed soil such that the total disturbed area for construction of the proposed CISF would be approximately 133.4 ha [330 ac]. This proposed CISF project area would be located north of the existing Low-Level Radioactive Waste (LLRW) disposal facilities WCS operates (EIS Figure 3.1-1).

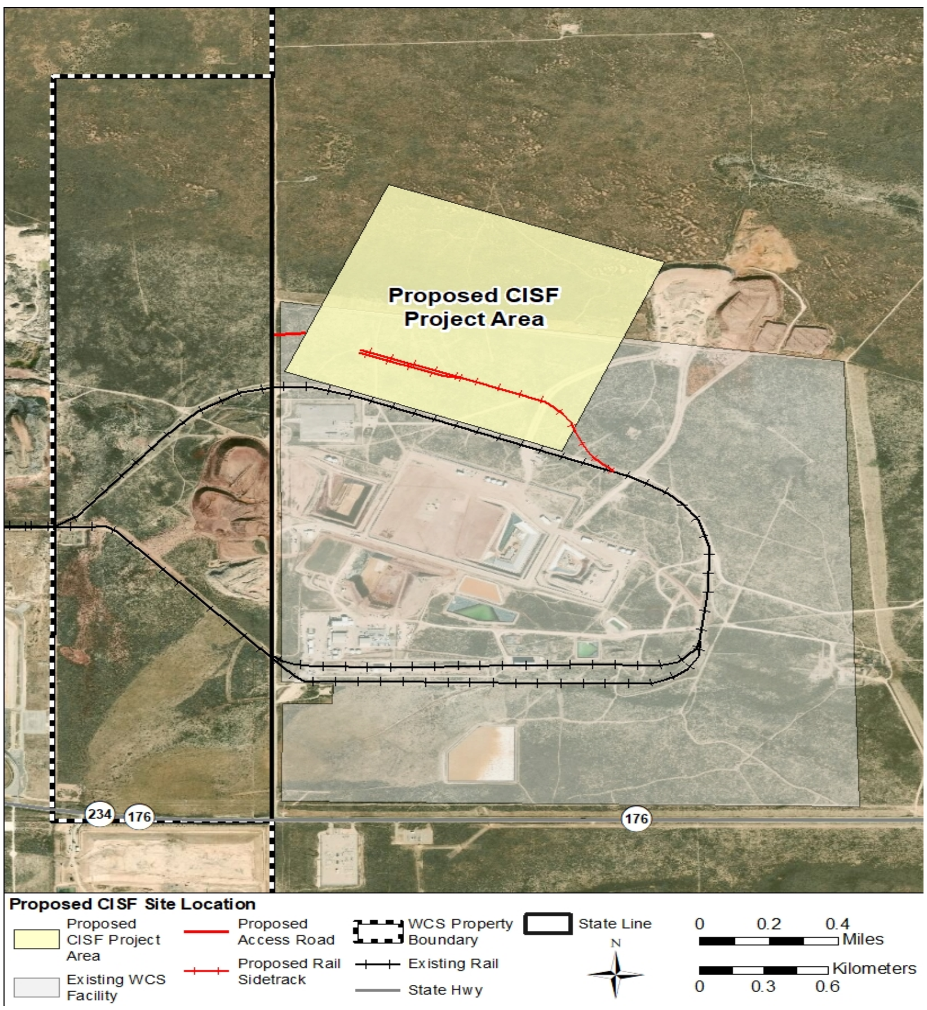

Figure 3.1-1 Site Map Showing Location of the Proposed CISF Project Area in Relation to Existing WCS LLRW Disposal Facilities

This chapter describes the current environmental conditions within the proposed CISF project area and, for some resource areas, the region surrounding the proposed CISF project area, if the proposed action could affect such areas. The resource areas described in this section include land use, transportation, geology and soils, water resources, ecology, noise, air quality, historic and cultural resources, visual and scenic resources, socioeconomics, public and occupational health, and current waste management practices. The descriptions of the affected environment are based upon information provided in the applicant's Environmental Report (ER) (ISP, 2020), Safety Analysis Report (SAR) (ISP, 2018), and the applicant's responses to U.S. Nuclear Regulatory Commission (NRC) staff requests for additional information (RAIs) (ISP, 2019a,b,c,d) and supplemented by additional information the NRC staff identified. The information in this chapter, along with the description of the proposed action (Phase 1) in the preceding chapter, forms the bases from which the NRC staff has evaluated the potential impacts of the proposed action and the No-Action alternative (EIS Chapter 4).

3.2 Land Use

This section describes current land use at and within an 8-km [5-mi] radius of the proposed CISF project area. As shown in EIS Figure 3.1-1, the proposed CISF is closer to the western boundary of the WCS site and therefore discussion of land use will focus on industries outside of the WCS site to the west and within the WCS site.

3.2.1 Land Ownership

The proposed CISF is approximately 8 km [5 mi] east of Eunice, New Mexico, north of and adjacent to the currently operating WCS LLRW disposal facilities, which the Texas Commission on Environmental Quality (TCEQ) licensed (TCEQ, 2017) (EIS Figure 3.1-1). As described in EIS Section 2.2.1.1, the existing WCS LLRW facilities include a Federal waste facility, a compact waste facility, other disposal areas, stormwater retention and evaporation ponds, excavated material storage piles, multiple access and service roads, and buildings to support workers and operations (DOE, 2018). WCS provides treatment, storage, and disposal of Class A, B, and C LLRW; hazardous waste; and byproduct materials (WCS, 2019). In addition, WCS currently stores, but does not dispose, Greater-Than-Class C (GTCC) and transuranic waste from decommissioned and decommissioning reactor sites, as well as from operating reactors prior to decommissioning.

The proposed CISF would be situated north of Texas State Highway 176, about 0.6 km [0.37 mi] from the Texas-New Mexico State line (ISP, 2020). The proposed CISF would be on approximately 130 ha [320 ac] sited within the 5,666 ha [14,000 ac] WCS property boundary (hereafter referred to as the WCS site). Per the TCEQ license, the existing facilities at the WCS site are fenced to control access (TCEQ, 2017). The land for the proposed CISF is owned by WCS and would be controlled by ISP through a long-term lease from ISP joint venture member WCS (ISP, 2020). The nearest residences are approximately 6.1 km [3.8 mi] west of the proposed CISF project area near Eunice, New Mexico.

3.2.2 Land Use Classification and Usage

The proposed CISF project area is currently unfenced and undeveloped land, except for a gravel-covered road and a railroad spur that borders the south side of the property. Land surrounding the proposed CISF project area is primarily rangeland used for grazing livestock and wildlife habitat, built-up land, and barren land (ISP, 2020). Ranchers are not allowed to graze cattle on WCS-owned land (including the proposed CISF project area) but grazing occurs on other nearby properties throughout the year. In some areas outside of the WCS-owned land, there are overlapping activities, such as cattle grazing and oil and gas production, on the same parcel of land. Within 8 km [5 mi] of the proposed CISF boundary, 23,755 ha [58,700 ac] (97 percent) of the land cover is shrubland (a subset of rangeland), as discussed further in EIS Section 3.6.2. An additional 365 ha [902 ac] of land is classified as developed, open space (approximately 1.5 percent) with all other land cover categories (e.g., open water, barren land) composing the remaining 1.5 percent (EIS Figure 3.2-1). Rangeland is an extensive area of open land on which livestock graze and includes herbaceous rangeland, shrub and brush rangeland, and mixed rangeland (NRCS, 2019). Developed, open-space land cover includes areas with a mixture of some constructed materials, some impervious cover, and vegetation (USGS, 2016). No special land use classifications (e.g., American Indian reservations, national parks, prime farmland) are within an 8-km [5-mi] radius of the proposed CISF project area (EIS Figure 3.2-1) (ISP, 2020). The closest special land use classification is Carlsbad Caverns National Park, located approximately 132 km [83 mi] southwest of the proposed CISF project area.

Although various crops are grown within Andrews County, Texas, and Lea County, New Mexico, local and county officials report that there is currently no agricultural activity within an 8-km [5-mi] radius of the proposed CISF, except for domestic livestock ranching (ISP, 2020). The principal livestock for both Andrews and Lea Counties is cattle. Milk cows compose a substantial portion of the cattle in Lea County (USDA, 2019); however, the nearest dairy farms are about 32 km [20 mi] northwest of the proposed CISF project area near the city of Hobbs, New Mexico. There are no commercial milk cow operations in Andrews County, Texas.

3.2.3 Hunting and Recreation

Within the proposed CISF project area and the larger WCS-controlled area, hunting is prohibited by WCS. Outside of the WCS property boundary, hunting is permitted at the landowner’s discretion (EIS Section 3.6.3). The closest state parks and scenic areas to the proposed CISF site are the Odessa Meteor Crater, located about 87 km [54 mi] to the southeast, and Monahans Sandhill State Park, located approximately 95 km [59 mi] south of the proposed CISF project area (EIS Figure 3.2-2) (ISR, 2020a). In New Mexico, the Green Meadow Lake Fishing Area is located north of Hobbs and is approximately 36 km [23 mi] from the proposed CISF project area (ISR, 2020a). The New Mexico Department of Fish and Game stocks the lake for fishing. Additionally, there is an historical marker and picnic area approximately 5.5 km [3.3 mi] from the proposed CISF project area at the intersection of New Mexico Highways 234 and 18.

Land north, south, and west of the proposed project area has been mostly developed by the oil and gas industry (ISP, 2020). Land further east is ranchland. The Elliott Littman oil field is to the northwest, the Freund and Nelson oil fields are to the south, the Paddock South and Drinkard oil fields are to the southwest, and the Fullerton oil field is to the east (ISP, 2020).

3.2.4 Mineral Extraction and Other Industry Activities

Located about 2 km [1.2 mi] west of the proposed CISF project area is the Permian Basin Materials sand and gravel quarry and a large spoil pile (EIS Figure 3.1-1). There are three “produced water” (i.e., water produced as a byproduct of oil and gas production) lagoons for industrial purposes on the Permian Basin Materials quarry property. In addition, there is a man-made pond on the quarry property that is stocked with fish for private use. The DD Landfarm site, which was a nonhazardous oilfield waste disposal facility located

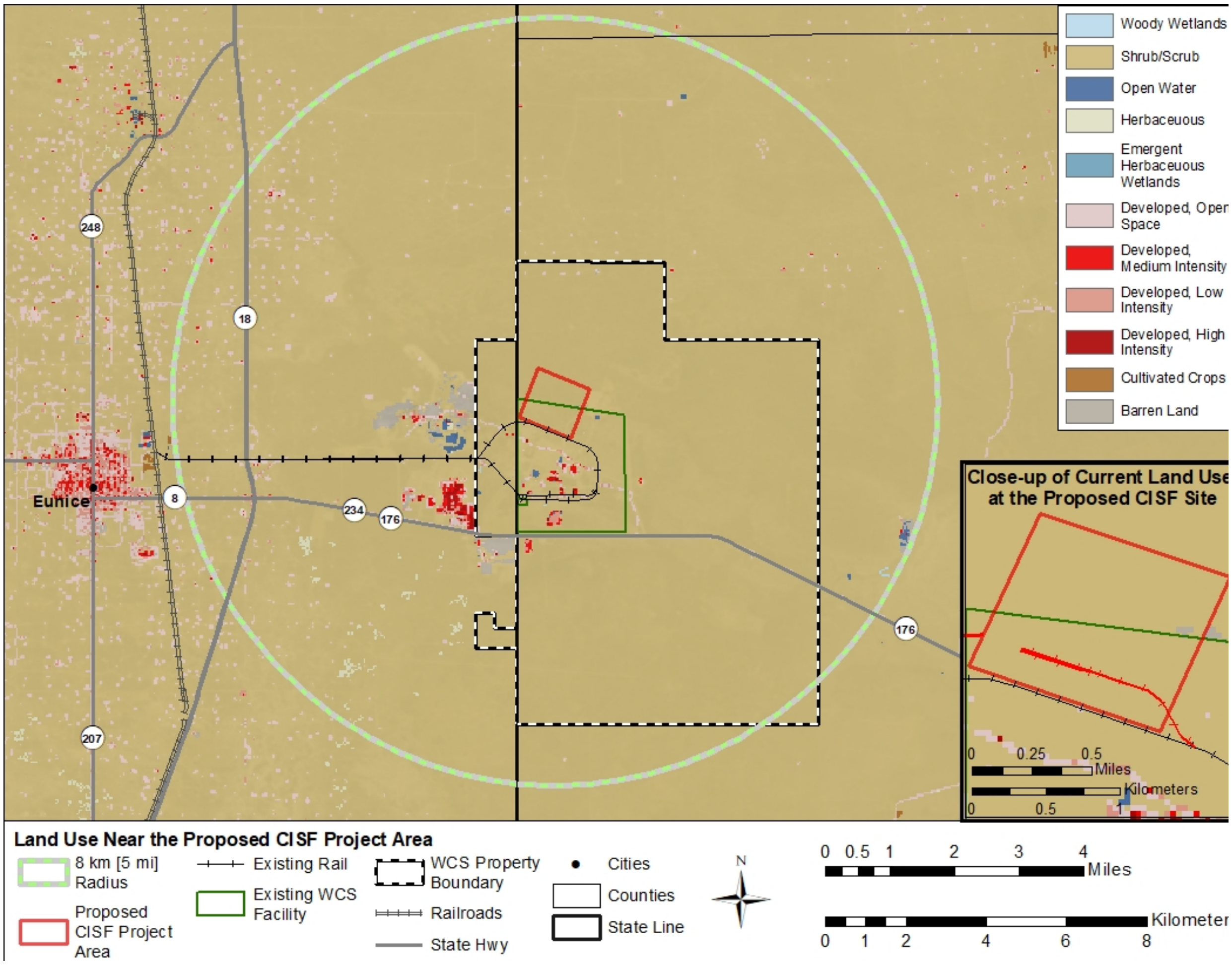

Figure 3.2-1 Land Use Classifications Within and Surrounding the Proposed CISF Project Area

approximately 4 km [2.5 mi] west of the proposed CISF project area, closed in August 2013 and is undergoing decommissioning and post-closure monitoring (ISP, 2020). Within an 8-km [5-mi] radius of the proposed CISF is Sundance Service, a full-service oilfield waste disposal facility with two locations: one in Eunice, NM (Parabo Facility) and the other located less than 1.6 km [1 mi] west of the proposed CISF site, across the New Mexico-Texas State line (Sundance, 2015). The Sundance Service facilities together are approximately 340 ha [840 ac] of privately owned land with access restricted to customers of the facility. An additional potential oil and gas waste disposal facility is the proposed Sprint Andrews County Disposal, on WCS-owned property, less than 2.8 km [1.75 mi] south of the proposed CISF site (ISP, 2020). If the Railroad Commission of Texas (RRC) permits, construction of the Sprint Andrews County Disposal would cover 66.8 ha [165 ac] with an expected life of 36 years (ISP, 2020).

Also near the proposed CISF project area is the Lea County Sanitary Waste Landfill, which is approximately 3 km [1.8 mi] south-southwest of the proposed CISF project area, across New Mexico Highway 176, just across the Texas-New Mexico State line (EIS Section 3.13). Similar to the Sundance Service facilities, Permian Basin Materials and the Lea County Landfill both restrict access to customers of the facilities.

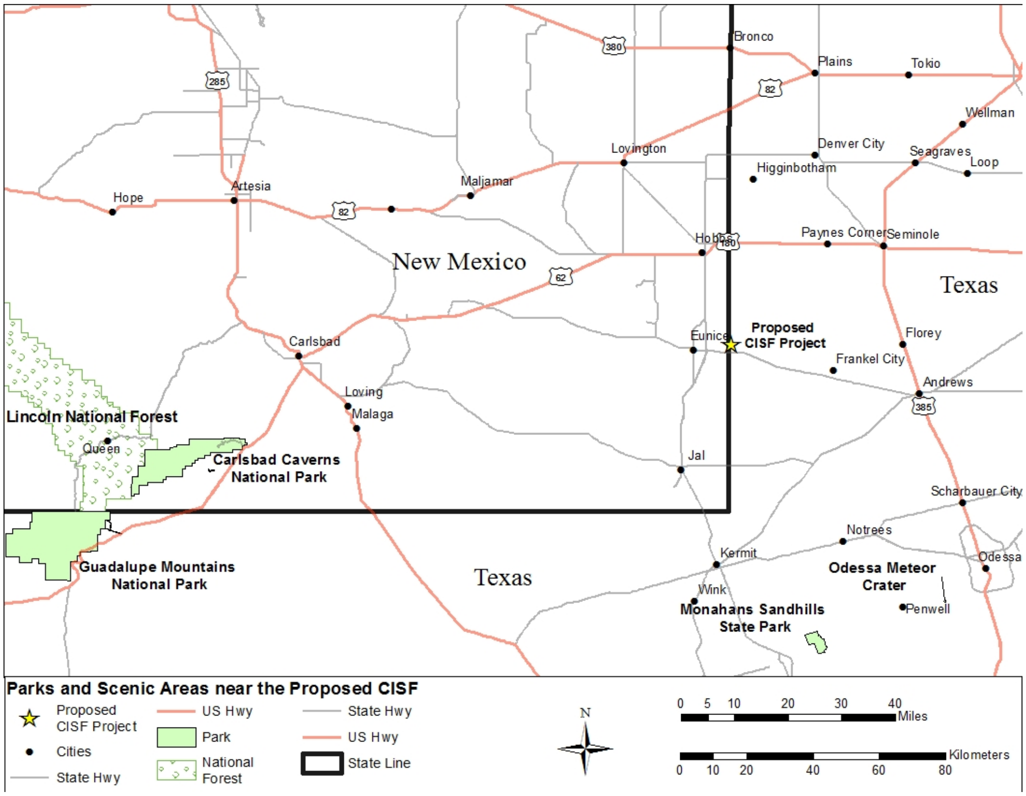

Figure 3.2-2 National Parks and Scenic Areas near the Proposed CISF

The National Enrichment Facility (NEF) URENCO USA operates in Lea County, New Mexico, is located approximately 2.5 km [1.6 mi] southwest of the proposed CISF project area (EIS Figure 3.1-1). This facility enriches natural uranium by centrifuge for the commercial nuclear power industry.

3.2.5 Utilities and Transportation

There are no transportation or military facilities within 8 km [5 mi] of the proposed CISF project area. The closest transportation facility is the Lea County Airport, which is approximately 29 km [18 mi] from the proposed CISF. Cannon Air Force Base is the closest military facility, located approximately 217 km [135 mi] away.

The proposed CISF is located approximately 2 km [1.25 mi] north of Texas State Highway 176 and just east of the Texas-New Mexico State line and State Line Road, also designated Andrews County Road 9998. Further information on local and regional transportation corridors (highways and railroads) can be found in EIS Section 3.3.

The oil and gas extraction industry is active in the region, and electric power is needed at the well pads to operate pumps, compressors, and other equipment. Therefore, numerous power transmission and distribution lines exist within the region surrounding the proposed CISF project area. These lines also service the WCS site and are anticipated to be used by the proposed CISF. Currently, there are no propane or natural gas pipelines at the proposed CISF project area, but there are propane tanks at the existing WCS site (ISP, 2019a).

3.3 Transportation

This section describes the transportation infrastructure and conditions within the region surrounding the proposed CISF project area as well as the national transportation infrastructure and conditions that would support shipment of spent nuclear fuel (SNF) to and from the proposed CISF. As described in EIS Section 2.2.1.5, ISP has proposed to use roads to ship construction equipment, supplies, and wastes the proposed activities would generate, as well as to move commuting workers during the lifecycle of the proposed CISF project. Rail is proposed as the primary means of transportation for the shipments of SNF to and from the proposed CISF project (ISP, 2020).

3.3.1 Regional and Local Transportation Characteristics

EIS Figure 3.3-1 shows the transportation corridor of the region surrounding the proposed CISF project area. The major roads in the area consist of State and county roads interconnecting the various population centers, but only three U.S. highways pass through the area. U.S. Highway 62/180 runs east from points west of Carlsbad, New Mexico, to points east through Hobbs, New Mexico, and continues east across the border to Seminole, Texas, and beyond in the direction of Fort Worth, Texas. U.S. Highway 82, located to the north of Hobbs, New Mexico, travels west to east from points west of Artesia, New Mexico, to the east through Lovington, New Mexico, and beyond. Further to the east of the proposed CISF project area, U.S. Highway 385 travels north and south from Andrews, Texas, with the southern segment traveling in the direction of Odessa, Texas, and Interstate 20.

Regional access to the proposed CISF project area is by New Mexico State Route 18, which is a divided highway with two lanes in each direction that connects Lovington, Hobbs, and Eunice and points south until it intersects with Interstate 20. The proposed CISF site is located approximately 2 km [1.25 mi] north of Texas State Highway 176 (EIS Figure 3-1.1) and just east of the Texas-New Mexico State line and State Line Road that runs north, also designated Andrews County Road 9998. Texas State Highway 176 is a two-lane undivided highway approximately 52 km [32 mi] northwest of Andrews and 3.2 km [2 mi] east of the intersection with New Mexico State Highway 18 approximately 30 km [19 mi] south of Hobbs, New Mexico. Because the proposed facility is located near the border between New Mexico and Texas, the regional roads that would be used to access the proposed CISF occur in both states. Therefore, the traffic data on the roads reflect the availability of the most current information each state reports. The most recent New Mexico Department of Transportation reporting of individual annual average daily traffic (AADT) counts was for 2015 (NMDOT, 2016) while the Texas Department of Transportation provided AADT counts through 2018 (TXDOT, 2020). For consistency, AADTs for 2015 are described for the regional roads in both states. Additional traffic count information (more recent counts and multi-year ranges) for Texas roads is provided for context.

The New Mexico Department of Transportation (NMDOT) reported that the 2015 AADT counts on New Mexico State Route 18 were 10,900 vehicles per day south of Lovington; 10,249 vehicles per day south of Hobbs; and 2,450 vehicles per day south of Eunice to Jal (NMDOT, 2016). The design volume (capacity) of New Mexico State Highway 18 is 20,000 vehicles per day (NRC, 2005). On State Route 176 west of Eunice, the reported 2015 AADT was 1,490 and then 4,257 at the intersection with State Route 18 (NMDOT, 2016). Traveling east on State Route 176 from the intersection with State Route 18 crossing into Texas and approaching the proposed CISF project area, the 2015 AADT was 2,622 (TXDOT, 2020).

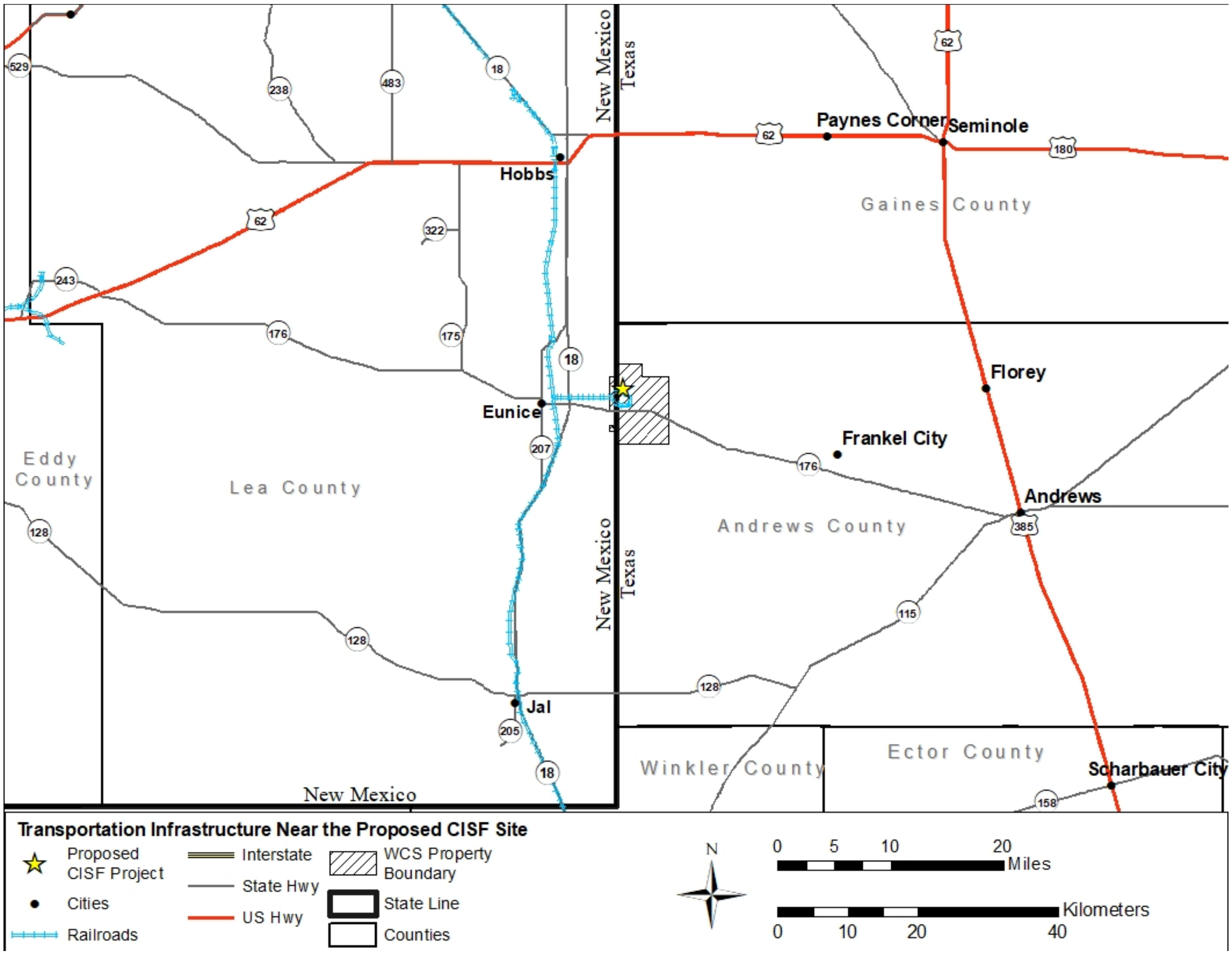

Figure 3.3-1 Road Network in the Vicinity of the Proposed CISF

The long-term average AADT at that location on State Route 176 from 1999 through 2018 was 2,584 vehicles, and the range was 1,527 to 4,400 with a decreasing trend following the highest count in 2014. Continuing from the proposed CISF project location on State Route 176 east, the 2015 AADT was 2,882 vehicles approximately 8 km [5 mi] west of Andrews, Texas (TXDOT, 2020). The long-term average AADT at that location on State Route 176 from 2011 through 2018 was 3,147 vehicles, and the range was 2,063 to 4,169 with a decreasing trend following the highest count in 2014. The design volume (capacity) of New Mexico State Highway 176 (also known as State Highway 234) is 6,000 vehicles per day (NRC, 2005). The 2015 AADT for U.S Highway 385 from Andrews, Texas, south to Odessa, Texas, was 13,989 vehicles approximately 11 km [7 mi] south of Andrews, and 12,153 at the Hector County line approaching Odessa, Texas (TXDOT, 2020). The long-term average AADTs at these locations on U.S. Highway 385 (from 1999 through 2018 for the Andrews south location and 2011 through 2018 for the Hector county line) were 9,005 vehicles (range of 5,900 to 15,133 with a generally increasing trend from 1999 to the present) and 11,795 vehicles (range of 9,900 to 15,032 with limited variation for most of the last decade except for a 2018 peak), respectively. In 2016, commercial trucks represented approximately 54 percent of the vehicles counted near the proposed CISF project area on State Route 176 (TXDOT, 2017).

A railroad services the region surrounding the proposed CISF project area. West of the proposed CISF project area, the Texas-New Mexico Railroad (TNMR) operates 172 km [107 mi] of track near the Texas-New Mexico border from a Union Pacific connection at Monahans, Texas, to Lovington, New Mexico. The railroad serves the oil fields of West Texas and Southeast New Mexico. The primary cargo shipped on this track includes oilfield commodities such as drilling mud and hydrochloric acid, fracking sand, pipe, and petroleum products, including crude oil, as well as iron and steel scrap (Watco, 2019). In 2015, the operator estimated approximately 22,500 railroad carloads per year would travel on this rail (USRRB, 2016). For context, if the average train size were 10 cars, then an average of 6 trains would need to travel each day on this line to generate the reported annual carload traffic of 22,500 cars.

ISP proposes that SNF would be transported from existing commercial nuclear power facilities across the U.S. to Monahans, Texas, using rail lines the Union Pacific Railroad primarily operates. SNF would subsequently be transported by rail from Monahans, Texas, approximately 105 km [65 mi] north through Eunice, New Mexico, along existing rail lines the TNMR owns and operates.

WCS operates a rail track from Eunice, New Mexico, to its site in Andrews County, Texas, where the track encircles WCS's current LLRW disposal facilities (EIS Figure 3.1-1). ISP is proposing to transport the SNF along WCS's rail track via a locomotive to the transfer facility at the proposed CISF.

3.3.2 Transportation from the Generation Site and to a Permanent Repository

For transportation of SNF from a nuclear power plant site or ISFSI (i.e., the current storage sites from which SNF could be transported to the proposed CISF), the affected environment for potential radiological impacts includes the rural, suburban, and urban populations living along the transportation routes within range of exposure to radiation emitted from the packaged material during normal transportation activities or that could be exposed in the unlikely event of a severe accident involving a release of radioactive material. The affected environment also includes people in rail cars traveling on the same transportation routes, people at rail stops, and workers who are involved in transportation activities. This discussion of the affected environment supports the radiological and nonradiological impact analyses of transportation of SNF to and from the proposed CISF project (EIS Section 4.3).

All U.S. nuclear power plant sites are serviced by controlled access roads. In addition to the access roads, many of the plants also have railroad connections that can be used for moving heavy loads, including SNF. Some of the plants that are located on navigable waters, such as rivers, the Great Lakes, or oceans, have facilities to receive and ship loads on barges. Power plants that are not served by rail would need to ship SNF by truck or barge to the nearest rail facility that can accommodate an intermodal transfer of the SNF cask (DOE, 2008).

Because no arrangements regarding which nuclear power plants would store SNF at the proposed CISF have been made yet, the exact locations of SNF shipment origins have not been determined; therefore, the details regarding the specific routes that would be used also are not known at this time. SNF may be shipped from the locations of currently decommissioned reactor sites that are identified on the map in Figure 2.2-4. The origin, destination, and distance of potential SNF rail shipments from these decommissioned reactor sites are provided in EIS Table 3.3-1. If the proposed CISF is approved for and loaded to full capacity (i.e., 40,000 MTU in Phases 1-8), then it is reasonable to assume that shipments of SNF would also come from

Table 3.3-1 Origin, Destination, and Distance of Potential Rail Routes for Proposed Transportation of Spent Nuclear Fuel from Decommissioned Reactor Sites

Decommissioned Reactor Site	Rail Origin	Destination	Estimated Distance*
Big Rock Point	Cadillac, MI	Monahans, TX	2,865
Connecticut Yankee	New Haven, CT	Monahans, TX	3,592
Crystal River	Crystal River, FL	Monahans, TX	2,845
Humboldt Bay	San Francisco, CA	Monahans, TX	2,482
Kewaunee	Green Bay, WI	Monahans, TX	2,549
Lacrosse	Lacrosse, WI	Monahans, TX	2,306
Maine Yankee	Wiscasset, ME	Monahans, TX	5,014
Rancho Seco	Herald, CA	Monahans, TX	2,365
San Onofre	Pendleton, CA	Monahans, TX	1,742
Trojan	Rainier, OR	Monahans, TX	3,472
Yankee Rowe	Rowe, MA	Monahans, TX	3,402
Zion	Zion, IL	Monahans, TX	2,342

*Distance estimates (km) (ISP, 2019a,b) do not include barge or truck travel from origin sites to the nearest rail line for those sites that do not have rail access or the approximately 100 km of travel on the TNMR line from the switching yard at Monahans, Texas to the final destination at the proposed CISF project area. To convert kilometers to miles divide by 1.6.

many of the existing reactor sites nationwide. Additionally, the SNF stored at the proposed CISF project would eventually need to be transported to a permanent geologic repository, in accordance with the U.S. national policy for SNF management established in the Nuclear Waste Policy Act of 1982, as amended (NWPA). The NWPA requires that DOE submit an application for a repository at Yucca Mountain, Nevada. Unless and until Congress amends the statutory requirement, the NRC assumes that the transportation of SNF from the CISF to a permanent repository will be to a repository at Yucca Mountain, Nevada.

The exact routes for SNF transportation to and from the proposed CISF would be determined in the future prior to making the shipments. However, to evaluate the potential impacts of these shipments and to aid the evaluation of the ISP transportation analyses, the NRC staff considers that representative or bounding routes applicable to a national SNF shipping campaign such as those described and evaluated in Section 2.1.7.2 of DOE's Final Supplemental Environmental Impact Statement for a geologic repository at Yucca Mountain (DOE, 2008) and NRC's most recent SNF transportation risk assessment in NUREG–2125 (NRC, 2014), provide sufficient information about potential transportation routes to support the analysis of impacts in EIS Section 4.3. The NRC staff considers the routes evaluated in these prior transportation analyses to be representative or bounding for SNF shipments to and from the proposed CISF project because they were derived based on typical transportation industry route selection practices, they considered existing power plant locations, and can be applied to EIS analyses using conservative or bounding assumptions (e.g., as described further in Section 4.3 of this EIS, selecting a route that is longer than most of the routes that would actually be used).

3.4 Geology and Soils

A description of the geology, seismology, and soils at and near the proposed CISF project area is presented in this section. While the geology and seismology are described on a regional scale, soil descriptions are limited to those within the proposed project area.

3.4.1 Regional Geology

3.4.1.1 Physiography

The proposed CISF would be located on the southwest-facing slope that transitions from the Southern High Plains to the Pecos Valley physiographic region. The Southern High Plains is an elevated area of undulating plains with low relief encompassing a large area of west Texas and eastern New Mexico (EIS Figure 3.4-1). In Andrews County, the southwestern boundary of the Southern High Plains is poorly defined, but for descriptive purposes is where the caprock caliche is at or relatively close to the surface (Hills, 1985).

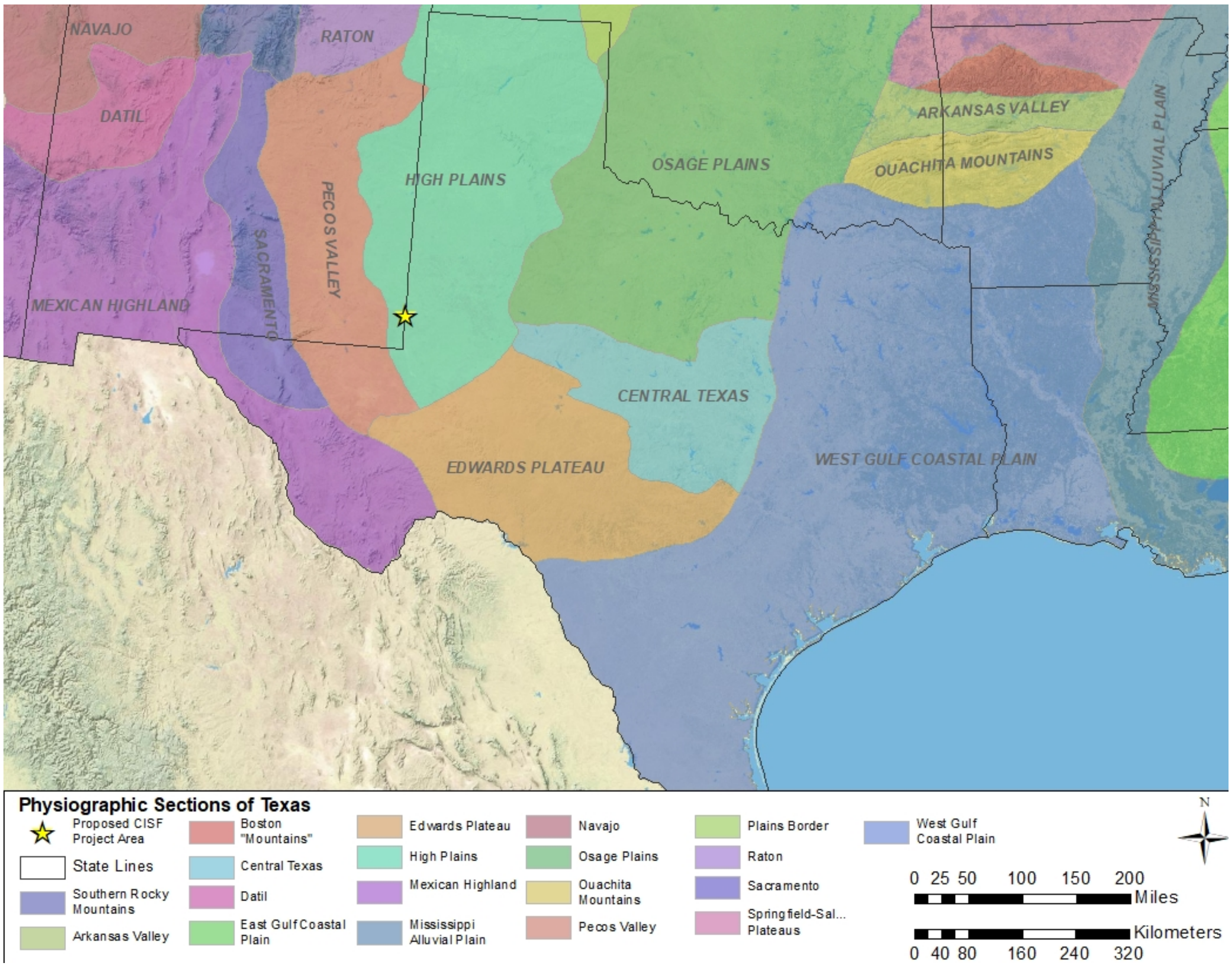

Figure 3.4-1 Map of Physiographic Provinces in Texas

3.4.1.2 Structure and Stratigraphy

Structure

The proposed CISF would be located over the north-central portion of a subsurface structural feature known as the Central Basin Platform (ISP, 2020). The Central Basin Platform is part of the larger Permian Basin and is composed of carbonate reef deposits and shallow marine clastic deposits (Ward, 1986). The Central Basin Platform extends northwest to southeast from southeastern New Mexico to eastern Pecos County, Texas, and is a tectonically uplifted basement block capped by a carbonate platform. As shown in EIS Figure 3.4-2, the Central Basin Platform is surrounded on three sides by regional structural depressions known as the Delaware Basin to the southwest, the Midland Basin to the northeast, and the Val Verde Basin to the south (ISP, 2020; Ward, 1986).

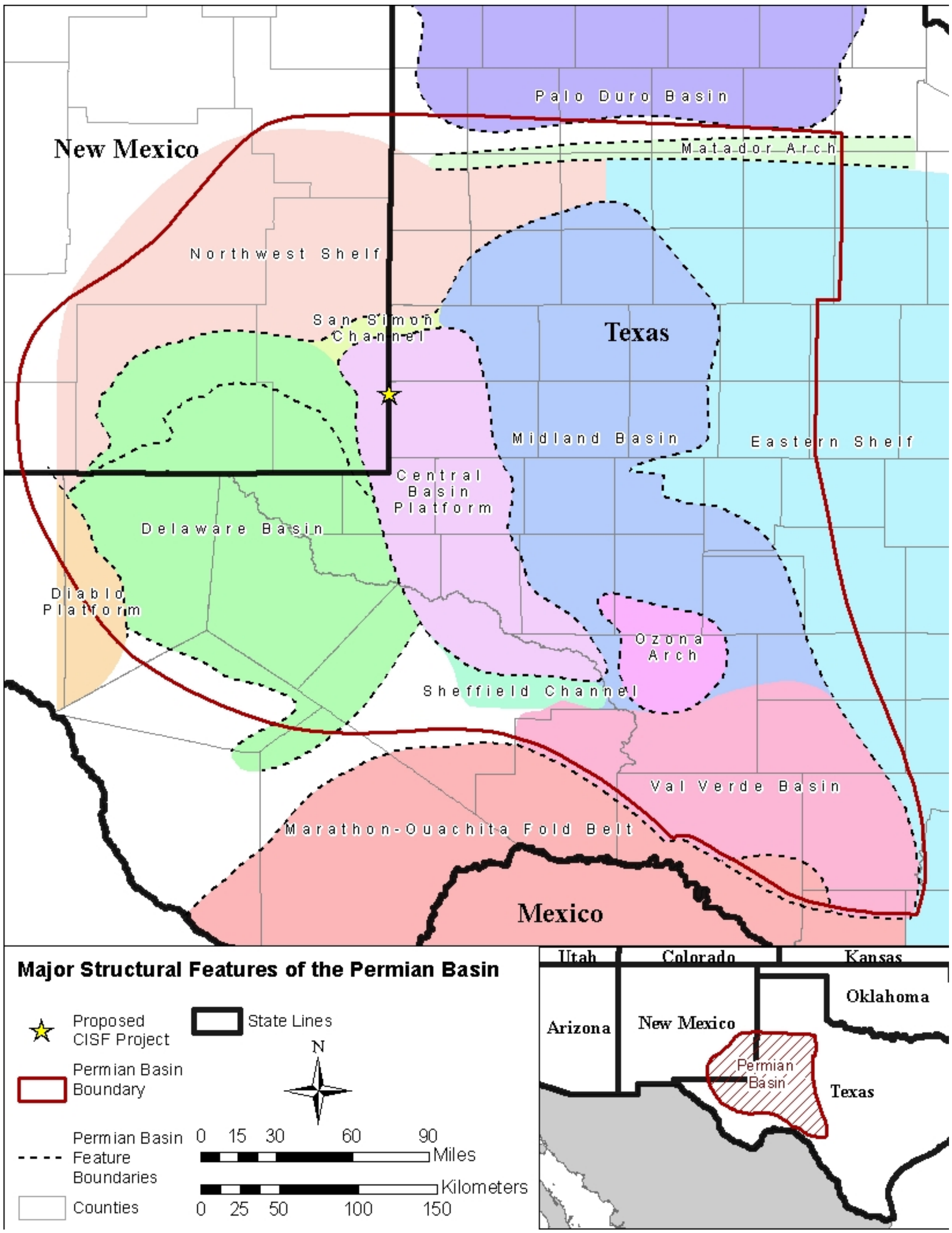

Figure 3.4-2 Major Structural Features of the Permian Basin of West Texas and Southeastern New Mexico

The Permian Basin, a large subsurface structural feature, underlies a large part of western Texas and southeastern New Mexico. EIS Figure 3.4-2 shows the major structural elements of the Permian Basin in west Texas and parts of New Mexico where the proposed CISF would be located. The Central Basin Platform is a steeply fault-bounded uplift of basement rocks that forms an abrupt eastern terminus of the Delaware Basin.

The Red Bed Ridge is the position of a drainage divide that has separated two major fluvial systems throughout late Cenozoic (Hawley, 1993; Fallin, 1988). The area was uplifted at the start of the Laramide Orogeny when the Cretaceous seas retreated. From the late Paleocene to near the end of the Pliocene, the area was subject to erosion, removing most of the Cretaceous deposits. The relatively resistant limestones over the partially silicified (i.e., silica-rich) Cretaceous Antlers Formation on the crest of the ridge may have effectively capped the Red Bed Ridge, maintaining the ridge as a mesa or inter-drainage high. The axis of the Red Bed Ridge runs long with a local topographic high, between Monument Draw Texas, which drains to the Colorado River, and Monument Draw New Mexico, which drains to the Pecos River.

Stratigraphy

Regions of west Texas and southeast New Mexico experienced mild structural deformation that produced broad regional arches and shallow depressions during the Cambrian to late Mississippian (Wright, 1979). During the Mississippian and Pennsylvanian, the Central Basin Platform uplifted, and the Delaware, Midland, and Val Verde Basins began to subside, forming separate basins (Hills, 1985). Also, Late Mississippian tectonic events uplifted and folded the Central Basin Platform. This uplift was followed by more intense late Pennsylvanian and early Permian deformation that compressed and faulted the area (Hills, 1985). The late Paleozoic deformation was followed by a long period of gradual subsidence and erosion that stripped the Central Basin Platform and other structures to near base-level, forming the Permian Basin (Wright, 1979). Accumulating along the edges and flanks of the regional structures were layers of arkose, sand, chert pebble conglomerate, and shale deposits as the expanding sea gradually rose over the broad eroded surfaces and truncated edges of previously deposited sedimentary strata.

Throughout the remainder of the Permian Period, the Permian Basin slowly filled with several thousand meters [feet] of evaporites, carbonates, and shales. During the Triassic Period, the region was once again slowly uplifted and eroded, eventually forming a large land-locked basin where deposits of the Dockum Group accumulated in alluvial floodplains and as deltaic (i.e., delta) and lacustrine (i.e., lake) deposits (McGowen, 1979). During the Jurassic Period, the area was again subject to erosion. During the Cretaceous Period, a thick sequence of Cretaceous rocks was deposited over most of the area. The Cretaceous sequence of sediments was composed of a basal clastic unit (the Trinity, Antlers, or Paluxy sands) and overlying shallow marine carbonates. Uplift from the west and southward and eastward–retreating Cretaceous seas occurred along with the Laramide Orogeny, which formed the Cordilleran Range west of the Permian Basin (Bebout et al., 1985; McGowen, 1979).

Sediments for the nearby late Tertiary Ogallala Formation came from the uplifted land associated with the Laramide Orogeny. The major episode of Laramide folding and faulting occurred in the late Paleocene; however, there have been no major tectonic events in North America since the Laramide Orogeny (Hills, 1985). The stratigraphy sequence of the Central Basin Platform of the west Texas Permian Basin is shown in EIS Figure 3.4-3.

ERA	PERIOD	FORMATION	THICKNESS	USCS	LITHOLOGY
CENOZOIC	QUATERNARY	COVER SANDS	1'-10'	SP	SAND, FINE GRAINED, WELL SORTED, **UNCONSOLIDATED**, LOOSE, ORANGE TO TAN, **DRY**
		CALICHE	4'-28'	NA	CALICHE WITH SAND MATRIX, **CONSOLIDATED**, FIRM TO MODERATELY HARD, WHITE TO TAN, **DRY**
		BLACKWATER DRAW	14'-38'	SP/SC/SM	SAND, W/SILT & CLAY, FINE GRAINED, WELL SORTED, **UNCONSOLIDATED**, ORANGE TO TAN, **DRY**
	TERTIARY	CALICHE	19'-28'	NA	CALCAREOUS SAND, **CONSOLIDATED**-VERY HARD, LIGHT GRAY TO WHITE, **DRY**
		OGALLALA	35'-51'	SW/GW	SAND WITH GRAVEL GRADING DOWNWARD TO A GRAVEL WITH SAND, UPPER SAND IS WELL GRADE, **UNCONSOLIDATED**, TAN, **DRY**, LOWER GRAVEL WITH SAND MATRIX, POORLY SORTED, WELL TO POORLY CEMENTED, SUBANGULAR TO SUB ROUNDED, **DRY** IN THE SOUTHERN PORTION OF CISF SITE, 1-5 FEET OF GROUNDWATER PRESENT IN THE NORTHERN PORTION OF THE CISF SITE
		ERODED OR NOT DEPOSITED			
MESOZOIC	CRETACEOUS				
	JURASSIC				
	TRIASSIC	DOCKUM/ COOPER CANYON	~1400'/~500'	CL-CH	CLAY, CLAYSTONE, PLASTIC, STIFF, **CONSOLIDATED** MAROON TO RED, **DRY**

Figure 3.4-3 Geologic Column of the Proposed CISF (Source: Modified from ISP, 2019c)

Except for a brief period of minor volcanism during the late Tertiary in northeastern New Mexico and in the Trans-Pecos area, there is no volcanic activity near the proposed project area. (Wilson, 1980).

3.4.2 Site Geology

Ground elevation above sea level ranges from about 1,072 to 1,061 m [3,520 to 3,482 ft] across the proposed CISF project area. The area of the proposed CISF is located in the Southern High Plains, and in the area surrounding the proposed site, the land surface has a gentle slope of approximately 2.4 to 3 m per km [8 to 10 ft per mi]. (ISP, 2020, 2019c)

EIS Figures 3.4-4, 3.4-5, and 3.4-6 contain information from borings WCS conducted between 2005 and 2009. The information was reconfirmed by an additional geotechnical survey covering the area for the proposed action (Phase 1) in 2015 (ISP, 2019c). The geologic cross-sections indicate that a veneer of sandy silt and sand from the Blackwater Draw are present across the proposed CISF project area. The topsoil consists of brown silty sand that contains sparse vegetation debris and roots. The Blackwater Draw consists of reddish brown, fine- to very-fine-grained sand with minor amounts of clay. Beneath the topsoil is a variable sequence of calcium carbonate-cemented caliche (i.e., the caprock caliche). The caprock caliche forms the resistant beds along the western and eastern margins of the Southern High Plains (Gustavson and Finley, 1985). The caprock caliche thickness varies but can reach up to 3.7 m [12 ft]. As shown in EIS Figure 3.4-6 and 3.4-7, sand at the surface increases to the north and east and thins to the south and west (ISP, 2019c).

The geologic formations of interest beneath the proposed CISF from oldest to youngest (i.e., which corresponds to deepest to most shallow) include the Triassic-aged Dockum Group, the undifferentiated Ogallala/Antlers/Gatuña Formation (i.e., collectively referred to as the OAG), the Pleistocene Blackwater Draw Formation, and the Holocene windblown sands, and playa deposits, as well as caprock caliche.

<u>Dockum Group</u>

The Dockum Group consists of clays, shales, siltstones, sandstones, and conglomerates. Five formations together form the Dockum Group, of which the Santa Rosa, Tecovas, Trujillo, and Cooper Canyon Formations are present beneath the proposed CISF project area. The Santa Rosa Formation sandstone at the base of the Dockum Group is approximately 76 m [250 ft] thick (Bradley and Kalaswad, 2003), and the top of the formation is approximately 347 m [1,140 ft] below ground surface at the proposed CISF project area.

<u>Ogallala/Antlers/Gatuña Formation (OAG)</u>

Of the Trinity Group sequence, the basal, Early Cretaceous Antlers Formation is the only geologic formation present at the WCS site, but it is not present in the proposed CISF project area (ISP, 2019c). The bedding in the Antlers Formation is continuous where observable at the WCS facility and not calichified. At the WCS site, in ascending order, the Antlers Formation consists of (i) a fine-to-coarse–grained, gravelly, silica-rich sand and sandstone with strips of sandy clay chert-pebble conglomerate basal unit, (ii) a weakly cemented, very fine-to-fine–grained quartzose sand of nearly pure quartzarenite, and (iii) a siltstone, mudstone, and shale interval, sometimes capped by an upper layer of calcareous shale or argillaceous limestone (Lehman and Rainwater, 2000). The Antlers Formation thickness ranges from 0 m [0 ft] to

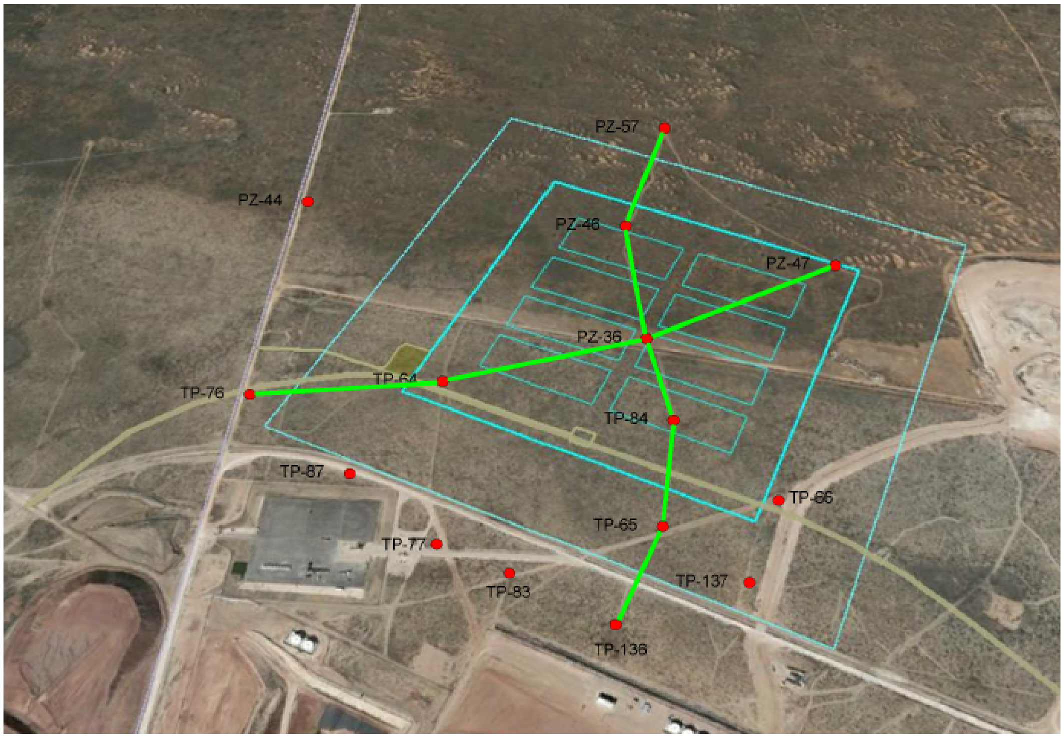

Figure 3.4-4 Location of Borings at the Proposed CISF (Source: ISP, 2018)

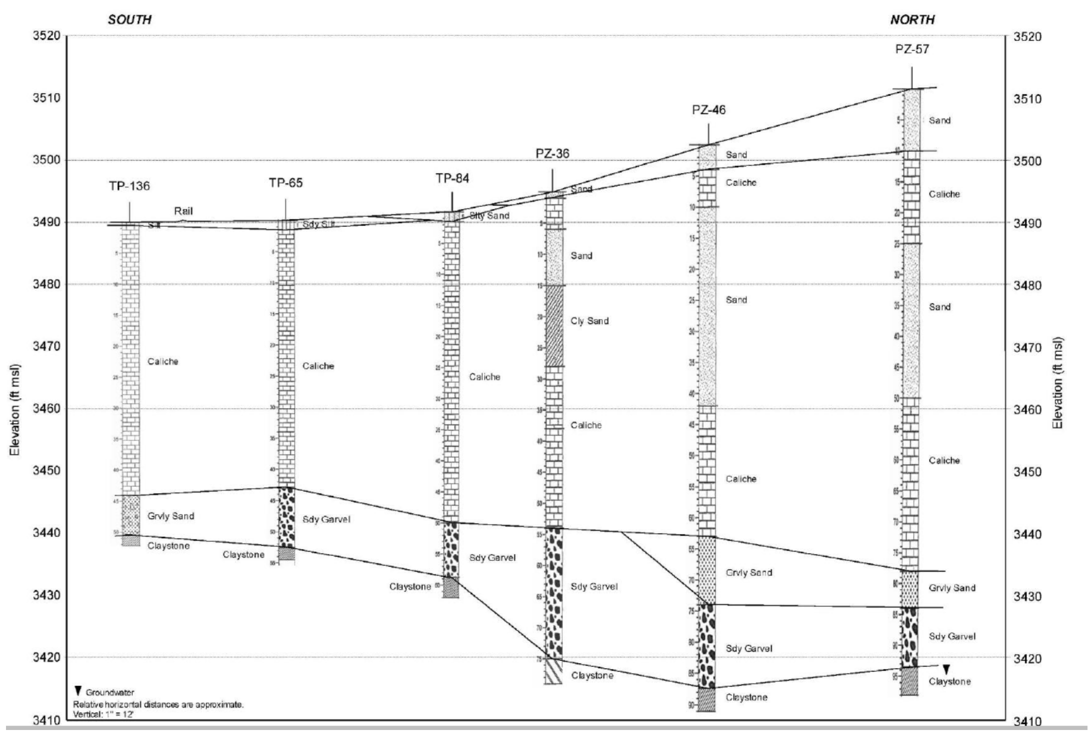

Figure 3.4-5 South-North Geologic Cross-Section Through the Proposed CISF (Source: Modified from ISP, 2019c)

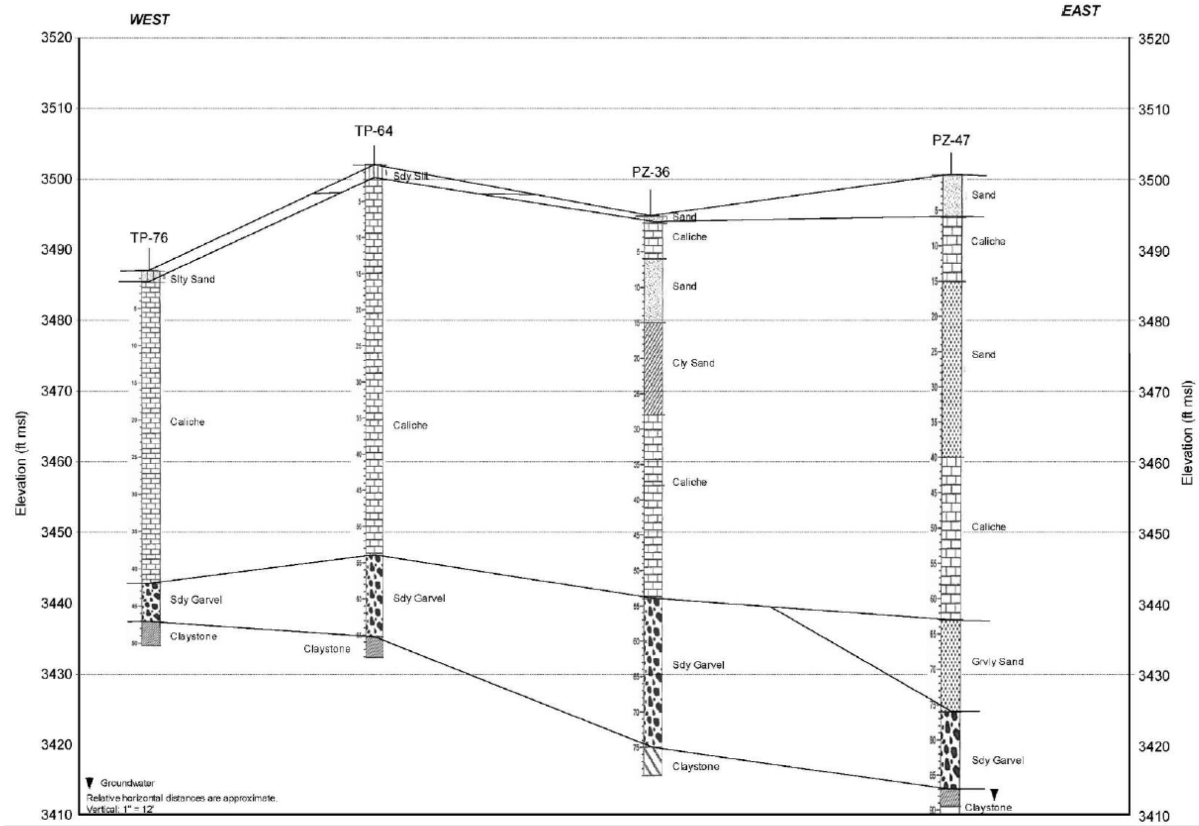

Figure 3.4-6 West-East Geologic Cross-Section Through the Proposed CISF (Source: Modified from ISP, 2019c)

18 m [60 ft]; its top ranges from near land surface to 10 m [32 ft] below ground level (Lehman and Rainwater, 2000).

Within the Southern High Plains, the Ogallala Formation consists of up to 122 m [400 ft] of fine- to coarse-grained quartz, local caliche nodules, silty in part, cemented in part by calcite and silica, locally cross-bedded with granule-pebble gravel, especially basally, and caliche horizons in the upper section (TWDB, 2015), deposited over an irregular terrain (Bachman, 1976). The Ogallala is capped by a layer of dense caliche, which ranges in thickness from a few meters [feet] to as much as 18 m [60 ft]. The Ogallala Formation is relatively thin <30 m [<100 ft] in Andrews County, and is thin to absent on the WCS site. The Ogallala Formation is present along the north and east sides of the WCS site, overlying the Triassic Cooper Canyon Formation or Cretaceous Antlers Formation (Lehman and Rainwater, 2000). The thickness of the Ogallala Formation ranges from 1.5 to 12 m [5 to 40 ft] on the WCS site (Lehman and Rainwater, 2000); its top occurs at depths from 14 to 32 m [45 to 105 ft] below ground level (Lehman and Rainwater, 2000). The Ogallala deposits in this area are a fine-to-medium–grained sand with granule-pebble gravel overlain by an upper interval of very fine-to-fine–grained sand where the unit is greater than 6 m [20 ft] thick (Lehman and Rainwater, 2000).

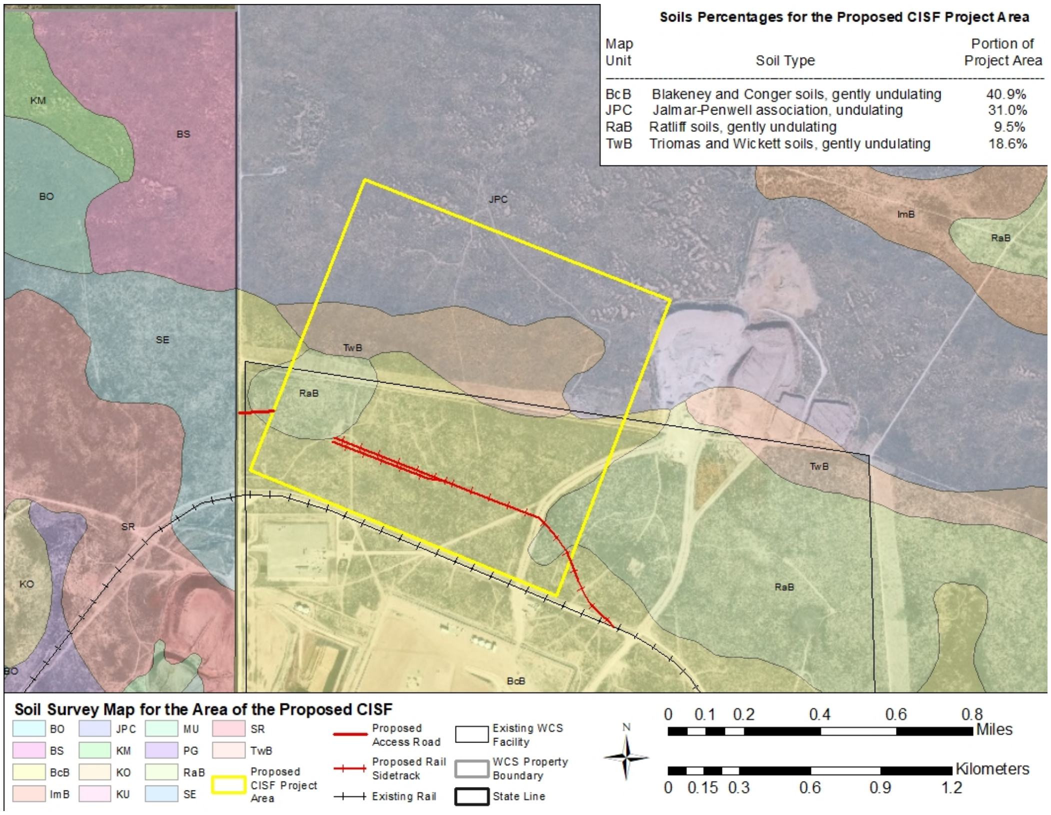

Figure 3.4-7 Soil Survey Map for the Proposed CISF

The Late Tertiary Gatuña Formation (Kelley, 1980), observed on the WCS site, is also sometimes referred to as the Cenozoic Alluvium. The thickness of the Gatuña Formation ranges from 0 to 60 m [0 to 200 ft] in Andrews County, Texas, and from 0 to 30 m [0 to 100 ft] adjacent the WCS site (Meyer et al., 2012). Locally, the Gatuña Formation consists mostly of fine-to-medium-grained yellowish-to-reddish orange sand and sandstone with interbedded granule–pebble gravel, conglomerate, gypsum, limestone, siltstone, and shale. The upper few feet of the Gatuña Formation is calcified, and the base of the formation is a poorly sorted conglomerate and includes abundant clasts derived from Pliocene-age caprock caliche. Thin deposits of the Gatuña Formation {1.5 to 4.6 m [5 to 15 ft] thick} are present along the southern and southwestern sides of the WCS site, draping the Triassic Cooper Canyon Formation (Lehman and Rainwater, 2000); its top occurs at depths ranging from 14 to 35 m [45 to 115 ft] below ground level (Lehman and Rainwater, 2000).

At the proposed CISF site, the Antlers, Gatuña, and Ogallala Formations are undifferentiated and referred to collectively as the Ogallala/Antlers/Gatuña Formation (OAG) (ISP, 2020).

Caprock Caliche

Caliche consists of a hardened natural cement of calcium carbonate. There are two caliche layers present in the subsurface at the proposed CISF. A 1.5- to 3.7-m [5- to 12-ft]-thick, dense bed of calcium carbonate–cemented, hard, laminated limestone called the Caprock Caliche (Lehman and Rainwater, 2000; ISP, 2018) forms the resistant beds of the escarpment along the western and eastern margins of the Southern High Plains (Gustavson and Finley, 1985). The

Caprock Caliche occurs everywhere on the WCS site, having formed on the upper surface of the OAG Formation (Lehman and Rainwater, 2000). The Caprock Caliche is exposed at the land surface along the trace of the Red Bed Ridge where Blackwater Draw Formation cover sands were eroded (Lehman and Rainwater, 2000). The older Caprock Caliche underlies the younger Blackwater Draw Formation. The Caprock Caliche is distinguishable from the formation of younger caliche deposits (e.g., Blackwater Draw Formation), which are lighter in color, softer, more porous, and include abundant sand (Lehman and Rainwater, 2000).

Blackwater Draw Formation

The aeolian (i.e., wind-blown) Blackwater Draw Formation mantles the High Plains. It is present at or near the land surface over most of the WCS site, except for along the crest of the Red Bed Ridge where it has been eroded (Lehman and Rainwater, 2000). The Blackwater Draw cover sands are up to 18 m [60 ft] thick on northern portions of the WCS site (Lehman and Rainwater, 2000), near the proposed CISF project area. The upper 1.5 m [5 ft] is very clayey and contains an organic surface horizon (Lehman and Rainwater, 2000). The sands 1.5 to 4.5 m [5 to 15 ft] below the surface consist of clayey fine- to very-fine–grained sand with nodules of soft sandy caliche (Lehman and Rainwater, 2000). Near-surface sand grains have iron oxide and clay coatings as a result of soil formation processes (i.e., iron and clay illuviation) (Holliday, 1989). Where Blackwater Draw cover sands are at the land surface, they underlie the Triomas and Wickett soil associations (Conner et al., 1974) or the Ratliff soil association (discussed in the following section). Deeper portions of the formation were less affected by soil formation, and contain multiple layers of soft, sandy caliche (Lehman and Rainwater, 2000). The lower 3 to 6 m [10 to 20 ft] of the formation contains coarse- to very-coarse–grained sand and layers of granule–small pebble gravel and may be partly alluvial in origin (Lehman and Rainwater, 2000). Blackwater Draw Formation caliche overlies the Caprock Caliche.

Windblown Surficial Sands

Windblown sand sheets, dunes, and linear dune ridges, some active but now mostly stabilized by vegetation, are 1.5 to 4.5 m [5 to 15 ft] thick; some active dunes are up to 11 m [35 ft] thick and consist of clean, very well-sorted sand (Lehman and Rainwater, 2000). Windblown sand deposits are extensive on the northern portion of the WCS site (Lehman and Rainwater, 2000) near the proposed CISF site. These windblown deposits are brown and grayish-brown silty sand and sandy silt deposited mainly by sheetwash precipitation action as broad, gently sloping sheets of sands that are distinguishable from those of the Blackwater Draw Formation by their pale coloration, absence of iron oxide grain coatings, and absence of caliche nodules (Lehman and Rainwater, 2000).

Playa Deposits

The playa deposits at the WCS site are clay and silt, sandy, light to dark gray and occur in shallow depressions. While there are numerous surface depressions on the WCS site, and applicant documents sometimes refer to them as playas, this term is a misnomer because the depressions lack a distinguishing soil type associated with playa basins (Lehman and Rainwater, 2000). There is only one playa on the WCS site, and it is located south of the LLRW facilities.

3.4.3 Soils

Near the proposed CISF, surficial materials consist of sandy, loamy aridisol topsoils (Anaya and Jones, 2009) and windblown cover sands, which bury the underlying Blackwater Draw Formation. Aridisols are characterized by the limited availability of soil moisture to sustain plant growth (NRCS, 1999). A thin veneer of ≤0.6 m [≤2 ft] of topsoil, consisting of silty sand containing sparse vegetation debris and roots, is present (ISP, 2018). The sparse vegetation and fine-grained nature of the soils at the WCS site allows for erosion. A soil survey map of the proposed CISF project area is depicted in EIS Figure 3.4-7. The Blakeney and Conger (BcB) soil association composes the majority (about 75 percent) of soils within the proposed CISF project area. The BcB profile transitions from fine, sandy loam to cemented material, to gravelly loam (NRCS, 2016). Surrounding the BcB are well-sorted sand, consistent with the United States Department of Agriculture (USDA) description of Jalmar-Penwell soils transitioning into loam and fine, sandy clay loam (ISP, 2020a, 2019c).

Residual soils (i.e., soils formed at the location) encountered at each of the WCS 2005, 2009 geotechnical surveys, and the 18 onsite soil borings included in the 2015 geotechnical survey, were identified as brown to orange-brown and characterized as medium-dense to very dense with lenses of very loose to loose soils (ISP, 2018). In addition, no groundwater was encountered in any of the 18 test soil borings. Each boring was drilled to a depth of 13.7 m [45 ft]. More information on the hydrologic characteristics of soils in the proposed CISF project area can be found in EIS Section 3.5.2.1.

3.4.4 Subsidence and Sinkholes

The WCS site and proposed location for the CISF are located over Permian-age halite-bearing formations approximately 460 m [1,500 ft] below the surface. Holt and Powers (2007) developed three conceptual models of dissolution processes (shallow, deep, and stratabound) based on features found in the Delaware Basin west of the WCS site and proposed CISF project area. Investigations and modeling by Holt and Powers (2007) showed that no features in the study area in and around the proposed CISF project area indicated any past dissolution, and the hydrologic systems at the proposed location limit the potential for future dissolution and/or sinkholes (Holt and Powers, 2007).

Specifically, at the WCS site and proposed CISF project area, halite and other soluble evaporites are at depths of approximately 460 m [1,500 ft], which would be below the Dockum Group, and are overlain by a thick section of red beds. Using stratigraphic and lithofacies data from geophysical logs from the area of the WCS site, Holt and Powers determined that the deeply buried halite is difficult to dissolve because it behaves as a ductile material, and pore fluids within halite flow outward from the halite units into overlying and underlying rocks (Holt and Powers, 2007). It is common for formation fluids at depth to be slow moving and saline, further limiting the dissolution process. Holt and Powers (2007) did not identify any features within and around the WCS site that would indicate past dissolution, and also state that the hydrologic system beneath the WCS site (including the proposed CISF site) limits the potential for future dissolution.

Sinkholes and karst fissures formed in gypsum bedrock are common features on the rim of the Delaware Basin, a sub-basin of the Permian, which abuts the Central Basin Platform in west Texas and southeastern New Mexico. New sinkholes form almost annually, often associated with upward artesian flow of groundwater from regional karstic aquifers that underlie evaporitic rocks at the surface (Land, 2003, 2006). Some of these sinkholes are man-made in origin and are associated with improperly cased, abandoned oil and groundwater wells or with solution mining of salt beds in the shallow subsurface (Land, 2009, 2013). In southeastern New Mexico and west Texas, the location of man-made sinkholes and dissolution features include the Wink, Jal, Jim's Water Service, Loco Hills, and Denver City sinkholes and the I&W Brine Well. All of these features formed around a well location, and the sinkholes have diameters ranging from 30 to more than 213 m [100 to more than 700 ft] (Land, 2013). The Wink sinkholes in Winkler County, Texas, are approximately 72 km [45 mi] south-southwest of the proposed CISF project area and probably formed by dissolution of salt beds in the upper Permian Salado Formation that resulted from an improperly cased abandoned oil well (Johnson et al., 2003). The Jal Sinkhole near Jal, New Mexico, is approximately 30 km [18 mi] southwest of the proposed CISF and also probably formed by dissolution of salt beds in the Salado Formation caused by an improperly cased groundwater well (Powers, 2003). The Jim's Water Service Sinkhole, Loco Hills Sinkhole, Denver City Sinkhole, and I&W Brine Well resulted from injection of freshwater into underlying salt beds and pumping out the resulting brine for use as oil field drilling fluid (Land, 2013). The Jim's Water Service, Loco Hills, and Denver City sinkholes are located in relatively remote areas; however, the I&W Brine Well is located in a more densely populated area within the City of Carlsbad, New Mexico. The wells and karst features described above all occur outside of the land use study area. In the proposed CISF project area, there are no subsurface salt mining operations.

Recent studies employing satellite imagery have identified movement of the ground surface across an approximately 10,360 km^2 [4,000 mi^2] area of west Texas that includes Winkler, Ward, Reeves, and Pecos counties (Kim et al., 2016; SMU Research News, 2018). In one area, as much as 102 cm [40 in] of subsidence was identified over the past 2.5 years. This area is approximately 0.8 km [0.5 mi] east of the Wink No. 2 sinkhole in Winkler County, Texas, where there are two subsidence bowls. The rapid sinking in this area is most likely caused by water leaking through abandoned wells into the Salado Formation and dissolving salt layers (SMU Research News, 2018).

3.4.5 Seismology

Recorded earthquakes from 1973 to January 2015 in the region surrounding the proposed CISF project area are shown in EIS Figure 3.4-8. Most of these earthquakes have had low to moderate magnitude (i.e., Moment (M) magnitudes between 2.5 and 5.0). Two clusters of earthquakes are located to the northeast and to the west of the proposed CISF. The largest earthquake recorded in the vicinity of the proposed CISF was the Rattlesnake Canyon earthquake recorded in 1992, which had a magnitude 5.0 M and an epicenter located approximately 30 km [18 mi] southwest of the proposed project area.

The closest Quaternary-aged faults are associated with the southwestern base of the Guadalupe Mountains. The closest Quaternary-aged fault is unnamed fault No. 907 at the base of the Guadalupe Mountains, which is located approximately 167 km [104 mi] southwest of the proposed CISF in Guadalupe Mountains National Park in Culberson County, Texas. This is a normal fault with the most recent deformation estimated at less than 1.6 million years ago. A second fault associated with this region is Guadalupe Fault No. 2058, which is located 174 km [108 mi] west of the proposed CISF in Chaves and Otero Counties, New Mexico. There are additional Quaternary faults located south of the two previously mentioned faults along the southwestern base of the Guadalupe Mountains in Texas. The next closest area of Quaternary-aged faulting is the Alamogordo fault, which is divided into three sections. The sections of the Alamogordo fault closest to the proposed CISF project area are located approximately 273 km

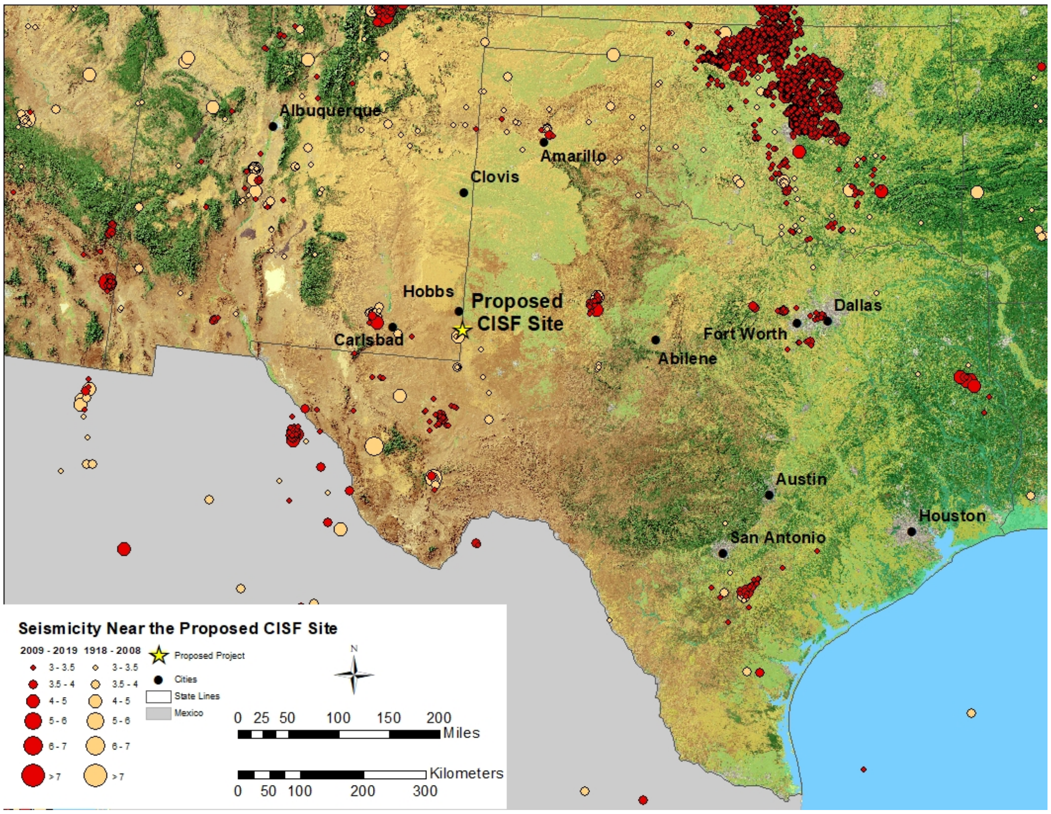

Figure 3.4-8 Earthquakes in the Region of the Proposed CISF Project Area

[170 mi] west in Otero County, New Mexico, with the most recent deformation estimated at less than 130,000 years ago (ISP, 2018, 2020).

ISP completed a site-specific probabilistic seismic hazard analysis (PSHA) of the proposed CISF project area in 2016 to estimate the levels of ground motions that could be exceeded at a specified annual frequency (or return period) at the site, incorporate the site-specific effects of the near-surface geology on ground motions, and develop seismic design parameters for the site (ISP, 2020). The peak ground acceleration for a 10,000-year return period is 0.26g (ISP, 2020), where g is the acceleration due to gravity of 9.8 meters per second squared (m/s^2) [32 ft/s^2] (DOE, 2018). As part of the analysis for the WCS site, the PSHA estimated a 2,500-year return period peak horizontal acceleration on soft rock of only 0.04g (ISP, 2020). For reference, ground shaking with a peak ground acceleration of 0.26g is roughly equivalent to a Modified Mercalli Intensity (MMI) of between III and VI (Alvarez et al., 2012). An MMI of III is defined as being felt quite noticeably by persons indoors, especially on upper floors of buildings with vibrations similar to that of a passing truck. A MMI of VI is defined as felt by everyone with heavy furniture moved and instances of fallen plaster. The actual amount of damage that could result from ground motions with 0.26g peak ground acceleration depends on factors such as the distance to the epicenter of the earthquake, duration of shaking, attenuation of the earthquake energy as it propagates from the epicenter to the location, and local amplification caused by the location's (i.e., proposed CISF) near-surface soil conditions.

3.5 <u>Water Resources</u>

This section presents a description of water resources near and within the proposed CISF project area, including surface water and groundwater resources, water usage, water availability, and water quality.

3.5.1 Surface Water Resources

3.5.1.1 Regional Topography and Surface Water Features

Andrews County, Texas, lies within the Colorado River Basin, with the exception of the southwestern portion of the county, including the proposed CISF project area, which lies within the Rio Grande River Basin (EIS Figure 3.5-1). The northwestern corner of the proposed CISF project area lies at the Rio Grande River Basin–Colorado River Basin boundary and the existing railroad spur is located 1.2 km [0.75 mi] south of this boundary, in the Rio Grande River Basin. The WCS property boundary crosses into three sub-basins: Shaffer Lake, Block 12 Oil Field-Monument Draw, and City of Eunice-Monument Draw (USGS, 2019). Shaffer Lake is a sub-basin of the Colorado River Basin. Block 12 Oil Field-Monument Draw and City of Eunice-Monument Draw are both sub-basins of the Rio Grande River Basin (EIS Figure 3.5-1).

The surface water drainage feature nearest the proposed CISF site, located approximately 4.8 km [3.0 mi] west of the proposed CISF in Lea County, New Mexico, is a southerly flowing ephemeral stream named Monument Draw (Monument Draw, New Mexico) (EIS Figure 3.5-2) (ISP, 2020). Monument Draw, New Mexico, flows into the Pecos River, which is more than 90 km [56 mi] from the proposed CISF project area. While Monument Draw, New Mexico's drainage way is typically dry, its maximum historical flow (on June 10, 1972) measured 36.2 m^3/s [1,280 ft^3/s] (ISP, 2020). The second closest surface water drainage feature is 11.4 km [7.0 mi] north of the proposed CISF and is also named Monument Draw (Monument Draw, Texas) (ISP, 2020); it also originates in Lea County, New Mexico. Monument Draw, Texas, enters Texas in southwestern Gaines County, and runs southeast for 100 km [62 mi], across Gaines County to its mouth on Mustang Draw in northeastern Andrews County. Monument Draw, Texas, flows southeasterly toward the Colorado River, which is 88 km [55 mi] from the proposed CISF project area.

An internally drained salt lake basin (i.e., labeled "depression pond" in EIS Figure 3.5-3), approximately 8 km [5 mi] east of the proposed CISF, is the only naturally occurring, perennial surface water body near the proposed CISF site (ISP, 2020). It rarely has more than a few centimeters (inches) of standing water at scattered locations within its approximate 12-ha [30-ac] footprint (ISP, 2019b). Surface drainage from the proposed CISF would not flow into this salt lake basin, because the salt lake and the proposed CISF site are within different sub-watersheds; however, surface drainage from the area immediately north of the proposed CISF, approximately 22 m [72 ft] at closest approach, would flow eastward into the salt lake basin (EIS Figure 3.5-1 and EIS Figure 3.5-3) (ISP, 2020). Two other relatively large ephemeral lakebeds are located in Andrews County: Whalen and Shafter Lakes, which are 24 and 36 km [15 and 22 mi], respectively, east-southeast of the proposed CISF in the Colorado River Basin.

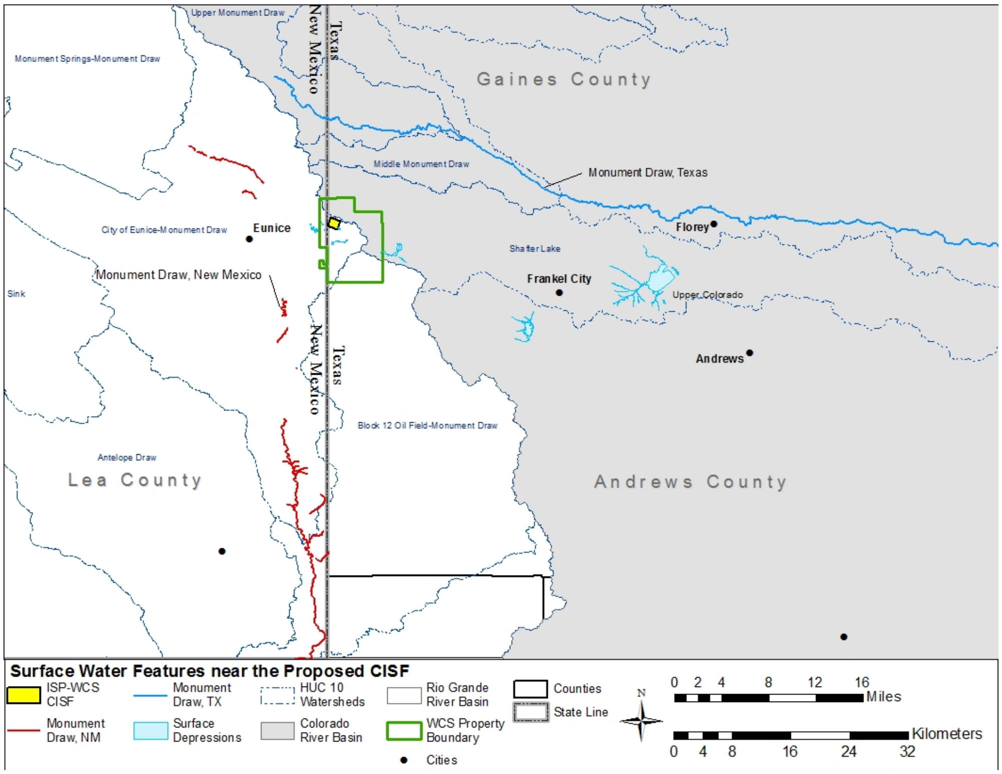

Figure 3.5-1 Map of Surface Water Sub-basins and South-Flowing and East-Flowing Monument Draws Near the Proposed CISF Project Area

Perennial surface water features across the area, other than the salt lake basin, are artificial (man-made) and include stock ponds and the feature denoted as Fish Pond (EIS Figure 3.5-3), located 2.0 km [1.2 mi] west of the proposed CISF in New Mexico at the Permian Basin Materials quarry (formerly Wallach Concrete). In addition, Sundance Services, LLC, operates the Parabo Disposal Facility for oil and gas waste west of the proposed CISF in New Mexico, which has several evaporation ponds. Water periodically collects in excavated and diked areas at this disposal facility and in its active quarry areas, which are 1 km [0.6 mi] west of the WCS property.

3.5.1.2 Local Topography, Surface Water, and Floodplains

The terrain at the WCS site is gently rolling with an elevation range of approximately 1,061 m to 1,072 m [3,482 ft to 3,520 ft] above mean sea level (ISP, 2018). The surface area of the local watershed that would host the proposed CISF is approximately 352 ha [869 ac] (ISP, 2018). The location of the proposed CISF is shown with respect to the surrounding topography, drainage features, and the WCS site property boundary in EIS Figure 3.5-1 and EIS Figure 3.5-3. Although no natural perennial surface water features are located within the proposed CISF project area, there are stock tanks present, which are often replenished by shallow groundwater wells. Ephemeral surface water features in the vicinity of the proposed project area are limited to Baker Spring, draws, drainage areas, and surface depressions that seasonally contain water for short durations following precipitation events.

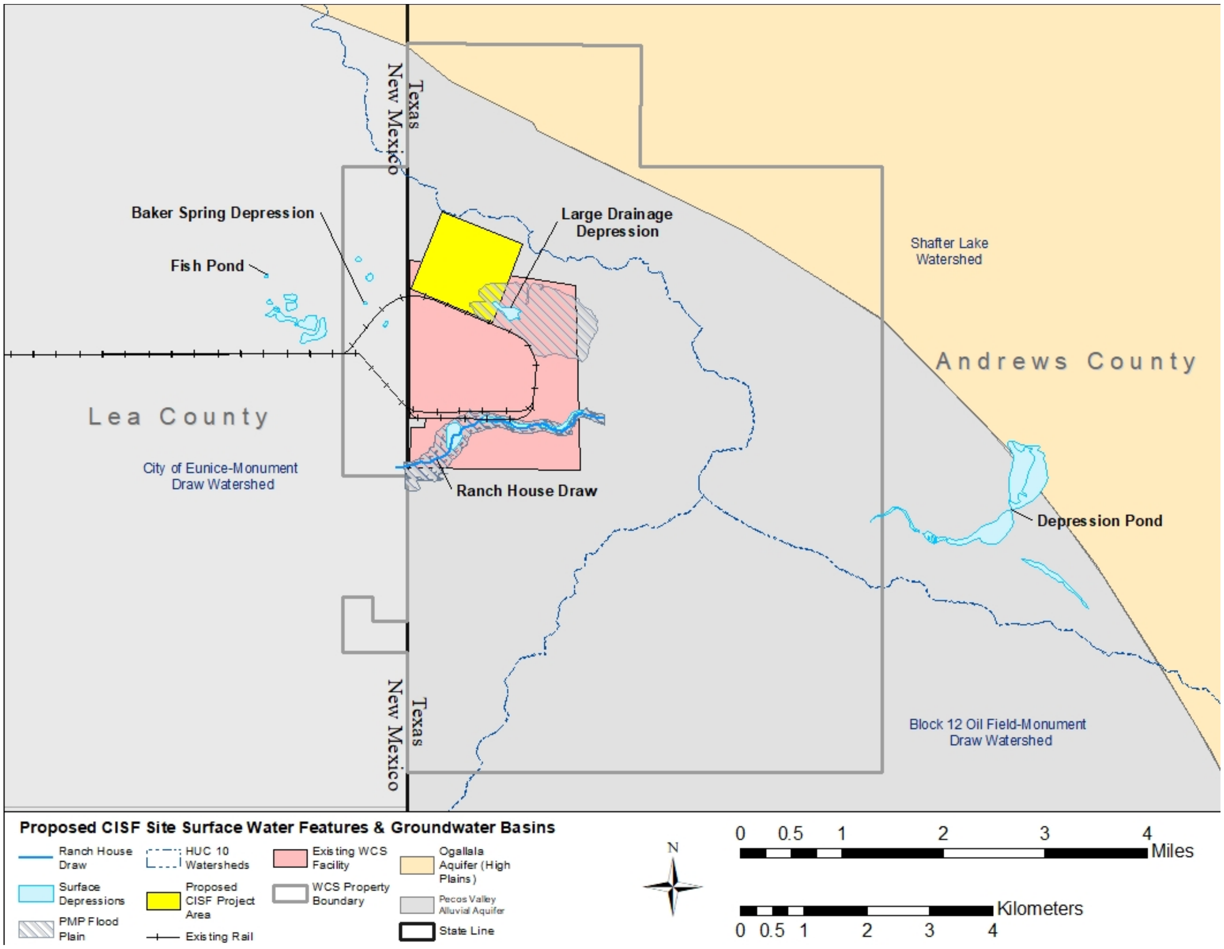

Figure 3.5-2 Map of Surface Water Features Near the Proposed CISF Project Area

Baker Spring is an ephemeral pond (EIS Figure 3.5-2), made from a historic quarry on the WCS property, approximately 722 m [2,370 ft] west-southwest from where the proposed CISF project area would be located (ISP, 2020). Two small, unnamed draws drain into the Baker Spring depression (ISP, 2020). Occasionally, ponded water is present in Baker Spring for a few days up to a few weeks following a heavy precipitation event; however, since 2017, water has only been noted in Baker Springs four times, with the last instance being January 2017(ISP, 2019b).

On and near the WCS site, there are numerous surface depressions or small, internally drained basins. While the surface depressions are sometimes called playas, this term is a misnomer because the depressions lack a distinguishing soil type associated with playa basins (Lehman and Rainwater, 2000). The surface depressions at the WCS site are usually dry. Some occasionally hold ponded water after large or intense rainfall events; however, the water rapidly dissipates through evapotranspiration and infiltration, potentially functioning as isolated recharge zones for shallow groundwater aquifers (ISP, 2020). A large, internally drained surface depression, referred to hereafter as the “large drainage depression” (EIS Figure 3.5-2) (≤0.4 mi^2 [≤280 ac]) with approximately 3.8 m [12.4 ft] of basin relief is present on the southeastern edge of the proposed CISF project area (ISP, 2018).

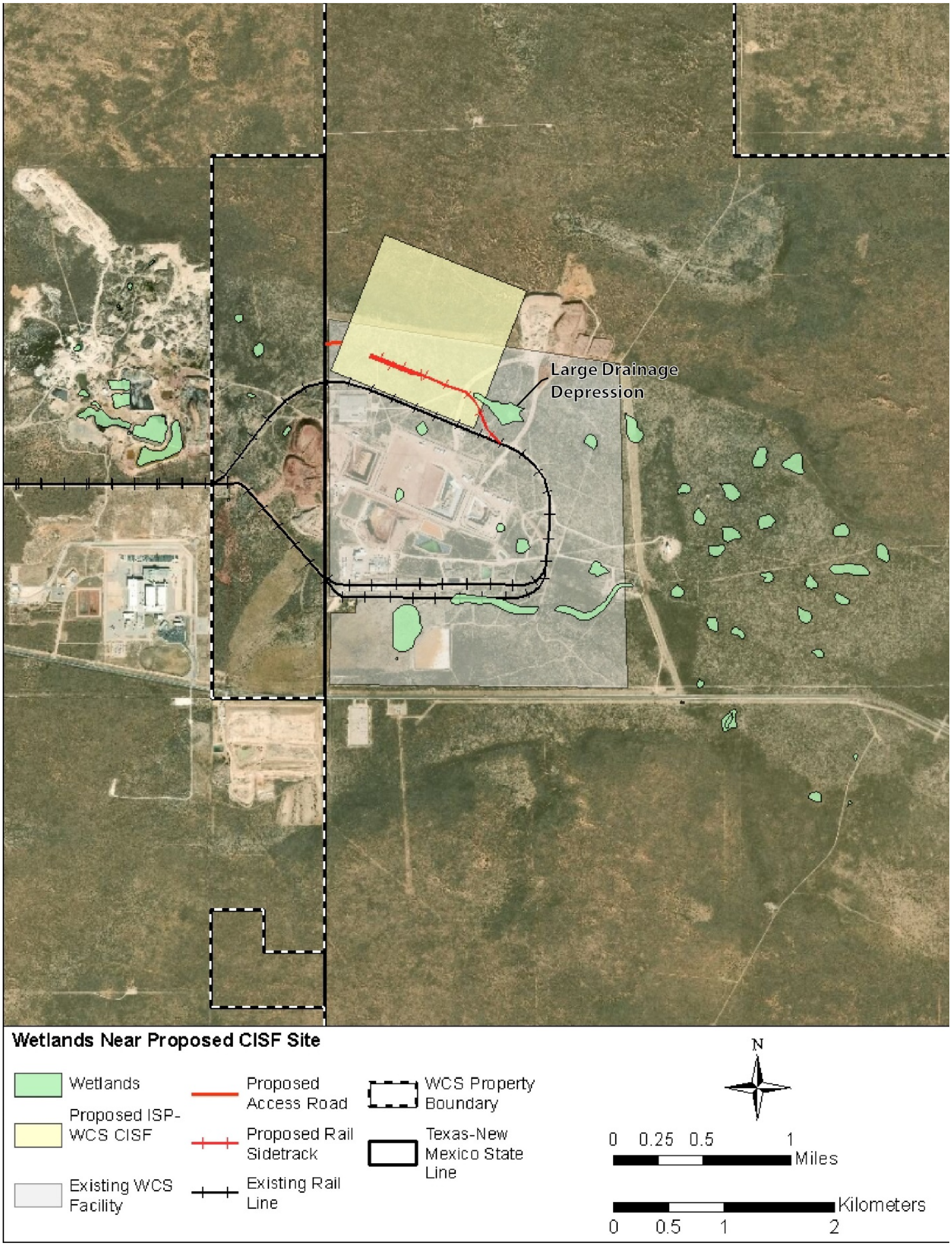

Figure 3.5-3 Nonjurisdictional Wetlands Near the Proposed CISF Project Area

The west half of the proposed CISF would drain southwest across State Line Road into New Mexico. The southwest portion of the proposed CISF would also drain across the existing railroad spur near Baker Spring. The east half of the proposed CISF would drain into the large drainage depression adjacent to the proposed CISF, potentially overflowing to the south over the existing railroad spur and toward Ranch House Draw (ISP, 2018; ISP, 2020). Ranch House Draw is an ephemeral drainage-way crossing the WCS site from east to west, south of the WCS LLRW facilities (ISP, 2018).

The land surface elevation at the proposed CISF project area is above the 100-yr floodplain elevation for Ranch House Draw and above the overflow level of the adjacent large drainage depression (ISP 2018) by approximately 0.3 m [1 ft] (ISP,2019b). Ranch House Draw's 100-yr floodplain is approximately 1,219 m [4,000 ft] southeast of the proposed CISF, while the 500-yr and probable maximum precipitation (PMP) floodplains are approximately 1,209 m and 1,187 m [3,965 ft and 3,895 ft] southeast of the proposed CISF (ISP, 2018). These floodplains extend across the west-central portion of the WCS site (EIS Figure 3.5-2).

3.5.1.3 Wetlands

According to the USGS National Wetland Inventory Map, there are temporarily flooded wetlands near the proposed CISF site, including one on the eastern edge of the proposed CISF footprint; however, the U.S. Army Corps of Engineers (USACE) determined that there are no USACE jurisdictional wetlands at either the WCS site or the proposed CISF site (EIS Figure 3.5-3) (FWS, 2019a).

3.5.1.4 Surface Water Use

Surface water in the area is not used for human consumption. Uptake by riparian vegetation (i.e., water-loving plants known to reside along the banks of surface water features) is the only known use of ephemeral surface water. The use of perennial surface water features across the area is limited primarily to stock watering and as evaporation ponds for stormwater runoff.

3.5.1.5 Surface Water Quality

Surface water that collects in the surface depressions near the proposed CISF project area is lost through evapotranspiration, resulting in high salinity conditions in the soils and remaining water. These conditions are not favorable for aquatic or riparian habitat. A surface water sample collected from Baker Spring had a total dissolved solids (TDS) concentration of 96 mg/L [96 ppm], a pH of 7.46, and a total alkalinity of 77.6 mg/L [77.6 ppm] (ISP, 2019b). The TCEQ has set surface water quality standards for segments of the Colorado River Basin and the Rio Grande River Basin within Texas. For the Rio Grande River, TDS limits range from 300 mg/L [300 ppm] to 15,000 mg/L [15,000 ppm] and pH limits range from 6.5 to 9, (30 TAC 307.10(1)). The Texas Commission on Environmental Quality (TCEQ) limits for the Colorado River Basin range from 400 mg/L [400 ppm] to 9,210 mg/L [9,210 ppm] for TDS and from 6.5 to 9 for pH (30 TAC 307.10(1)). The EPA recommends that water suitable for aquatic plants and animals maintain an alkalinity value at least of 20 mg/L [20 ppm] (EPA, 2019).

3.5.2 Groundwater Resources

3.5.2.1 Regional Groundwater Resources

Groundwater resources in the region of the proposed project area are found in the Santa Rosa and Trujillo Formations (collectively known as the Dockum Aquifer) of the Dockum Group, the Antlers Formation of the Trinity Group, the Ogallala Aquifer in the Ogallala Formation, and the Pecos Valley Alluvium of the Gatuña Formation (also known as the Cenozoic Alluvium). The stratigraphic position of these units is shown in EIS Figure 3.4-3.

Geologic cross-sections showing the relationship of the Ogallala Formation to underlying strata of the Trinity Group (also referred to as the Edwards-Trinity Group) and Dockum Group in west Texas and southeastern New Mexico are illustrated in EIS Figures 3.5-4 and 3.5-5. The Antlers Formation of the Trinity Group, Ogallala Formation, Pecos Valley Alluvium are major aquifers (i.e., they produce large amounts of water over large areas). The Dockum Group is considered a minor aquifer (i.e., it produces a small amount of water over a large area).

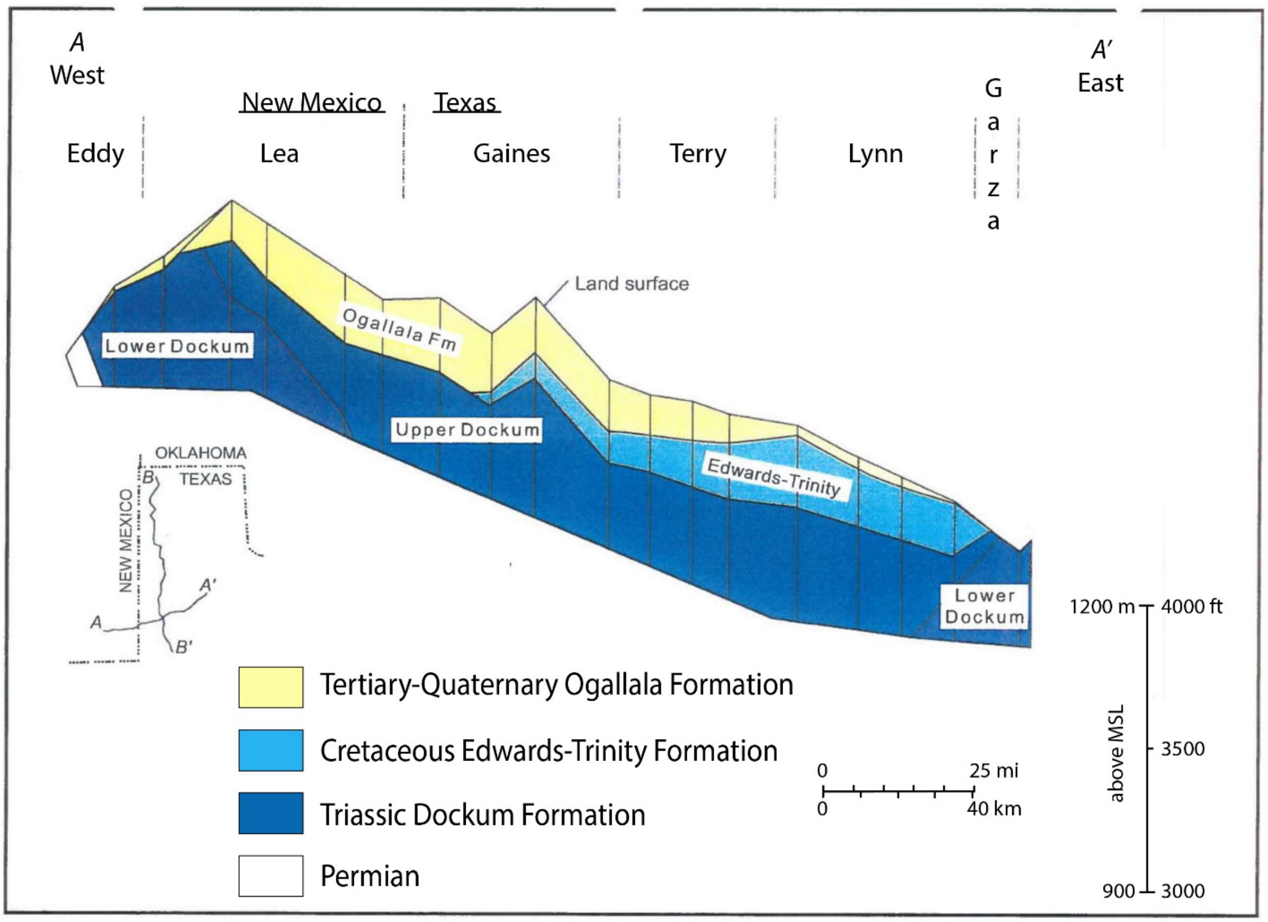

Figure 3.5-4 West to East Hydrostratigraphic Cross-Sections of the Area Near the Proposed CISF Project Area

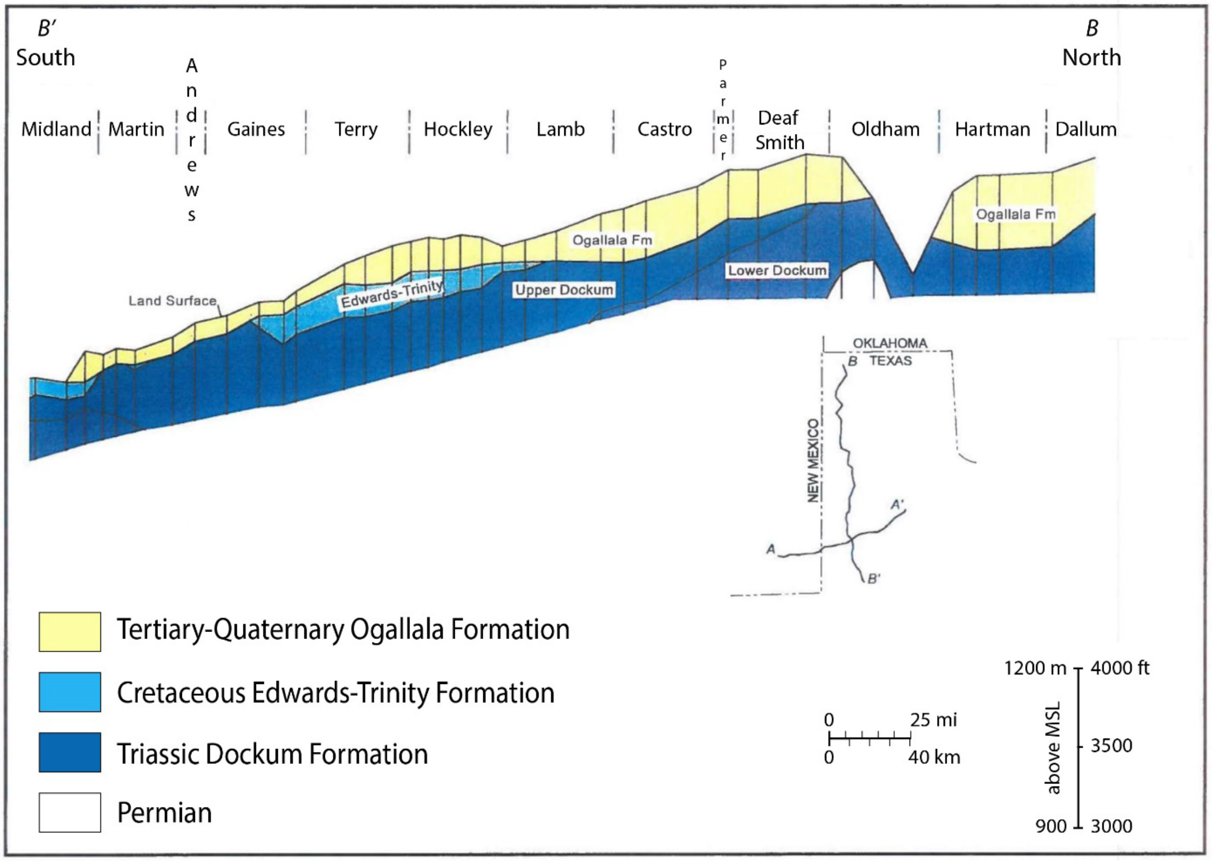

Figure 3.5-5 South to North Hydrostratigraphic Cross-Sections of the Area Near the Proposed CISF Project Area

Dockum Aquifer

The water-bearing formations in the Dockum Group are the Santa Rosa and Trujillo Formations and are known collectively as the “Lower Dockum Group Aquifer” and the “Dockum Aquifer,” which is considered a minor aquifer in northwestern Texas (Dutton and Simpkins, 1986; Bradley and Kalaswad, 2003).

The Dockum Aquifer is recharged by precipitation where its sandstone units outcrop at the surface in eastern New Mexico (Richey et al. 1985; Bradley and Kalaswad, 2003). During the Pleistocene, the Dockum Aquifer was cut off from its recharge area by development of the Pecos and Canadian River valleys. Therefore, most of the recharge to the aquifer in Texas is considered to have occurred 15,000 to 35,000 years ago (Dutton, 1995; Dutton and Simpkins, 1986). Without recharge, the Dockum Aquifer undergoes a net loss of groundwater from discharges because of seepage and pumpage (Dutton and Simpkins, 1986).

The Dockum Group’s Tecovas Formation and Cooper Canyon red beds generally function as regional aquitards within the Dockum Group, restricting the movement of groundwater (Bradley and Kalaswad, 2003). The piezometric water level in the Dockum Aquifer is approximately 61 to 91 m [200 to 300 ft] lower than that of the Ogallala Aquifer throughout much of the region and suggests that the Dockum Aquifer is receiving essentially no recharge through the Cooper Canyon Formation red beds from cross-formational flow (Nativ, 1988).

Antlers Aquifer

The Trinity Group Antlers Formation (also known as the Trinity Aquifer or the Antler Aquifer) is a main aquifer of the Edwards–Trinity (Plateau) Aquifer, a major aquifer of southwestern and central Texas (Ryder, 1996; TWDB, 2019). The Antlers Formation is sometimes overlain and potentially hydraulically connected to the Ogallala Aquifer (Anaya and Jones, 2009; their Figure 5-12; ISP, 2020). Thicker sections of the Antlers Formation (i.e., where it ranges from 12 to 18 m [40 to 60 ft] thick) are capped by a shale interval, potentially limiting direct infiltration, whereas thinner sections are characterized by its erosional absence (Lehman and Rainwater, 2000).

The Antlers Formation is primarily recharged by precipitation infiltration in surface depressions, stream losses, a small amount of cross-formational flow from the Ogallala Aquifer (Blandford and Blazer, 2004), and irrigation return flow (Anaya and Jones, 2009). Groundwater discharge from the Edwards–Trinity (Plateau) Aquifer occurs naturally to springs, seeps, and through cross-formational flow to the Pecos Valley Aquifer/Gatuña Formation, as well as through pumpage (Anaya and Jones, 2009; their Figure 10-2).

Ogallala Aquifer

Where the Ogallala Formation is saturated, it forms the Ogallala Aquifer, a major Texas (and multi-State) aquifer, which is typically unconfined (ISP, 2020). The Ogallala Aquifer is relatively thin <30 m [<100 ft] in Andrews County and thickens towards the north (i.e., from Terry to Deaf Smith County) and west (i.e., Lea County, New Mexico) (ISP, 2020; Blandford et al., 2003; George, 2011), as shown in EIS Figures 3.5-4 and 3.5-5 (ISP, 2020). The saturated thickness of the aquifer ranges from negligible to approximately 91 m [300 ft] in the Southern High Plains (Nativ, 1988); the median thickness of the southernmost part of the Ogallala Aquifer in the southernmost portion of the Texas Panhandle Plains is 16 m [50 ft] (Reedy, 2011).

The Ogallala Aquifer is primarily recharged through infiltration of precipitation in surface depressions, headwater creeks, and by irrigation runoff (Blandford et al., 2003). Regionally, the recharge rate to the Ogallala Aquifer is approximately 9 mm/yr [0.35 in/yr] (Mullican et al., 1997). Groundwater discharge from the Ogallala Aquifer occurs naturally through springs, underflow, and evapotranspiration (where the formation is near the land surface), but groundwater is also extracted through pumping (ISP, 2020).

Pecos Valley Alluvium (Gatuña Formation)

The Gatuña Formation (Kelley, 1980) is generally associated with the Quaternary Pecos Valley Alluvium (TWDB, 2006). The Pecos Valley Alluvium forms a major unconfined aquifer in west Texas (Richey et al., 1985). Artesian conditions may be present where clay layers act as confining beds (Richey et al., 1985). The thickness of the Pecos Valley Alluvium ranges from 0 to 60 m [0 to 200 ft] in Andrews County, Texas (Meyer et al., 2012; their Figure 6-5). Irrigation wells of the Pecos Valley Aquifer typically yield 3,800 Lpm [1,000 gpm] (Ryder, 1996).

The Pecos Valley Aquifer is primarily recharged by infiltration from precipitation, irrigation, and ephemeral streams; it is also recharged by cross-formational flow from the Dockum, Edwards–Trinity (Plateau) and Ogallala Aquifers (Nicholson and Clebsch, 1961; LaFave, 1987; Ashworth, 1990; Anaya and Jones, 2009). Due to the semiarid climate, recharge by infiltration of precipitation is significant only during intense rainfall events (Richey et al., 1985). Groundwater discharge from the Pecos Valley Aquifer occurs naturally as base flow to the Pecos River, as discharge to streams, springs, and reservoirs, through evapotranspiration where the water table is shallow, and as cross-formational flow, and artificially as pumpage.

3.5.2.2 Local Groundwater

Local hydrostratigraphic units of direct relevance to the proposed CISF project area, from oldest to youngest, are the Dockum Group, the Antlers Formation, and the Ogallala Formation.

WCS Site Hydrostratigraphy

At the WCS Site, the Dockum Group is present and is made up of the Santa Rosa, Tecovas, Trujilo, and Cooper Canyon Formations. As described in EIS Section 3.5.3.1, only the Santa Rosa and Trujillo Formations contain groundwater and form a minor aquifer referred to as the "Dockum Aquifer" (Bradley and Kalaswad, 2003). The Santa Rosa Formation at the WCS site is approximately 76 m [250 ft] thick and approximately 347 m [1,140 ft] below ground level (Bradley and Kalaswad, 2003) (ISP, 2020). The Tecovas Formation clays form an aquitard between the Santa Rosa Formation and the overlying Trujillo Formation (ISP, 2020). The Trujillo Formation at the WCS site is approximately 30.5 m [100 ft] thick and approximately 183 m [600 ft] below ground level (ISP, 2020). Based on measurements from two deep wells at the WCS site, water levels in the Dockum Aquifer range from 869 m [2,852 ft] above mean sea level in the Santa Rosa Formation to 967 m [3,172 ft] above mean sea level in the Trujillo Formation (ISP, 2020). The top of the Cooper Canyon Formation is generally at a depth of 11 m [35 ft] or less along the crest of the Red Bed Ridge (Lehman and Rainwater, 2000). The Cooper Canyon Formation red beds, into which the WCS LLRW facility was placed, also forms a low-permeability aquitard, separating groundwater in any overlying formations from groundwater in the underlying Trujillo or Santa Rosa Formations (Nicholson and Clebsch, 1961; Dutton and Simpkins, 1986; Rainwater, 1996). At the WCS site, the Cooper Canyon Formation is more than 61 m [200 ft] thick and contains three to four interbedded siltstone/sandstone layers (Rainwater, 1996). Within one of these layers, which are two orders of magnitude more permeable than the surrounding claystone, the Cooper Canyon Formation hosts the shallowest confined groundwater beneath the proposed CISF, located at a depth of approximately 69 m [225 ft].

The Antlers Formation is mostly unsaturated at the WCS site, except for a few isolated pockets of groundwater that infill topographic lows or erosional channels incised into the underlying Cooper Canyon Formation red beds (Lehman and Rainwater, 2000; ISP, 2018).

The Ogallala Formation is thin where it is present along the north and east sides of the WCS site, ranging in thickness from 1.5 to 12 m [5 to 40 ft] (Lehman and Rainwater, 2000, Figures 4, 5, and 6). The formation's top occurs at depths from 14 to 32 m [45 to 105 ft] below ground level (Lehman and Rainwater, 2000). Groundwater was found in three piezometers (i.e., Nos. 11, 12, 17) along the eastern border of the WCS site that are thought to have penetrated the Ogallala Formation (Lehman and Rainwater, 2000; their Figure 10); based on this information and the Environmental Report, the Ogallala Formation is locally saturated within 3.2 km [2 mi] of the proposed CISF project area (ISP, 2020). The proposed CISF project area lies approximately 1.7 km [1 mi], at closest approach, southwest of the southwestern limits of the Ogallala Aquifer (EIS Figure 3.5-2) (Qi, 2010).

The Gatuña Formation has 4.5-to-6-m [15-to-20 ft]-thick vertical surface exposure of coarse, cross-bedded, gravelly sand containing large sandstone and limestone boulders at Baker Spring and appears to be mostly unsaturated on and near the WCS site (Lehman and Rainwater, 2000). Although the base of the Gatuña Formation is near the surface at Baker Spring, it is not exposed, and groundwater from the unit does not discharge to Baker Spring (ISP, 2019b,c). The saturated Pecos Valley Aquifer is not present near the proposed CISF (ISP, 2018), and Lehman and Rainwater (2000) reported that groundwater was not found in any of the 10 boreholes that fully penetrated the Gatuña Formation on the WCS site.

Lehman and Rainwater (2000) used water level data obtained from 95 boreholes to map shallow groundwater elevation and saturated thickness beneath the WCS site. They found discontinuous groundwater in two areas, one in the northwestern corner of the proposed CISF project area, and the other in the east-central area surrounding Windmill Hill (Lehman and Rainwater, 2000; their Figure 10). Of 17 wells in which shallow groundwater was found, 14 were identified as having been perforated in the Antlers Formation, but the unit was not fully saturated. The other three wells that intercepted groundwater were screened in the Ogallala Formation on the eastern edge of the WCS site (Lehman and Rainwater, 2000; their Figures 9 and 10). Lehman and Rainwater (2000) concluded that near-surface groundwater in the Antlers and Ogallala Formations on the WCS site likely resulted from local recharge through closed surface depressions in the Caprock Caliche along the crest of the Red Bed Ridge and was not a product of regional lateral flow or indicative of hydrologic connectivity between the saturated pockets and the Ogallala Aquifer. The local saturated thickness in the Antlers and Ogallala Formations on the WCS site typically ranges from 0 to 3 m [0 to 10 ft] but may approach 7.5 m [25 ft] in the Antlers Formation at the far northwestern corner of the proposed CISF project area (Lehman and Rainwater, 2000; their Figure 10).

Proposed CISF Site Hydrostratigraphy

Within the proposed CISF footprint, there are no borings that penetrate into the Santa Rosa and Trujillo Formations of the Dockum Group (EIS Figures 3.4-5 and 3.4-6). Within and in the vicinity of the proposed CISF, sands, sandstone, and gravels ascribed to the Ogallala Formation, Antlers Formation, and Gatuna Formation are situated in the same stratigraphic interval and hydrogeologically represent a single hydrostratigraphic unit overlying the Dockum Group. This hydrostratigraphic unit of undifferentiated sands and sandstones is locally referred to as the OAG (Ogallala/Antlers/Gatuna) unit. However, the Gatuña Formation is not present at or in the vicinity of the proposed CISF project site. As described in EIS Section 3.4.2, the Gatuña Formation is only present along the southern and southwestern sides of the WCS site (Lehman and Rainwater, 2000; their Figures 3 through 6). A site-specific geologic column for the proposed CISF is shown in EIS Figure 3.4-3.

The OAG Unit is mostly unsaturated beneath the proposed CISF site, except for a few isolated perched lenses (EIS Figure 3.5-6) (ISP, 2019c) at the bedrock interface. The shallowest groundwater beneath the proposed CISF footprint is a few centimeters to up to approximately a meter [a few inches to a few feet] of saturation in the undifferentiated OAG sediments detected in piezometer PZ-47 at the northern fence line of the Protected Area boundary in the northeast corner of the proposed CISF and in piezometer PZ-57 north of the proposed CISF (EIS Figure 3.5-6) (ISP, 2019c). The sands and gravels containing the water in PZ-47 and PZ-57 are at a 27- to 30-m [90- to 100-ft] depth immediately above clay of the Cooper Canyon Formation of the Dockum Group (EIS Figures 3.4-5 and 3.4-6). The position of this water is consistent with Davidson et al., 2019, who concluded that saturation in the subsurface does not occur other than where localized recharge reaches the OAG sands and gravel immediately above the

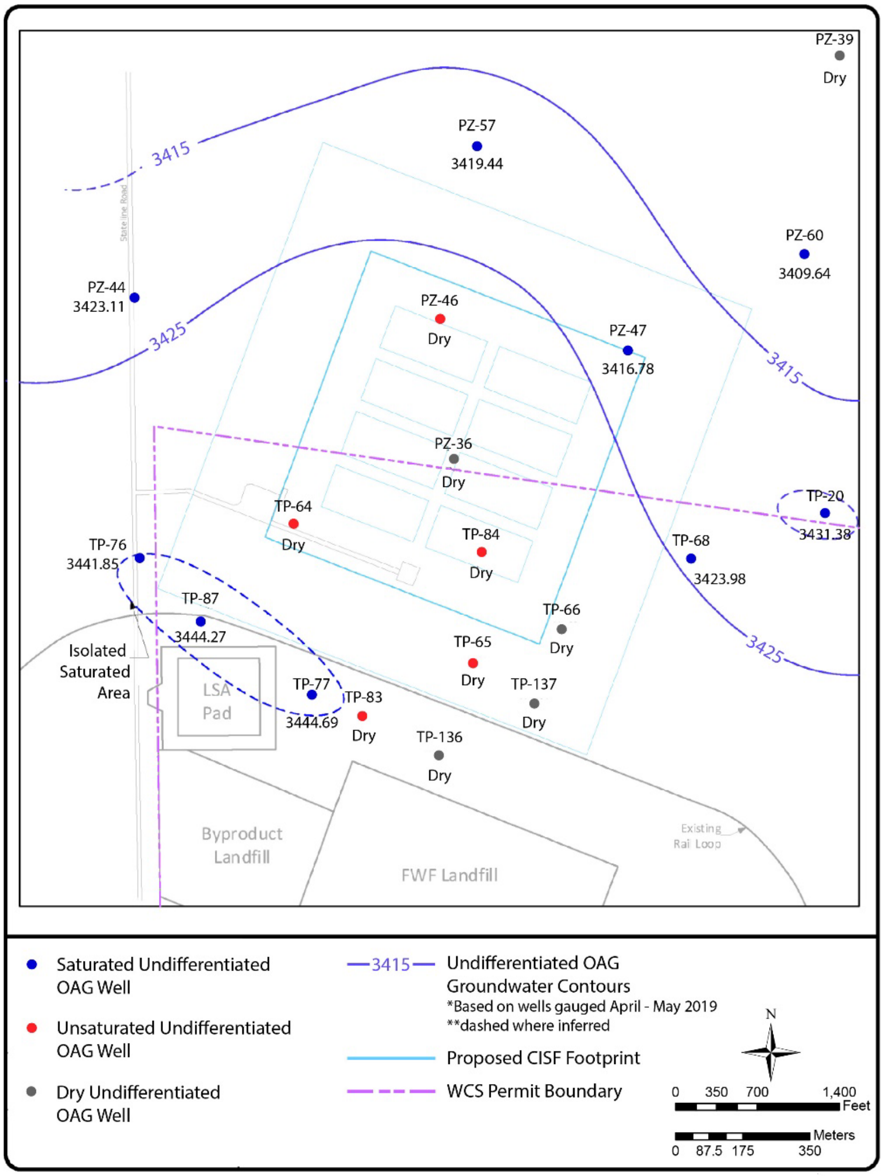

Figure 3.5-6 OAG Wells and Groundwater Elevation Contours Near the Proposed CISF Project Area. Modified from ISP (ISP, 2019c)

Triassic red beds (i.e., the Cooper Canyon Formation of the Dockum Group). Water has also been detected in piezometers TP-77 and TP-87 directly south of the proposed CISF footprint (ISP, 2019c). The water in these piezometers is isolated and not connected to the water in piezometers PZ-47 and PZ-57 to the north of the proposed CISF footprint (ISP, 2019c).

3.5.2.3 Groundwater Use

Andrews County is located within Groundwater Management Area 2 in the panhandle of Texas but does not have a groundwater conservation district inside its boundaries (e.g., George et al., 2011; their Figure 2-14). It is estimated that between 2020 and 2070 in Andrews County and Gaines County, water demands will average 58,489,155 cubic meters/year (m^3/yr)

[47,418 acre-feet/year (ac-ft/yr)] and 424,642,759 m^3/yr [344,264 ac-ft/yr], respectively (TWDB, 2017a; TWDB, 2017b). For both counties, the primary use of pumped groundwater is for agricultural irrigation, averaging approximately 457,616,146 m^3/yr [370,996 ac-ft/yr] (Anaya and Jones, 2009; TWDB, 2017a; TWDB, 2017b). After irrigation, groundwater usage is primarily for municipal public water, industrial uses, mining, thermoelectric power generation (using water to create steam to drive stream-driven turbine generators), livestock watering, rural domestic water supply, and commercial uses (Anaya and Jones, 2009).

Dockum Aquifer

Groundwater from the Dockum Aquifer is used as a replacement for, or in combination with, water from the Ogallala Aquifer as a regional source for irrigation, stock, and municipal water (Dutton and Simpkins, 1986), as well as for oil field water-flooding operations in the southern High Plains (George et al., 2011). In the absence of recharge, the Dockum Aquifer in Texas experiences a net loss of groundwater from withdrawal by wells and seepage (Dutton and Simpkins, 1986). Groundwater availability from the Dockum Aquifer during the year 2010 was 506 million m^3 [410,000 ac-ft], whereas the reported Dockum groundwater use during the year 2003 was 60 million m^3 [49,000 ac-ft] (George et al., 2011; their Figure 2-12).

WCS currently uses approximately 3.78 million liters [one million gallons] of nonpotable water per year, pumped from two local wells (the central/CW well and the southeast/backup well) completed in the Santa Rosa Formation of the Dockum Aquifer (WCS, 2004). WCS uses well water to maintain the firewater tank, for processing activities, and for dust suppression during both construction and landfilling operations.

Antlers Aquifer

Water use from the Antlers Aquifer includes stock watering, domestic use, and irrigation. Irrigated agriculture claims two-thirds of the groundwater pumpage from the Antlers Aquifer, with the remainder being withdrawn for municipal public water and livestock supplies (George et al., 2011). Groundwater availability from the Antlers Aquifer during the year 2010 was 703 million m^3 [570,000 ac-ft], whereas the reported Antler groundwater use during the year 2003 was 185 million m^3 [150,000 ac-ft] (George et al., 2011; their Figure 2-12).

Ogallala Aquifer

Irrigated agriculture claims 95 percent of groundwater pumpage from the Ogallala Aquifer in the High Plains (George et al., 2011). The nearest drinking water well perforated in the OAG unit is located approximately 10.5 km [6.5 mi] east of the proposed CISF, at a residence on the Letter B Ranch (ISP, 2020). Throughout most of the Ogallala Aquifer, groundwater supply has been decreasing as a result of depletion; however, the rate of decline has slowed in recent years because of regional water planning groups' conservation efforts and the implementation of water management strategies (George et al., 2011). During the year 2003, reported Ogallala groundwater use in Texas was 7.8 billon m^3 [6.3 million acre feet], which is 400 million m^3 [324,285 acre feet] more than the calculated Ogallala groundwater availability during the year 2010 (George et al., 2011; their Figure 2-12). By 2060, it is estimated that the supply from the Ogallala Aquifer will be reduced by approximately 3.1 billion m^3 [2.5 million acre feet] (George et al., 2011).

Pecos Valley Aquifer (Gatuña Formation)

Annual pumpage in the Pecos Valley Aquifer/Gatuña Formation is much greater than annual recharge (Ryder, 1996). Irrigated agriculture claims more than 80 percent of groundwater pumpage from the Pecos Valley Aquifer, with the remainder being withdrawn for municipal public water supplies, industrial use, and power generation (George et al., 2011). Groundwater availability from the Pecos Valley Aquifer during the year 2010 was 247 m^3 [200,000 ac-ft], whereas the reported Pecos Valley groundwater use during the year 2003 was 68 million m^3 [55,000 ac-ft] (George et al., 2011; their Figure 2-12).

3.5.2.4 Groundwater Quality

Shallow groundwater (groundwater 69 m [225 ft] below the surface) at the WCS site is a calcium-magnesium-bicarbonate-dominated solution having TDS in the range of 278 to 767 mg/L [278 to 768 ppm] (ISP, 2020). The maximum secondary constituent level for drinking water, according to the TCEQ, is 1,000 mg/L [1,000 ppm] (30 TAC 290).

Dockum Aquifer

Dockum Aquifer groundwater is hard and is typically of poor water quality due to salinity, particularly in its western extent, where the transmissive portions of the aquifer are buried deep in the subsurface, far from any recharge zone (George et al., 2011). The water-bearing formations in the Dockum Group near the proposed CISF project area yield nonpotable water with TDS ranging from 1,000 to 5,000 mg/L [1,001 to 5,006 ppm] (Ewing et al., 2008). The Santa Rosa Formation sandstone is considered the best water-bearing unit within the Dockum Group because it is the most prolific, productive, and widely used (Bradley and Kalaswad, 2003). Gross alpha and combined radium (from naturally occurring uranium in the units) may be in excess of the State of Texas's primary drinking water standard in some areas (Reedy et al., 2011), but levels that exceed the standard have not been observed near the WCS site (George et al., 2011; their Figure 2-10). However, eight wells in Andrews County, including one near the WCS site, exhibited gamma ray spikes during logging, indicating a potential radionuclide source in the interrogated sediments of the Dockum Group/Dewey Lake Formation (Meyer et al., 2012; their Figure 6-27). Some wells sampled for Radium-226 and -228 concentrations in Dockum Aquifer groundwater have also exhibited levels higher than acceptable standards (George et al., 2011). High TDS related to high chloride and sulfate concentrations exceed the primary MCL throughout most of Andrews County (Reedy et al., 2011; their Figure 53). Secondary MCL exceedances relate to fluoride, iron, and manganese concentrations (Reedy et al., 2011). Nearer the land surface, trapped within the interbedded siltstone/sandstone layers in the Cooper Canyon Formation red beds, TDS ranges widely from 1,800 to 5,500 mg/L [1,802 to 5,506 ppm], and the waters are classified as sodium-sulfate-chloride–dominated solutions (Rainwater, 1996). Groundwater that has evolved to sulfate-type water typically has been in the subsurface for a longer time than has bicarbonate-type water (Rainwater, 1996; ISP, 2020). Large differences in geochemical composition of the Cooper Canyon Formation water samples from different wells indicate that little flow and mixing of water occurs within this siltstone (Rainwater, 1996).

Antlers Aquifer

Water quality in the Antlers Aquifer ranges from fresh to slightly saline; TDS ranges from 100 to 3,000 mg/L [100 to 3,003 ppm] (George et al., 2011). Salinity typically increases to the west within the Trinity Group (George et al., 2011). Primary MCL exceedances relate to gross alpha, combined radium, and uranium concentrations (Reedy et al., 2011). Secondary MCL exceedances relate to TDS, sulfate, chloride, and fluoride concentrations (Reedy et al., 2011).

Ogallala Aquifer

Water quality data for three Ogallala Aquifer wells (Lehman and Rainwater, 2000; their Figure 10), located within 3.2 km [2 mi] of the proposed CISF, indicate that local groundwater is fresh to slightly saline {TDS ≤ 3,000 mg/L [≤ 3,003 ppm]} (ISP, 2020). Upward cross-formational flow from the underlying Dockum Aquifer may contribute to the salinity in some areas (Reedy et al., 2011). Arsenic, fluoride, nitrate as nitrogen (nitrate-N), gross alpha, uranium, and selenium concentrations may exceed the primary maximum contaminant level (MCL) in the southern Ogallala Aquifer, where the aquifer is thin (George et al., 2011; Reedy et al., 2011). Fluoride, TDS, chloride, and sulfate concentrations also tend to exceed the secondary MCL in the same region (Reedy et al., 2011). However, near the WCS site, TWDB and other groundwater-monitoring cooperators have found that arsenic concentrations fall within the maximum acceptable limits (George et al., 2011; their Figure 2-9).

Pecos Valley Aquifer (Gatuña Formation)

The water quality of the Pecos Valley Aquifer is highly variable (Ashworth and Hopkins, 1995). A Pecos Valley water sample drawn from south of the WCS site in Andrews County, Texas, indicated that locally, TDS were relatively low {i.e., within the range of 116 to 500 mg/L [116 to 500 ppm] (Meyer et al., 2012; their Figure 6-22)}. Groundwater in the nearby Monument Draw Trough of the Pecos Valley Aquifer is fresh to moderately saline (i.e., TDS < 1,000 mg/L [<1,000 ppm]) (George et al., 2011; Jones, 2001). Arsenic, fluoride, nitrate-N, and gross alpha may exceed the primary MCL, particularly in the eastern part of the Monument Draw Trough (Reedy et al., 2011). TDS, related to high chloride and sulfate concentrations, as well as fluoride, iron, and manganese, may exceed the secondary MCL (Reedy et al., 2011). Pecos Valley groundwater may be characterized by chloride and sulfate concentrations that exceed secondary drinking water standards either as a result of oilfield brine contamination released from unlined pits or improperly cased oil wells (Jones, 2001; George et al., 2011), or as a result of cross-formational flow of underlying Permian groundwaters (Reedy et al., 2011). However, sulfate and chloride concentrations in a water sample drawn from south of the WCS site indicated that locally, such concentrations were low (Meyer et al., 2012; their Figures 6-25, -26). Near the WCS site, Texas Water Development Board (TWDB) or other groundwater-monitoring cooperators have found that arsenic concentrations fall within the maximum acceptable limits (George et al., 2011; their Figure 2-9), and gamma ray spikes were not associated with the Pecos Valley Alluvium in wells drilled in Andrews County, Texas.

3.6 Ecology

This section describes the ecological characteristics (terrestrial and aquatic plants and animals) within the proposed CISF project area (130 ha [320 ac]) and the larger WCS-controlled property {5,666-ha [14,000-ac]}. It also discusses important plant and animal species that occur or have the potential to occur at the proposed CISF project area and habitats that are important to those species.

Ecological assessments and surveys were previously conducted at the WCS site prior to the development of existing WCS LLRW facilities to support the WCS application for a license to authorize near-surface land disposal of LLRW. These ecological assessments and surveys included baseline ecological surveys the Ecology Group conducted in 1996 and 1997, which focused on the Resource Conservation and Recovery Act (RCRA)-permitted area of the WCS-controlled property where the LLRW facilities are located and included the proposed CISF project area (ISP, 2020; ISP, 2019d). Also, to support the WCS application for a license to authorize near-surface land disposal of LLRW, a habitat characterization and rare-species survey Doug Reagan & Associates, LLC conducted in 2004 encompassed the area within 5 km [3.1 mi] of the LLRW facilities and included the proposed CISF project area (ISP, 2019d). In addition, Eddie Lyons conducted a survey for the lesser prairie-chicken in April 2004 at the LLRW site (ISP, 2019d). Finally, URS prepared another ecological survey within the RCRA-permitted area in 2007, with field work performed by Doug Reagan in 2006, to support the WCS application for a license to authorize near-surface land disposal of LLRW that included only the southern portion of the proposed CISF project area (ISP, 2019d). Because of the proximity of the proposed CISF project area to the National Enrichment Facility, the 2007 URS report references the New Mexico Department of Game and Fish survey that was conducted in 2000 in Lea County for the lesser prairie-chicken (ISP, 2019d). ISP's ER Section 3.5.16 also provides references to surveys that Eagle Environmental Inc. conducted in 2003 and Don Sias in 2004 for the dunes sagebrush lizard at the National Enrichment Facility (Eagle Environmental, Inc., 2003; Sias, 2004).

ISP hired Cox McLain Environmental Consulting, Inc. (CMEC) to conduct an ecological survey and assessment for the proposed CISF project area. CMEC prepared an ecological report dated July 2019 that the NRC staff reviewed for this EIS (ISP, 2020). CMEC conducted a field survey at the proposed CISF project area in October 2018 and April 2019 (ISP, 2020). The 2019 ecological report included a literature review of species that could occur at the proposed CISF project, descriptions of plant and animal communities observed at the proposed CISF project area, including a targeted survey for the presence or absence of lesser prairie-chicken, a list of State and Federally listed threatened and endangered species that could occur at the proposed CISF project, and agency consultations (ISP, 2020).

To describe the affected ecological environment at the proposed CISF, the NRC staff reviewed the surveys previously described in this section and other information related to the ecology of the region, including NRC's 2005 EIS and 2015 EA for the National Enrichment Facility (NRC, 2005, 2015), and consulted with Texas Parks and Wildlife Department (TPWD).

The NRC staff requested information on rare species, native plant communities, and animal aggregations from the TPWD Texas Natural Diversity Database (TXNDD) in November 2018. The TXNDD does not currently have any records for the proposed CISF project area; however, because of the large amount of private land and other monitoring and surveying constraints, the data the TXNDD provided does not confirm the absence or presence or condition of species and habitats (TPWD, 2018a; TPWD, 2017). The TXNDD also cannot be considered a substitute for site-specific surveys, such as the surveys conducted at the WCS-controlled property described in this section.

3.6.1 Description of Ecoregions and Habitats Found in Andrews and Lea County

The proposed CISF is located within the Shinnery Sands ecoregion of Texas and New Mexico (Griffith et al., 2006, 2004). The Shinnery Sands ecoregion is part of the larger High Plains ecoregion that spans most of the Texas panhandle and eastern border of New Mexico. The Shinnery Sands ecoregion is named after the shinnery oak (*Quercus havardii)* plant, also called Havard oak, which is a deciduous, low-growing shrub that stabilizes sandy areas found in the ecoregion. Much of the plant cover in this ecoregion is composed of sand sagebrush (*Artemisia* *filifolia)* and mid-to-tall prairie grasses, such as sand dropseed (*Sporobolus cryptandrus)* and sand bluestem (*Andropogon hallii)* (Griffith et al., 2004; Peterson and Boyd, 1998).

Examples of sensitive species that could occur within these habitats include the black-tailed prairie dog (*Cynomys ludovicianus*), burrowing owls (*Athene cunicularia*), Northern aplomado falcon (*Falco femoralis septentrionalis*), dunes sagebrush lizard (*Sceloporus arenicolus*), Texas horned lizard *(Phrynosoma cornutum*), and lesser prairie-chicken (*Tympanuchus pallidicinctus*) (ISP, 2020; NMDGF, 2016a; TPWD, 2019). In addition, many common animals, such as the southern plains woodrat (*Notoma micropus*), black-tailed prairie dog (*Cynomys ludovicianus)*, desert cottontail (*Sylvilagus audubonii*), spotted ground squirrel (*Spermophilus spilosoma*), swift fox (*Vulpes velox*), coyote (*Canis latrans*), and hawks use both grassland and shrubs for foraging, nesting, and protection (ISP, 2020; Davis and Schmidly, 1994; NRC, 2005).

Southern New Mexico and the Texas High Plains are covered with numerous small basins capable of holding water after rain events, called "playa lakes" (Lehman and Rainwater, 2000). These playa lakes that temporarily retain water have a variety of ecosystem functions depending on their specific qualities that affect the plants and animals that may use them (Playa Lakes Joint Venture, 2018). During seasonal migrations, migratory birds that use the Central Flyway, one of the four major North American bird migration corridors between northern nesting grounds and southern wintering grounds, are known to use the water-filled playa lakes in this region, depending on the available food and water present (FWS, 2019b). There is one large drainage depression adjacent and east of the proposed CISF project area (EIS Section 3.5.1.2). However, the term "playa" in this case is a misnomer, because the depression lacks a distinguishing soil type associated with playa basins.

The 1973 Endangered Species Act (ESA) provides for the conservation of "critical habitat," the areas of land, water, and airspace that an endangered species needs for survival (16 U.S.C. §1531 et seq.). These areas include sites with food and water, breeding areas, cover or shelter sites, and sufficient habitat to provide for normal population growth and behavior. One of the primary threats to endangered and threatened species is the destruction or modification of their essential habitat areas by pollution and development (EPA, 2019). FWS-designated critical habitat, or areas of habitat that FWS considers essential for the survival of a Federally threatened or endangered plant or animal species, does not occur within either Andrews County, Texas, or Lea County, New Mexico (FWS, 2019c; FWS, 2019d). The nearest FWS-designated critical habitat to the proposed CISF is located west of the Pecos River in Eddy County, New Mexico, approximately 129 km [80 mi] west-northwest of the proposed CISF project area. State-designated threatened and endangered species that could occur within the proposed CISF project area are further discussed in Section 3.6.4.

3.6.2 Vegetation at the Proposed CISF Project Area

Texas Parks and Wildlife Department (TPWD) classifies 398 vegetation types throughout the State of Texas as part of its ecological mapping system (Elliott, 2014). According to the interactive TPWD Ecosystem Analytical Mapper, there are six vegetation types present within the proposed CISF project area (TPWD, 2018b). The TPWD ecological mapping system indicates that the sandy shinnery shrubland vegetation type and sandy deciduous shrubland vegetation types together cover approximately 47 percent of the northern half of the proposed CISF project area (TPWD, 2018b). The vegetation type that covers most of the southern half of the proposed CISF project area is identified by TPWD as mesquite shrubland. The remaining 6 percent of the proposed CISF project area, primarily along the southeastern edge of the site, is covered by the sand prairie vegetation type, mixed grass prairie vegetation type, and shortgrass prairie vegetation type.

The NRC staff's review of the vegetation types described in CMEC's 2019 ecological report found that the vegetation species and habitats observed at the proposed CISF project area are generally consistent with the vegetation types mapped by the TPWD's Ecosystem Analytical Mapper, with a few exceptions. CMEC did not report a difference between the sandy deciduous shrubland and mesquite shrubland vegetation types and characterizes most of the southern 93.3 ha [230.5 ac] as resembling the mesquite shrubland vegetation type (ISP, 2020). CMEC identifies the northern 30.7 ha [76 ac] of the proposed CISF project area as Havard oak dunes instead of sandy shinnery shrubland. In addition, CMEC describes an east-west strip of land approximately 7.2 ha [17.8 ac] in size across the middle of the proposed CISF project that follows an existing road as maintained grassland. CMEC's classifications of the vegetation types present at the proposed CISF project area have been succeeded by updated TPWD classifications, but generally correspond with current TPWD classifications that are referenced in this EIS (e.g., sandy shinnery shrubland vegetation type and mesquite shrubland vegetation type) (Elliott et al., 2014).

The mesquite shrubland vegetation type (CMEC identified as mesquite thorn-shrub) provides important habitat for numerous bird species, small mammals such as mice and squirrels, and many reptiles and invertebrates. The mesquite shrubland vegetation type at the proposed CISF project is dominated by honey mesquite (*Prosopis glandulosa)*, a native invasive thorny shrub (ISP, 2020; Elliott, 2014). Mesquite invades grasslands and decreases the abundance of short-grass prairie habitats (Elliott, 2014). The sandy shinnery shrubland vegetation type (CMEC identified as Havard oak dunes) within the northern portion of the proposed CISF project area is dominated by shinnery oak, also called Havard oak (*Quercus havardii*). This plant produces acorns that germinate and grow into plants. Shinnery oak spreads by rhizome growth (underground stems) and can sprout from rhizomes after the aboveground stem is damaged (Peterson and Boyd, 1998). The underground roots grow slowly and can cover an area of about 0.8 ha [2 ac] over time. The oak stand where the proposed CISF is located covers an area between 2 and 2.8 million ha [5 and 7 million ac] in size (Peterson and Boyd, 1998). Some shinnery oak communities are very old (hundreds to thousands of years) and occur as a shrub in vegetative communities that are in their late intermediate ecological development stage. Following top-killing disturbances, shinnery oak can start to sprout above ground within a few months (Peterson and Boyd, 1998). The strip of maintained grassland area at the proposed CISF project is devoid of woody vegetation, but there are sparse honey mesquite saplings present. The remainder of the vegetation in the maintained grassland area consists of herbaceous grasses and herbs. Some of the plants that CMEC observed at the proposed CISF project area in October 2018 and April 2019 surveys are summarized in EIS Table 3.6-1.

Table 3.6-1 Vegetation Types Observed at the Proposed CISF Project Area*

Scientific Name	**Common Name**
Mesquite Shrubland Vegetation Type {93.3 hectares [230.5 acres]}	
Trees and Woody Shrubs	
Atriplex canescens	Fourwing saltbush
Prosopis glandulosa	Honey mesquite
Quercus havardii	Shinnery oak/Havard oak
Rhus lanceolata	Prairie flameleaf sumac

Table 3.6-1 Vegetation Types Observed at the Proposed CISF Project Area*	
Scientific Name	**Common Name**
Schinus molle	Peruvian peppertree
Ulmus pumila	Siberian elm
Grasses, Subshrubs, and Herbs	
Ambrosia artemisiifolia	Annual ragweed
Artemisia filifolia	Aand sagebrush
Aristida purpurea	Purple threeawn
Bouteloua gracilis	Blue grama
Cenchrus spinifex	Coastal sandbur
Chloris cucullata	Hooded windmill grass
Chrysopsis pilosa	Soft goldenaster
Croton monanthogynus	Prairie tea
Echinocactus texensis	Horse crippler
Eragrostis lehmanniana	Lehmann lovegrass
Eragrostis secundiflora	Red lovegrass
Ephedra trifurca	Longleaf jointfir
Gutierrezia sarothrae	Broom snakeweed
Heterotheca subaxillaris	Camphorweed
Melampodium leucanthum	Plains blackfoot
Opuntia sp.	Prickly pear
Senna bauhinioides	Twinleaf senna
Setaria vulpiseta	Plains bristlegrass
Solanum elaeagnifolium	Silverleaf nightshade
Sphaeralcea coccinea	Scarlet globe mallow
Sporobolus indicus	Smut grass
Yucca sp.	Yucca
Sandy Shinnery Shrubland Oak Vegetation Type {30.7 hectares [76 acres]}	
Trees and Woody Shrubs	
Quercus havardii	Shinnery oak/Havard oak
Grasses, Subshrubs, and Herbs	
Ambrosia confertiflora	Field ragweed
Brickellia eupatorioides	False boneset
Cenchrus spinifex	Coastal sandbur
Dimorphocarpa wislizeni	Rouristplant
Eragrostis lehmanniana	Lehmann lovegrass
Heterotheca subaxillaris	Camphorweed

Table 3.6-1 Vegetation Types Observed at the Proposed CISF Project Area*	
Scientific Name	**Common Name**
Ipomopsis longiflora	Flaxflowered ipomopsis
Mirabilis linearis	Narrowleaf four o’clock
Nassella leucotricha	Texas wintergrass
Packera cana	Woolly groundsel
Paspalum dilatatum	Dallisgrass
Schizachyrium scoparium	Little bluestem
Sorghastrum nutans	Indiangrass
Stillingia sylvatica	Queen's-delight
Yucca sp.	Yucca
Maintained Grassland {7.2 hectares [17.8 acres]}	
Trees and Woody Shrubs	
Quercus havardii	Shinnery oak/Havard oak
Grasses, Subshrubs, and Herbs	
Amaranthus sp	Pigweed
Ambrosia artemisiifolia	Annual ragweed
Bouteloua hirsuta	Hairy grama
Cenchrus spinifex	Coastal sandbur
Chamaesyce sp.	Sandmat
Chloris cucullata	Hooded windmill grass
Chrysopsis pilosa	Soft goldenaster
Croton monanthogynus	Prairie tea
Descurainia pinnata	Western tansymustard
Eragrostis sp.	Lovegrass
Senecio flaccidus	Threadleaf ragwort
Solanum elaeagnifolium	Silverleaf nightshade
Sphaeralcea coccinea	Scarlet globemallow

* List does not include every species observed at the proposed CISF project area
Source: ISP, 2020

Noxious weed infestations are reported to be the second leading cause of native plant and animal species being listed as threatened or endangered nationally (NMDGF, 2016a). As of 1998, nonnative species have been implicated in the decline of 42 percent of Federally-listed species under the ESA (NMDGF, 2016a). In its license application, ISP states that weedy plant species such as snakeweed (*Gutierrezia sarothrae),* soapweed (*Yucca elata)*, prickly pear cacti (*Opuntia* sp*.),* and Russian thistle (*Salsola iberica*) are present at and around the proposed CISF project area (ISP, 2020). Russian thistle (commonly called tumbleweed) and prickly pear cacti are opportunistic plants with invasive features in the region due to their ability to establish quickly in arid conditions and out-compete other plants (USDA, 2014, 2006). Regional habitat fragmentation from oil and gas development and overgrazing from cattle and other livestock that have occurred in the area are partly responsible for the presence of weedy plants in the high plains ecoregion (TPWD, 2012). No plants classified as noxious or invasive species by the Texas Department of Agriculture (Texas Invasive Plant & Pest Council, 2018) have been reported at the WCS site, including within the proposed CISF project area (ISP, 2020; ISP, 2019d).

The states of Texas and New Mexico maintain lists of State rare, threatened, and endangered plant species (TPWD, 2019; New Mexico State Forestry, 2017). According to the TPWD interactive website that provides these lists for each county, there are three rare plant species that could potentially occur in Andrews County: Cory's ephedra (*Ephedra coryi*), dune umbrella-sedge (*Cyperus onerosus*), dune unicorn-plant (*Proboscidea sabulosa*), and Hinckley's spreadwing (*Eurytaenia hinkleyi*) (TPWD, 2019). None of these plant species were reported during the previously described ecological surveys conducted at the WCS site (ISP, 2020; ISP, 2019d). According to the New Mexico State Forestry, no plants designated as threatened or endangered species in New Mexico have been reported during ecological surveys conducted at the WCS site, and none are expected to occur in Lea County (New Mexico State Forestry, 2017; New Mexico Rare Plant Technical Council, 2018). There are no important plant areas (IPAs) that occur in Lea County (New Mexico State Forestry, 2017). IPAs are places that support either a high diversity of sensitive plant species or are the last remaining locations of New Mexico's most endangered plants. According to FWS, there are no Federally threatened, endangered, or candidate plant species or critical habitats that the proposed CISF could affect (FWS, 2019c; FWS, 2020a).

3.6.3 Wildlife that Could Occur at the Proposed ISP CISF Project Area

This section describes the wildlife likely to be present near the proposed CISF project area and provides information on sensitive species that could occur at the proposed project site. The species composition of wildlife at the proposed CISF project area and WCS site is reflective of the type, quality, and quantity of habitat present. Previous ecological surveys conducted at the WCS site described in EIS Section 3.6 included investigations for mammals, including small mammal trappings, insect and arachnid collections, reptiles, amphibians, and birds. EIS Table 3.6-2 lists mammals, birds, amphibians, and reptiles that are likely to be present at the proposed CISF project area. The table was compiled from the ecological surveys previously conducted for the WCS site, the NRC staff's review of previous EISs conducted in the area, and review of other sources [e.g., Texas Breeding Bird Atlas (Benson and Arnold, 2001) and The Mammals of Texas (Davis and Schmidly, 1994)].

Table 3.6-2 Mammal, Bird, Amphibian, Reptile, Insect, and Arachnid Species Likely to be Present at the Proposed CISF

Scientific Name	Common Name	Preferred Season or Habitat
BIRDS		**Seasonal Preference**
Accipiter cooperii	Cooper's hawk	Uncommon migrant
Agelaius phoeniceus	Red-winged blackbird	Year round
Aimophila cassinii	Cassin's sparrow	Spring and summer
Ammodramus savannarum	Grasshopper sparrow	Spring and summer
Amphispiza bilineata	Black-throated sparrow	Year round
Anus clypeata	Northern shoveler	Winter and migrant

Table 3.6-2 Mammal, Bird, Amphibian, Reptile, Insect, and Arachnid Species Likely to be Present at the Proposed CISF		
Scientific Name	**Common Name**	**Preferred Season or Habitat**
Anas platrhynchos	Mallard	Spring
Anas strepera	Gadwall	Winter and migrant
Aphelocoma californica	Western scrub jay	Winter
Ardea herodias	Great blue heron	Winter and summer
Bombycilla cedrorum	Cedar waxwing	Winter
Bubo virginianus	Great horned owl	Winter
Buteo jamaicensis	Red-tailed hawk	Winter
Buteo swainsonii	Swainson's hawk	Summer
Calamospiza melanocorys	Lark bunting	Spring and summer
Callipepla squamata	Scaled quail	Year round
Campylorhynchus brunneicapillus	Cactus wren	Year round
Cardinalis cardinalis	Northern cardinal	Year round
Cardinalis sinuatus	Pyrrhuloxia	Year round
Charadrius vociferus	Killdeer	Spring and summer
Cathartes aura	Turkey vulture	Summer
Catharus guttatus	Hermit thrush	Spring and summer
Chondestes grammacus	Lark sparrow	Spring and summer
Chordeiles minor	Common nighthawk	Summer
Circus hudsonius	Northern harrier	Winter
Colinus virginianus	Northern bobwhite	Year round
Colaptes auratus	Northern flicker	Winter
Corpodacus mexicanus	House finch	Year round
Corvus corax	American crow	Year round
Corvus cryptoleucus	Chihuahuan raven	Year round
Dryobates scalaris (synonym *Picoides scalaris*)	Ladder-backed woodpecker	Year round
Euphagus cyanocephalus	Brewer's blackbird	Winter
Falco mexicanus	Prairie falcon	Winter
Falco sparrerius	American kestrel	Winter
Geococcyz californianus	Greater roadrunner	Year round
Guiraca caerulea	Blue grosbeak	Summer
Himantopus mexicanus	Black-necked stilt	Summer and migrant
Hirundo rustica	Barn swallow	Summer
Hirundo pyrrhonota	Cliff swallow	Summer
Icterus bullockii	Bullock's oriole	Summer
Icterus spurius	Orchard oriole	Summer
Junco hyemalis	Dark-eyed junco	Year round

Table 3.6-2 Mammal, Bird, Amphibian, Reptile, Insect, and Arachnid Species Likely to be Present at the Proposed CISF		
Scientific Name	**Common Name**	**Preferred Season or Habitat**
Lanius ludovicianus	Loggerhead shrike	Spring and fall
Melospiza lincolnii	Lincoln's sparrow	Winter
Melospiza melodia	Song sparrow	Winter
Mimus polyglottos	Northern mockingbird	Summer
Molothrus ater	Brown-headed cowbird	Year round
Myiarchus cinerascens	Ash-throated flycatcher	Winter
Nycticorax nycticorax	Black-crowned night heron	Spring
Oxyura jamaicensis	Ruddy duck	Winter and migrant
Passer domesticus	House sparrow	Winter and spring
Passerculus sandwichensis	Savannah sparrow	Winter
Podilymbus podicepts	Pied-billed grebe	Winter or year-round
Podilymbus nigricollis	Eared grebe	Winter and summer
Pooecetes gramineus	Vesper sparrow	Winter
Quiscalus mexicanus	Great-tailed grackle	Year round
Regulus calendula	Ruby-crowned kinglet	Winter and migrant
Sayornis saya	Say's phoebe	Spring
Setophaga coronata	Yellow-rumped warbler	Winter
Spiza americana	Dickcissel	Spring and fall
Spizella passerine	Chipping sparrow	Winter and migrant
Spizella pusilla	Field sparrow	Winter and migrant
Sturnella magna	Eastern meadowlark	Year round
Sturnella neglecta	Western meadowlark	Year round
Sturnus vulgaris	European starling	Year round
Thryomanes bewickii	Bewick's wren	Spring and summer
Toxostoma curvirostre	Curve-billed thrasher	Year round
Tyrannus forficatus	Scissor-tailed flycatcher	Summer
Tyrannus verticalis	Western kingbird	Summer
Tyrannus vociferans	Cassin's kingbird	Summer
Tyto alba	Barn owl	Year round
Xanthocephalus xanthocephalus	Yellow-headed blackbird	Spring and migrant
Zenaida macroura	Mourning dove	Year round
Zonotrichia leucophrys	White-crowned sparrow	Winter and migrant
MAMMALS	**Common Name**	**Preferred Habitat**
Canis latrans	Coyote	Open space, grasslands, and brush country
Chaetodipus hispidus	Hispid pocket mouse	Scattered weeds and shrubs
Dipodomys sp.	Kangaroo rat	Hard desert soils

Table 3.6-2 Mammal, Bird, Amphibian, Reptile, Insect, and Arachnid Species Likely to be Present at the Proposed CISF		
Scientific Name	**Common Name**	**Preferred Season or Habitat**
Lepus californicus	Black-tailed jackrabbit	Grasslands and open areas
Mus Musculus	House mouse	Fields, drainage areas, and dense vegetation
Neotoma micropus	Southern plains wood rat	Grasslands, prairies, and mixed vegetation
Odocoileus hemionus	Mule deer	Desert shrubs, chaparral, and rocky uplands
Odocoileus virginianus	White-tailed deer	Riparian drainages, grasslands, and brush country
Perognathus flavus	Silky pocket mouse	Scattered shrubs in rocky to sandy soils
Peromyscus maniculatus	Deer mouse	Open space, grasslands, and sparse desert
Sigmodon hispidus	Hispid cotton rat	Sandy soil with scattered grasses and shrubs
Spermophilus mexicanus	Mexican ground squirrel	Brushy and grassy areas
Spermophilus spilosoma	Spotted ground squirrel	Brushy, semi-desert, chaparral, mesquite, and oaks
Sylvilagus audubonii	Desert cottontail	Grassland and desert cactus
AMPHIBIANS		**Preferred Habitat**
Bufo speciosus	Texas Toad	Sandy grasslands
Rana blairi	Plains leopard frog	Plains and prairies after rain events
Scaphiopus multiplicatus	New Mexico spadefoot	Shallow to standing pools of water
REPTILES		**Preferred Habitat**
Cnemidophorus gularis	Texas spotted whiptail	Mixed grass prairie and desert grasslands
Cnemidophorus inornatus heptagrammus	Trans-Pecos striped whiptail	Mixed grass prairie and desert grasslands
Cnemidophorus sexlineatus	Six-lined racerunner	Fields and sand dunes
Crotalus atrox	Western diamondback rattlesnake	Grasslands and rocky areas
Crotalus viridis viridis	Green prairie rattlesnake	Grasslands and rocky areas
Eumeces obsoletus	Great Plains skink	Grasslands with fine soils
Heterodon nasicus nasicus	Plains hognosed snake	Desert grasslands
Kinosternon flavescens	Yellow mud turtle	Shallow to standing pools of water
Masticophis flagellum	Western coachwhip	Mixed grass prairie and desert grasslands

Table 3.6-2 Mammal, Bird, Amphibian, Reptile, Insect, and Arachnid Species Likely to be Present at the Proposed CISF		
Scientific Name	**Common Name**	**Preferred Season or Habitat**
Phrynosoma cornutun	Texas horned lizard	Desert grasslands
Pituophis melanoleucus saya.	Bull snake	Grasslands and agricultural fields
Sceloporus arenicolus	Dunes sagebrush lizard	Sand dunes and sandy areas
Terrapene ornata	Western box turtle	Desert grasslands and shortgrass prairie
Uta stansburiana	Desert side-blotched lizard	Desert shrubs
INSECTS AND ARACHNIDS		**No Habitat Specified**
***ORDERS**		
Araneidae	Spiders	
Coleoptera	Beetles	
Danau gilippus	Queen butterfly	
Hymenoptera	Wasps, ants, bees, sawflies	
†*Hemiptera*	True bugs	
Solifugae	Wind scorpions	
INSECT FAMILIES		
Acridiae	Grasshoppers	
Anthicidae	Ant-like beetles	
Asilidae	Robber flies	
Blattidae	Roaches	
Braconidae	Parasitoid wasps	
Cantharidae	Soldier beetles	
Carabidae	Ground and tiger beetles	
Cerambycidae	Long-horned beetles	
Chalcididae	Wasps	
Chrysomelidae	Leaf beetles	
Cicadidae	Cicadas	
Coccinellidae	Lady bugs	
Coreidae	Squash bugs	
Curculionidae	Snout beetles	
Formicidae	Ants	
Geometridae	Larval moths	
Gryllidae	Crickets	
Ichneumonidae	Wasps	
Lepidoptera	Moths	
Lygaeidae	Milkweed bugs	
Mantidae	Mantids	

Table 3.6-2 Mammal, Bird, Amphibian, Reptile, Insect, and Arachnid Species Likely to be Present at the Proposed CISF		
Scientific Name	**Common Name**	**Preferred Season or Habitat**
Meloidae	Blister beetles	
Melyridae	Soft winged flower beetles	
Membracidae	Treehoppers	
Monotomidae	Dark beetles	
Mutillidae	Velvet ants	
Nitidulidae	Sap beetles	
Pentatonidae	Stink bugs	
Phasmatidae	Walking sticks	
Pogonomyrmex barbatus	Red harvester ants	
Proctotrupidae	Wasps	
Psyllidae	Plant louse	
Pyrrhocoridae	Red bugs	
Reduviidae	Assassin bugs	
Scarabaeidae	June bugs, dung beetle	
Sphecidae	Wasps	
Tenebrionidae	Darkling beetles	
Tettigoniidae	Katydids	
Vespidae	Paper wasps	
ARACHNID FAMILIES		
Salticidae	Crab spiders (Jumping spiders)	
Theridiidae	Widow spiders	
Trombidiidae	Velvet mites	

*Individuals of unknown families

†Includes immatures that cannot be identified to family

Sources: ISP, 2020; ISP, 2019d; TPWD, 2020; NRC, 2005; Benson and Arnold, 2001; Davis and Schmidly, 1994

Mule deer (*Odocoileus hemionus*) and white-tailed deer (*Odocoileus virginianus*) are economically important large mammal species in Texas and New Mexico. Mule deer and white-tailed deer in this region do not migrate but do have large ranges within which they move (Cantu and Richardson, 1997; Fulbright and Ortega-S, 2005). To better manage deer populations, TPWD categorizes deer herds by ecoregion, and the New Mexico Department of Game and Fish (NMDGF) categorizes deer herds by Game Management Units (GMUs). Andrews County lies within TPWD's high plains ecoregion (Purvis, 2018), and Lea County lies within NMDGF's GMU 31 (NMDGF, 2016b). During the 2017–2018 hunting season, an estimated 2,517 mule deer and 10,920 white-tailed deer were harvested within the TPWD high plains ecoregion, where the proposed CISF project area is located. NMDGF estimates that a combined 777 mule deer and white-tailed deer were harvested in GMU 31 during the 2017–2018 hunting season (NMDGF, 2018a).

Pronghorn antelope (*Antilocapra americana*) are much less prevalent than deer in southeast New Mexico and the southern part of the Texas Panhandle, but are still hunted and managed by each State. The TPWD has assigned areas of land as herd units to manage antelope populations, but the proposed CISF project area does not fall within a herd unit (TPWD, 2018c). Similar to the designation for management of deer in New Mexico, Lea County is within GMU 31. NMDGF estimates that 102 antelope were harvested in GMU 31 during the 2017–2018 hunting season (NMDGF, 2018b).

The proposed CISF project area contains no viable aquatic habitats that could support freshwater aquatic animals. According to the USGS National Wetland Inventory Map, a feature that the USGS identified as a "temporarily-flooded wetland" was mapped in the 2000s on the eastern edge of the proposed CISF footprint (i.e., the large drainage depression adjacent to the eastern edge of the proposed CISF) (EIS Figure 3.5-3, Wetlands). This feature may occasionally hold ponded water after relatively large rainfall events; however, the water rapidly dissipates (EIS Section 3.5.1.2). The USACE determined in June 2019 that the feature is not a jurisdictional Water of the United States, and "that no waters of the U.S., including wetlands, are located within the project area" (FWS, 2019a; ISP, 2020). There are no freshwater streams, rivers, or lakes, and no commercial or sport fisheries are located on the proposed CISF project area or in the local area that could support freshwater aquatic animals. Although stock ponds, surface depressions, and Baker Spring are located within 10 km [6.2 mi] of the proposed CISF project area that retain small amounts of water for several days following a major precipitation event (EIS Section 3.5.1), these features do not support aquatic life, aquatic species of greatest conservation need, or aquatic threatened or endangered species (TPWD, 2019; NMDGF, 2016a). These features are shallow and relatively small in size {less than 2 ha [5 ac] each}; however, they attract wildlife such as amphibians [Texas toad (*Bufo speciosus*)] and semi-aquatic reptiles [yellow mud turtle (*Kinosternon flavescens*)], both of which have been observed at the WCS site during ecological surveys at locations where water was present (ISP, 2020; ISP, 2019d).

Seasonal surface water features could also provide important habitat for migratory birds. Waterfowl that use the Central Flyway to move between breeding areas in Canada and wintering areas in Texas and Mexico include the mallard (*Anas platrhynchos*), American widgeon (*Anas americana*), green-winged teal (*Anas crecca*), and others. Songbirds that migrate along the Central Flyway include the American goldfinch (*Spinus tristis*), Western kingbird (*Tyrannus verticalis*), lark bunting (*Calamospiza melanocorys*), vesper sparrow (*Pooecetes gramineus*) and others. Common shorebirds associated with the Central Flyway include the killdeer (*Charadrius vociferus*), greater yellowlegs (*Tringa melanoleuca*), spotted sandpiper (*Actitis macularia*), least sandpiper (*Calidris minutilla*) and others (Stokes and Stokes, 1996). Depending on the availability of food and water that may be temporarily present in shallow, water-retaining features during seasonal migrations, migratory birds such as these could occasionally be present at or in the vicinity of the proposed CISF project area (EIS Table 3.6-2; Dick and McHale, 2007).

3.6.4 Protected Species and Species of Concern

The NRC has an obligation under the ESA Section 7 to determine whether the proposed CISF project may affect Federally listed species, species proposed to be listed under the ESA, or their critical habitat. The FWS maintains lists of Federally listed endangered and threatened species and candidate species as part of the ESA. The NRC staff obtained an updated list of endangered and threatened species and candidate species from the FWS Information Planning and Conservation (IPaC) website to determine which species should be considered in this EIS

(FWS, 2020a). The FWS identified one Federally listed species, the Northern aplomado falcon, that may occur at the proposed CISF project area (FWS, 2020a). This species is designated as Federally endangered; however, the species is designated as a nonessential experimental population in all of New Mexico (FWS, 2018; 71 FR 42298). Unless located within a National Wildlife Refuge or on National Park Service lands, the FWS treats nonessential experimental populations as a proposed species for Section 7 consultation purposes under the ESA (71 FR 42298). Additionally, the FWS identified three other bird species (least tern [*Sterna antillarumm*], piping plover [*Charadrius melodus]*, and red knot [*Calidris canutus rufa*]) that, according to FWS, only need to be considered for wind energy projects. These species have not been identified in previous ecological surveys conducted at the WCS site or vicinity (EIS Table 3.6-2), and therefore these three other bird species are omitted from further consideration in this EIS (FWS, 2020a).

The proposed CISF project area is located on the eastern edge of Northern aplomado falcon's range (FWS, 2018; USGS, 2017). The Northern aplomado falcon's preferred habitat in the region is open grasslands or desert grasslands with scattered mesquite and yucca (FWS, 2014). These falcons use abandoned stick nests other raptors and ravens built on the ground. To ensure its continued existence, reintroduction efforts were initiated in west Texas and New Mexico in the early 2000s; however, the success rate sharply declined around 2010 and there are no known pairs of breeding falcons in west Texas (FWS, 2014). During the ecological field surveys CMEC conducted in October 2018 and April 2019, stick nests were observed at the proposed CISF project area. However, none of these falcons have been observed during ecological surveys conducted at the proposed CISF project area or at the WCS site (ISP, 2020; ISP, 2019d).

There are three Texas State-designated threatened or endangered species that could potentially occur in Andrews County and eight New Mexico State-designated threatened or endangered species that could potentially occur in Lea County (TPWD, 2019; NMDGF, 2019). A list of Texas and New Mexico State designated threatened or endangered species is provided in EIS Table 3.6-3, followed by a description of these species.

Other species that TPWD and NMDGF monitor but are not designated as State-listed threatened or endangered species that could occur at the proposed CISF include the black-tailed prairie dog and lesser prairie-chicken (TPWD, 2016b; TPWD, 2012; NMDGF, 2016a). The black-tailed prairie dog is a keystone species, or a species on which other species strongly depend, as they provide important food and cover to other sensitive species, such as the black-footed ferret, ferruginous hawks, and Western burrowing owls, as well as various small rodents and reptiles (Campbell, 2003). The WCS site is located within the range of this species; however, its occurrence at the WCS site has not been reported (USGS, 2017; ISP, 2020). Black-tailed prairie dogs are associated with shortgrass prairie and desert grassland habitat types (NMDGF, 2016a) in the high plains ecoregion but often avoid areas with heavy brush that reduce their ability to view predators (TWPD, 2004).

Research about and monitoring of the lesser prairie-chicken has occurred in the region for decades due to concerns about impacts to this species caused by habitat loss and fragmentation. Impacts to this species include historical, ongoing, and probable future habitat loss and fragmentation due to conversion of grasslands to agricultural uses, encroachment by invasive woody plants, wind and petroleum (oil and gas) energy development, and presence of roads and man-made vertical structures in the region (Wolfe et al., 2017). Currently, the FWS does not list this species, and its status is under review (FWS, 2020b).

Table 3.6-3 State-Designated Threatened or Endangered Species that Could Potentially Occur in Andrews County, Texas and Lea County, New Mexico			
Common Name	**Scientific Name**	**Federal Status***	**State Status***
State Threatened and Endangered Species for Andrews County, Texas			
Birds			
American peregrine falcon	*Falco peregrinus anatum*	DL	T
Bald eagle	*Haliaeetus leucocephalus*	DL	T
White-faced ibis	*Plegadis chihi*	-	E
Reptiles			
Texas horned lizard	*Phrynosoma cornutum*	-	T
State Threatened and Endangered Species for Lea County, New Mexico			
Birds			
American peregrine falcon	*Falco peregrinus anatum*	DL	T
Baird's sparrow	*Ammodramus bairdii*	-	T
Bald eagle	*Haliaeetus leucocephalus*	DL	T
Bell's vireo	*Vireo bellii*	-	T
Broad-billed hummingbird	*Cynanthus latirostris magicus*	-	T
Least tern	*Sterna antillarum*	E	E
Northern aplomado falcon†	*Falco peregrinus*	E	EX
Reptiles			
Dunes sagebrush lizard	*Sceloporus arenicolus*	-	E

*DL = Delisted, E = Endangered, T = Threatened, EX = Experimental, - = Not listed.
†This species may be referred to as both Aplomado falcon and Northern aplomado falcon in literature.
Sources: TPWD, 2019; NMDGF, 2019

The Kansas Biological Survey maintains the Southern Great Plains Crucial Habitat Assessment Tool (SGP CHAT), which is a spatial model designed to designate lesser prairie-chicken habitat and prioritize conservation activities (KBS, 2017). The tool classifies crucial lesser prairie-chicken habitat and important connectivity areas. The WCS facility, including the proposed CISF project area, is located within the lesser prairie-chicken's estimated occupied range but is not located within a designated focal area or connectivity zone, which are areas of the greatest importance to the lesser prairie-chicken (TPWD, 2017; Wolfe et al., 2017). CMEC conducted a survey for the lesser prairie-chicken in April 2019—no lesser prairie-chickens were heard or observed during the survey (ISP, 2020). Previous surveys for lesser prairie-chickens were conducted at the WCS site and within 8 km [5 mi] of the WCS site in 2004 (ISP, 2019d). No lesser prairie-chickens were observed on the WCS site in 2004 (ISP, 2019d). The nearest lesser prairie-chicken lek (where male lesser prairie-chickens gather to compete for female lesser prairie-chickens) to the proposed CISF project area, which is identified in the SGP CHAT as a historic lek and not active, was observed approximately 5.8 km [3.6 mi] northwest of the proposed CISF in Lea County, New Mexico, in township T21S R38E (Eagle Environmental, Inc., 2004; KBS, 2017).

Bald Eagle

The bald eagle was removed from the Federal threatened and endangered species list in 2007; however, it remains a Federal bird of conservation concern in the region (FWS, 2008a), is designated as threatened by the States of Texas and New Mexico, and still receives protection under the *Bald and Golden Eagle Protection Act*, *Lacey Act*, and *Migratory Bird Treaty Act*. It is a rare visitor to Lea County, New Mexico, and Andrews County, Texas, and is not known to breed in these counties (NMDGF, 2019; Benson and Arnold, 2001; Seyffert, 2002). Bald eagles are found along lakes, rivers, and coasts where prey is abundant and there are large trees that offer nest sites and an unobstructed view of surroundings. These settings are not found on or near the proposed CISF project area. Bald eagles were not observed during the October 2018 and April 2019 field surveys CMEC conducted at the proposed CISF project area.

Whooping Crane

The whooping crane is a Federally listed endangered species and designated as endangered by the State of Texas. These birds migrate every year from northern Canada during the spring to the Gulf of Mexico coast at the Aransas National Wildlife Refuge where they nest. They travel along a north-south migratory corridor that is centered approximately 483 km [300 mi] east of the proposed CISF project area. Although approximately 75 percent of all confirmed sightings occur within approximately 64 km [40 mi] of the centerline of the migration corridor, there have been rare sightings in the Texas High Plains (FWS, 2011; Seyffert, 2002). It is considered extirpated from New Mexico (NMDGF, 2019). The whooping crane depends on wetlands, marshes, mudflats, wet prairies, and shallow portions of rivers and reservoirs, which are not present on or near the proposed CISF project area (FWS, 2011). This species was not observed during the October 2018 and April 2019 field surveys CMEC conducted at the proposed CISF project area.

Texas Horned Lizard

The Texas horned lizard, a TPWD listed threatened species, often called “horny toad,” has been observed throughout the WCS site during ecological surveys (TPWD, 2019; ISP, 2020). Although this species is widespread throughout South and West Texas, its population is declining in the eastern part of the State (TPWD, 2010). They can be found in arid and semiarid habitats in open areas with sparse plant cover. They prefer sandy or loose soils where red harvester ants (*Pogonomyrmex barbatus*), their primary food source, are present. This species was not observed during the October 2018 and April 2019 ecological surveys CMEC conducted; however, potentially suitable habitat for the Texas horned lizard and harvester ant mounds were observed within the proposed CISF project area (ISP, 2020).

Baird’s Sparrow

The Baird’s sparrow is designated as threatened by the State of New Mexico (NMDGF, 2019). The Baird’s sparrow prefers expansive open prairies where tall grass can conceal its nest. This bird breeds in the spring in the northern Great Plains and spends the winter in Texas, southwest of the Pecos River, and in southwest New Mexico, west of Eddy County (USGS, 2017). This species is considered to be a rare winter migrant in southeast New Mexico and is rarely observed in the spring and summer in the Texas High Plains (NMDGF, 2019; ISP, 2020; ISP, 2019d; Seyffert, 2002). This species was not observed during previous ecological surveys conducted at the WCS site or during the October 2018 and April 2019 field surveys CMEC conducted at the proposed CISF project area (ISP, 2020; ISP 2019d).

Bell’s Vireo

The Bell’s vireo is a Federal bird of conservation concern in the region (FWS, 2008a) and designated as threatened by the State of New Mexico (NMDGF, 2019). The Bell’s vireo occurs rarely in the proposed CISF project area in the summer and prefers dense vegetation among brushy thickets along stream beds (NMDGF, 2019; USGS, 2017; Benson and Arnold, 2001). This species was not observed during previous ecological surveys conducted at the WCS site or during the October 2018 and April 2019 field surveys CMEC conducted at the proposed CISF project area (ISP, 2019d).

Broad-billed Hummingbird

The broad-billed hummingbird is designated as threatened by the State of New Mexico. It is rare in Eddy County (adjacent to Lea County) and is not known to occur in Lea County (NMDGF, 2019; USGS, 2017). In Texas, the hummingbird is rarely seen in the high plains in late spring and summer (Seyffert, 2002). Its preferred habitat is in riparian woodlands but can inhabit open-to-dense stands of brushy vegetation and large succulents. This species was not observed during previous ecological surveys conducted at the WCS site or during the October 2018 and April 2019field surveys CMEC conducted at the proposed CISF project area (ISP, 2020; ISP, 2019d).

Least Tern

The least tern is designated as endangered by the FWS and the State of New Mexico. Its historic distribution was coincident with the major river systems of the Midwest because its habitat includes barren shorelines of lakes, rivers, and reservoirs, and its food source is fish (NMDGF, 2019). The least tern is not known or expected to occur in Andrews County, Texas, or Lea County, New Mexico, according to the FWS (FWS, 2017). In the Texas High Plains, its breeding is scarce, occasional, or highly localized in a few localities between April and August (Seyffert, 2002). The least tern has been reported as a migrant in Eddy County (the county west of Lea County) and has been documented breeding at Bitter Lake National Wildlife Refuge in Chaves County, approximately 161 km [100 mi] northwest of the proposed CISF project area (NMDGF, 2019). No rivers, lakes, or reservoirs with fish occur on the WCS-controlled property; therefore, no food source for this species is present at the proposed CISF project area or elsewhere on the WCS-controlled property. This species was not observed during previous ecological surveys conducted at the WCS site or during the October 2018 and April 2019 field surveys CMEC conducted at the proposed CISF project area and is not expected to occur in Andrews County, Texas (ISP, 2020; ISP, 2019d). Further, according to the FWS, this species only need to be considered for wind energy projects (FWS, 2020a).

Dunes Sagebrush Lizard

The dunes sagebrush lizard is a TPWD species of greatest conservation need and a rare species in Texas (TPWD, 2019; TPWD, 2011; NMDGF, 2016a). The species is a New Mexico endangered species and species of greatest conservation need. The proposed CISF is located within this species' habitat range (TPWD, 2017; USGS, 2017; ISP, 2020). As stated in EIS Section 3.6, a habitat characterization and rare species survey was conducted in 2004 that encompassed the area within 5 km [3.1 mi] of the WCS LLRW facilities and included the proposed CISF project area. During the 2004 survey, a juvenile lizard that may have been a dunes sagebrush lizard was observed approximately 5 km [3.1 mi] south of the proposed CISF project area (ISP, 2020; ISP, 2019d). In its ER, ISP states that the dunes sagebrush lizard has been observed in the area northwest of the proposed CISF project area in past surveys. This species was not observed during the October 2018 and April 2019 ecological surveys CMEC conducted; however, potentially suitable habitat for the dunes sagebrush lizard was observed within the proposed CISF project area (ISP, 2020). TPWD reports that the proposed CISF is in an area of high likelihood for the species (ISP, 2020; TPWD, 2017). Therefore, it is reasonable to anticipate that this species could potentially be present at the proposed CISF. Texas and New Mexico, along with other states and the FWS, have established multi-state efforts to conserve this species in the Western United States through a combined Candidate Conservation Agreement (CCA) for Federally administered land, and CCA with Assurances (CCAA) for privately owned land for the dunes sagebrush lizard (NMDGF, 2018c). The Texas Conservation Plan, which facilitated voluntary cooperative agreements between landowners and the FWS to provide protection for the dunes sagebrush lizard was surrendered in November 2018; however, a revised plan was implemented in 2019. The plan states that it “shall remain in effect until the CCAA’s expiration date or until surrender by the Permittee, unless it is suspended or revoked by FWS, as provided in its permitting regulations.” (TCPA, 2019a).

3.7 Meteorology

3.7.1 Climate

The proposed CISF is in a climate region called the Texas High Plains (NOAA, 2019). This region experiences four seasons and generally low precipitation levels. The regional weather is dominated in the winter by a high-pressure system in the central part of the western United States and in the summer by a low-pressure system located over Arizona. Winters are generally not severe with temperatures only occasionally dropping below freezing. Summers are typically hot and dry with low relative humidity (ISP, 2020).

In 2009, WCS established four weather stations at the WCS site. These weather stations are located approximately at the four corners of WCS’s existing LLRW disposal facilities (EIS Figure 3.7-1). The two northern most weather stations are located near the southern boundary of the proposed CISF project area. Data collected at the onsite weather stations includes temperature, precipitation, wind speed, and wind direction. Onsite data were supplemented with data from the Hobbs, New Mexico, National Weather Service (NWS) meteorological station to further characterize the regional climate. This station, located about 32 km [20 mi] north of the proposed CISF, is the closest NWS meteorological station. EIS Table 3.7-1 presents the temperature and precipitation data from both the onsite (from 2014) and Hobbs (from 1981 to 2010) weather stations. The onsite temperature data compare favorably and fall within the historical range of the Hobbs weather station data. The onsite annual precipitation level compares favorably with the Hobbs annual precipitation level; however, the monthly onsite rainfall pattern from 2014 does vary from the historical monthly trends at the Hobbs station. Wind data collected from the four onsite weather stations from 2010 to 2015 showed that the average wind speed ranged from 11.2 kilometers per hour (kph) [6.98 miles per hour (mph)] to 19.5 kph [12.1 mph] and the predominant wind direction was from the south. EIS Figure 3.7-2 contains a wind rose from the Hobbs weather station for data collected from 2010 to 2015. For the Hobbs data, the average wind speed was 14.2 kph [8.8 mph], and the wind direction shifted slightly to the south-east relative to the onsite data.

Andrews, Gaines, and Lea Counties experience a variety of severe weather events. EIS Table 3.7-2 describes the types and numbers of severe weather events occurring in Andrews County from 1950 to 2017, as documented in the National Centers for Environmental Information storm event database. Of the 154 tornados in the three-county area over the 77-year time period, 103 were included in the lowest severity category on the Fujita or Enhanced Fujita Tornado Damage Scale (the Enhanced Fujita scale replaced the old Fujita scale in 2007). Larger Fujita Tornado Damage Scale numbers represent greater tornado severity. Tornadoes with Fujita or Enhanced Fujita values from F2 to F5 are considered strong

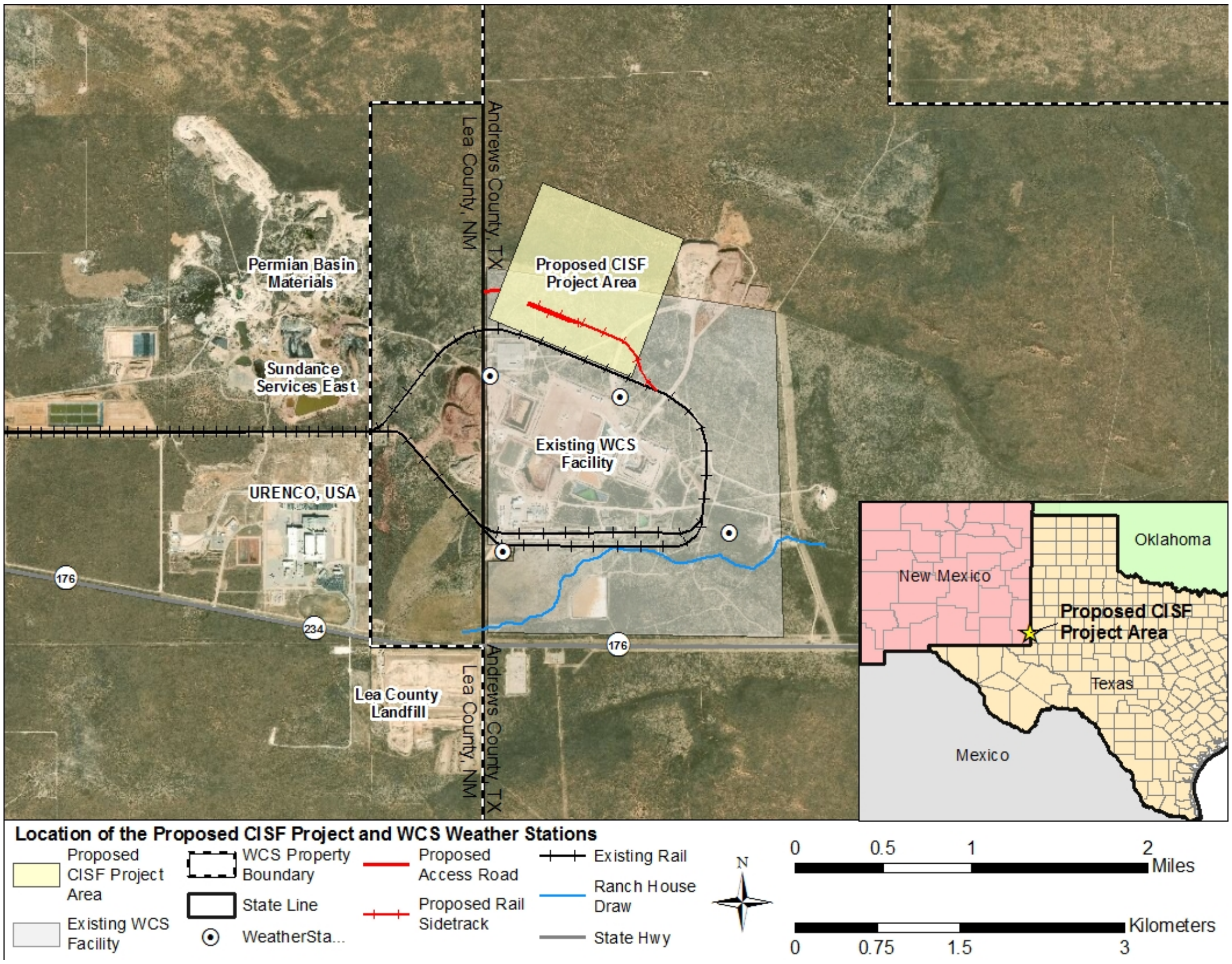

Figure 3.7-1 Map Identifying Onsite Weather Stations and Other Facilities Close to the Proposed CISF [Source: Modified from ISP (2020)

to violent. The three-county area has experienced two F3 tornadoes over the 77-year time period. This represents the most severe category of tornado experienced in the three-county area (NOAA, 2018a and NOAA, 2018b).

Table 3.7-1 Temperature and Precipitation Data for the Onsite and Hobbs, New Mexico Weather Stations

Month	Temperature (° C)*				Precipitation (cm)†	
	Mean Daily		Mean Daily Minimum	Mean Daily Maximum		
	Onsite‡	Hobbs, NM§	Hobbs, NM§	Hobbs, NM§	Onsite‡	Hobbs, NM§
January	5.44	6.44	-1.17	14.1	0.00	2.1
February	8.17	8.67	0.56	16.7	0.53	1.8
March	12.1	12.4	3.72	21.1	0.15	1.8
April	17.3	17.3	8.33	26.3	2.54	2.7
May	21.7	22.1	13.3	30.9	1.45	6.0
June	26.7	26.2	17.7	34.7	4.88	4.5
July	27.1	27.2	19.5	34.8	7.87	6.9

Table 3.7-1 Temperature and Precipitation Data for the Onsite and Hobbs, New Mexico Weather Stations

Month	Temperature (° C)*				Precipitation (cm)†	
	Mean Daily		Mean Daily Minimum	Mean Daily Maximum		
	Onsite‡	Hobbs, NM§	Hobbs, NM§	Hobbs, NM§	Onsite‡	Hobbs, NM§
August	26.7	26.4	19.2	33.8	5.94	5.3
September	21.3	22.8	15.3	30.2	14.81	6.9
October	18.4	17.6	9.67	25.4	0.18	3.5
November	8.55	11.1	3.17	19.0	4.42	2.1
December	7.05	6.33	-1.44	14.1	1.19	1.9
Annual	16.8	17.1	9.00	25.1	44.0	45.5

Sources: Modified from National Oceanic and Atmospheric Administration (NOAA) (2017a), ISP (2020), and Southwest Research Institute (SwRI) (2019a).
* To convert Celsius (°C) to Fahrenheit (°F), multiply by 1.8 and add 32.
†To convert centimeters (cm) to inches (in), multiply by 0.3937.
‡Data from the onsite weather station from 2014.
§Data from the Hobbs, New Mexico, weather station collected over a 30-year period (1981–2010).

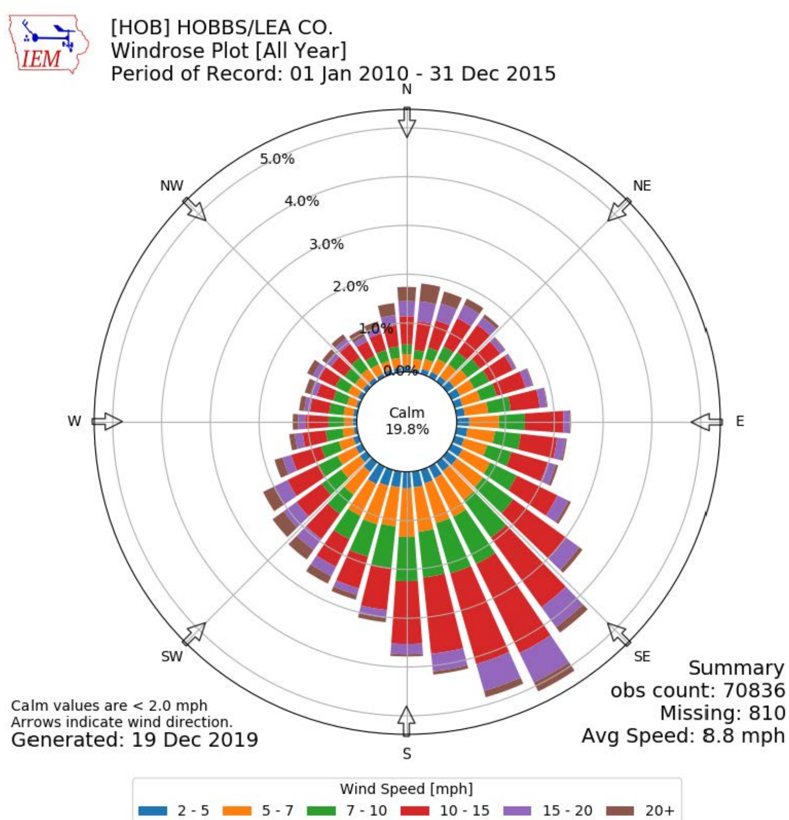

Figure 3.7-2 Wind Rose from the Hobbs Weather Station for Data Collected from 2010 to 2017 (Iowa State University, 2019)
***To convert mph to km per hour, multiply by 1.609.**

Table 3.7-2 Severe Weather Event Data for Andrews (Texas), Gaines (Texas), and Lea (New Mexico) Counties from 1950 through 2017.

Type of Event	Number of Events* Andrews County	Gaines County	Lea County	Description of Event†
Flash Flood	42	60	81	A rapid and extreme flow of high water into a normally dry area or a rapid water level rise in a stream or creek above a predetermined flood level.
Hail	161	209	416	Hail 1.9 cm [¾ in] or larger or hail accumulations of smaller size, which cause property and/or crop damage or casualties.
Heavy Rain	236	237	4	Unusually large amount of rain which, does not cause a flash flood or flood but causes damage (e.g., roof collapse or other human/economic impact).
High Wind	10	20	55	Sustained nonconvective winds of 35 knots [40 mph] or greater lasting for 1 hour or longer, or gusts of 50 knots [58 mph] or greater for any duration (or otherwise locally/regionally defined).
Thunderstorm Wind	203	233	200	Winds arising from convection (occurring within 30 minutes of lightning being observed or detected) with speeds of at least 50 knots [58 mph], or winds of any speed producing a fatality, injury, or damage.
Tornado	24	37	93	A violently rotating column of air, extending to or from a cumuliform cloud or underneath a cumuliform cloud, to the ground, and often (but not always) visible as a condensation funnel.

Sources: National Oceanic and Atmospheric Administration (2018a), National Oceanic and Atmospheric Administration (2018b), and NWS (2017).
* Severe weather events are included in this table if one of the counties experienced a particular event a minimum of 25 times from 1950 to 2017
†Description of the event as defined in National Weather Service Instruction 10-1605.

3.7.1.1 Climate Change

Temperature and precipitation are two parameters that can be used to characterize climate change. Average annual temperatures increased by 1.0 °C [1.8 °F] for the contiguous United States over the time period 1901 to 2016, and temperatures are expected to continue to rise (GCRP, 2017). The 1986 to 2016 average temperature in the region where the proposed CISF project area is located increased up to 0.83 °C [1.5 °F] compared to the 1901 to 1960 average temperature (GCRP, 2017). The average temperature in this region is projected to increase between 2.22 and 4.44 °C [4 and 8 °F] by mid-century (2036-2065) (GCRP, 2017). Average U.S. precipitation has increased by 4 percent since 1901; however, some regions experienced greater increases than the national average, while other regions experienced decreased precipitation levels (GCRP, 2017). From 1986 to 2015, the annual precipitation totals in the region where the proposed CISF is located increased between 0 and 10 percent compared to the 1901 to 1960 baseline (GCRP, 2017). The U.S. Global Climate Research Program (GCRP) forecasts that by the latter part of the 21st century, precipitation levels in the region of Texas where the proposed CISF project area is located will decrease between 5 and 10 percent in the winter and decrease between 0 and 5 percent in the spring, summer, and fall (GCRP, 2017).

The following list from the National Oceanic and Atmospheric Administration identifies additional climate change projections for Texas (NOAA, 2017b).

- An increase in extreme precipitation events
- An increase in extreme heat events
- An increase in drought intensity
- An increase in the severity, frequency, and extent of wildfires

3.7.2 Air Quality

3.7.2.1 Nongreenhouse Gases

The U.S. Environmental Protection Agency (EPA) established the National Ambient Air Quality Standards (NAAQS), which specifies maximum ambient (outdoor air) concentrations for the following six criteria pollutants: (i) nitrogen dioxide (NO_2), (ii) ozone (O_3), (iii) sulfur dioxide (SO_2), (iv) carbon monoxide (CO), (v) lead (Pb), and (vi) particulate matter (PM) (PM_{10} and $PM_{2.5}$). Particulate matter PM_{10} refers to particles 10 μm [3.9×10^{-4} in] in diameter or smaller, and $PM_{2.5}$ refers to particles 2.5 μm [9.8×10^{-5} in] in diameter or smaller. EIS Table 3.7-3 contains the NAAQS. Primary NAAQS are established to protect health, and secondary NAAQS are established to protect welfare by safeguarding against environmental and property damage.

The EPA requires States to monitor ambient air quality and evaluate compliance with the NAAQS. Based on the results of these evaluations, EPA assigns areas to various NAAQS compliance classifications (i.e., attainment, nonattainment, or maintenance) for each of the six criteria air pollutants. An attainment area is defined as a geographic region that EPA designates meets the NAAQS for a pollutant. A nonattainment area is defined as a geographic region that EPA designates does not meet the NAAQS for a pollutant or that contributes to the ambient pollutant levels in a nearby area that does not meet the NAAQS. A maintenance area is defined as any geographic region previously designated nonattainment and EPA subsequently redesignated to attainment. These classifications characterize the air quality within a defined area. These defined areas range in size from portions of cities to large air quality control regions composed of many counties. An air quality control region is an EPA-designated area for air quality management purposes.

Table 3.7-3 National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary/Secondary*	Averaging Time	Level†	Form
Carbon Monoxide	Primary	1 hour	35 ppm	Not to be exceeded more than once per year
	Primary	8 hours	9 ppm	Not to be exceeded more than once per year
Lead	Primary and Secondary	Rolling 3-month average	0.15 μg/m^3	Not to be exceeded
Nitrogen Dioxide	Primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Primary and Secondary	Annual	53 ppb	Annual mean

Table 3.7-3 National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary/Secondary*	Averaging Time	Level†	Form
Ozone	Primary and Secondary	8 hours	0.070 ppm	Annual fourth highest daily maximum 8-hour concentration, averaged over 3 years
Particulate Matter $PM_{2.5}$	Primary and Secondary	24 hours	35 μg/m^3	98th percentile, averaged over 3 years
	Primary	Annual	12 μg/m^3	Annual mean, averaged over 3 years
	Secondary	Annual	15 μg/m^3	Annual mean, averaged over 3 years
Particulate Matter PM_{10}	Primary and Secondary	24 hours	150 μg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide	Primary	1 hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

Source: Modified from EPA (2016a)
*Primary standards are established to protect public health and secondary standards are established to protect welfare by guarding against environmental and property damage.
†ppm is parts per million; ppb is parts per billion; and to convert μg/m^3 to oz/yd^3, multiply by 2.7×10^{-8}

The proposed CISF project area and rail sidetrack are located in the Midland-Odessa-San Angelo Air Quality Control Region, which comprises Andrews County and 29 other counties in Texas primarily to the south and east of Andrews County (EIS Figure 3.7-3). This Air Quality Control Region is classified as an attainment area for each criteria pollutant (40 CFR 81.344). The proposed CISF project area and rail sidetrack would be located immediately adjacent to Lea County, New Mexico (EIS Figure 3.7-1). Lea County is one of seven New Mexico counties in the Pecos-Permian Basin Air Quality Control Region, which is located primarily in the southeast portion of the State (EIS Figure 3.7-3). This Air Quality Control Region is also classified as an attainment area for each criteria pollutant (40 CFR 81.332). Based on the attainment classification of the air quality control regions, the air quality in and around the WCS site (and proposed CISF project area) is considered good. The nearest nonattainment area is in El Paso County in Texas, about 281.6 km [175 mi] southwest of the proposed CISF project area. A portion of that county is nonattainment for particulate matter PM_{10} (40 CFR 81.344). The only nonattainment area in New Mexico is Dona Ana County, located about 312.2 km [194 mi] west of the proposed CISF project area. A portion of that county is nonattainment for both particulate matter PM_{10} and ozone (40 CFR 81.332). Dona Ana County in New Mexico and El Paso County in Texas share a border. Texas and New Mexico contain several maintenance areas; however, none are located in the Midland-Odessa-San Angelo Air Quality or Pecos-Permian Basin Intrastate Air Quality Control Region (EPA, 2018).

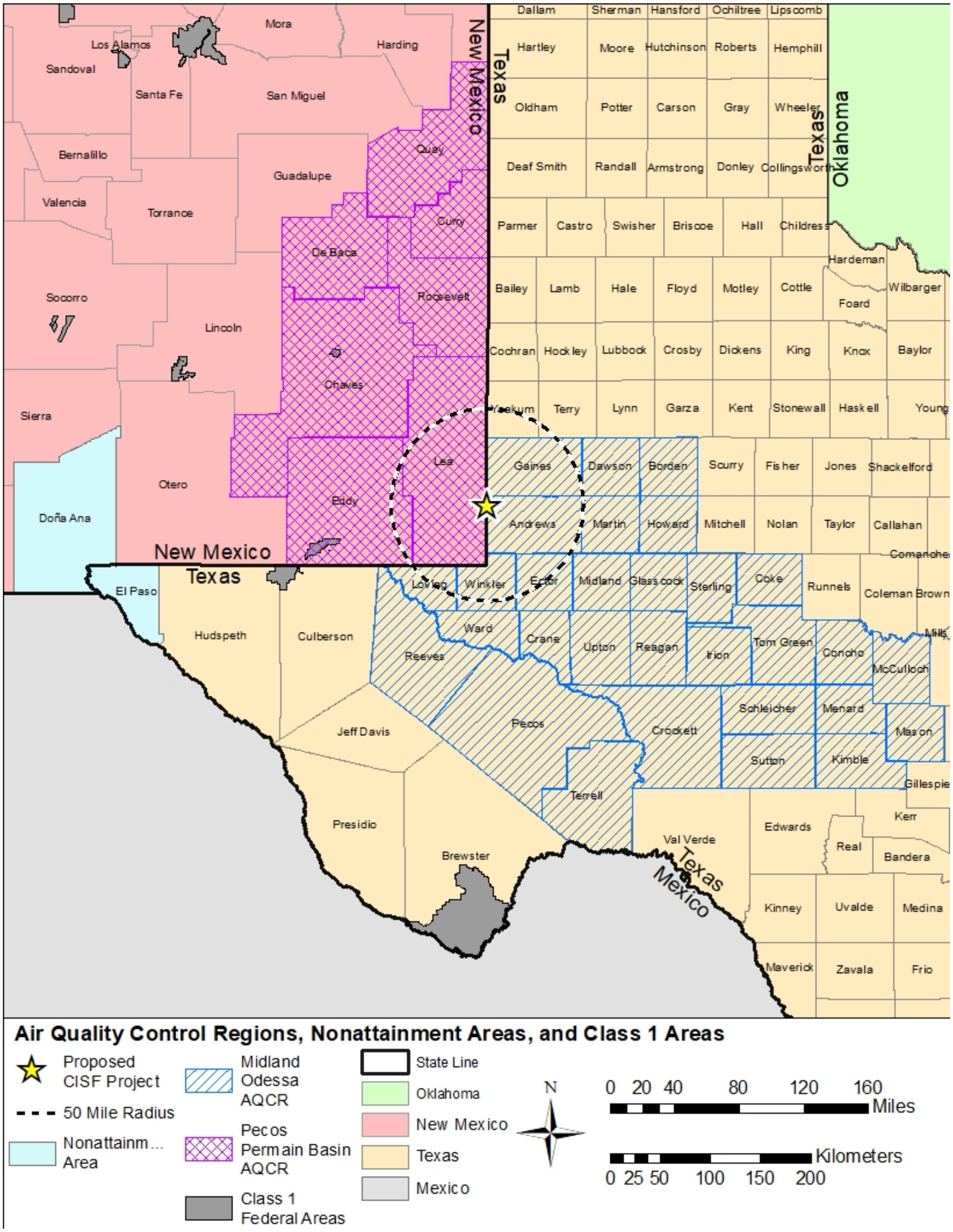

Figure 3.7-3 Regional Map Identifying Air Quality Control Regions, Class I Areas, and Nonattainment Areas (Sources: 40 CFR 81.137, 40 CFR 81.242, 40 CFR 332, 40 CFR 344, 40 CFR 81.421, 40 CFR 81.429)

States may develop standards that are stricter or supplement the NAAQS. The State of Texas does not have any standards that are stricter than or that supplement the NAAQS.

EIS Table 3.7-4 contains air pollutant emission levels for Andrews and Gaines Counties in Texas as well as Lea County in New Mexico, as documented in EPA's National Emission Inventory. The emissions in EIS Table 3.7-4 include both stationary and mobile sources. EIS Table 3.7-4 provides pollutant levels that characterize the existing ambient air conditions.

The EIS characterization of potential receptors close to the proposed CISF project area considers both residences where people live and facilities where people work. The nearest resident is located approximately 6 km [3.8 mi] to the west of the proposed CISF, just east of Eunice, New Mexico (ISP, 2020). EIS Figure 3.7-1 shows other facilities that are closer to the proposed CISF project area than the nearest residence. Immediately to the south of the proposed CISF project area is the existing WCS LLRW disposal facility. Located about 0.97 km [0.6 mi] to the west is Sundance Services and Permian Basin Materials. NEF is located about 1.6 km [1.0 mi] to the southwest, and the Lea County Landfill is located about 2.4 km [1.5 mi] to the south-southwest. The southwest corner of the proposed CISF project area is located immediately adjacent to State Line Road. Relative to the proposed CISF, Texas State Highway 176 is located about 2.0 km [1.25 mi] to the south, and County Road 9701 is located about 1.3 km [0.8 mi] to the east. The proposed rail sidetrack primarily occurs within the proposed CISF project area (EIS Figure 3.7-1); therefore, for the purpose of characterization of the distance to potential receptors, the sidetrack is accounted for as part of the proposed CISF project area.

EPA established Prevention of Significant Deterioration (PSD) standards (40 CFR 52.21) that set maximum allowable concentration increases for nitrogen dioxide, particulate matter $PM_{2.5}$, particulate matter PM_{10}, and sulfur dioxide above baseline conditions in attainment areas. The PSD program designated three different classes or groups of areas with different standards or levels of protection established for each class. Class I areas have the most stringent requirements. Federally designated Class I areas include national parks, wilderness areas, and monuments, as specified in 40 CFR Part 81. Areas not designated as Class I would be considered Class II areas since there are no designated Class III areas in the United States. The proposed CISF site is located in a Class II area. EIS Figure 3.7-3 shows the three Class I areas closest to the proposed CISF project area: Carlsbad Caverns National Park located about 132.0 km [82 mi] west of the proposed CISF, Guadalupe Mountains National Park located about 165.8 km [103 mi] west-southwest of the proposed CISF, and Salt Grass Wilderness Area located about 175.4 km [109 mi] the northwest of the proposed CISF.

Table 3.7-4 Annual Air Pollutant Emissions in Metric Tons* from the U.S. Environmental Protection Agency's 2014 National Emission Inventory for Andrews and Gaines Counties in Texas and Lea County in New Mexico

County	Pollutant						
	Carbon Monoxide	Hazardous Air Pollutant	Nitrogen Dioxides	Particulate Matter $PM_{2.5}$	Particulate Matter PM_{10}	Sulfur Dioxide	Volatile Organic Compounds
Andrews TX	11,925	4,586	8,331	282	904	1,785	49,567
Gaines TX	8,132	3,358	4,162	1,182	5,716	532	31,254
Lea NM	27,698	10,959	15,626	2,029	13,104	5,037	88,614
All Three Counties	47,755	18,903	28,119	3,493	19,724	7,354	169,435

*To convert metric tons to short tons, multiply by 1.10231.
Source: EPA (2016b), SwRI (2019a), and SwRI (2019b)

In addition to PSD standards, potential impacts to Class I areas also consider air quality-related values such as visibility. Impact to visibility occurs when the pollution in the air either scatters or absorbs the light. Both natural and man-made sources contribute to air pollution, which may impair visibility. Natural sources include windblown dust and smoke from fires, while man-made sources include electric utilities (i.e., power plants), oil and gas development, and motor vehicles.

3.7.2.2 Greenhouse Gases

Greenhouse gases, which can trap heat in the atmosphere, are produced by numerous activities, including the burning of fossil fuels and agricultural and industrial processes. Greenhouse gases include carbon dioxide, methane, nitrous oxide, and certain fluorinated gases. These gases vary in their ability to trap heat and in their atmospheric longevity. Greenhouse gas emission levels are expressed as carbon dioxide equivalents (CO_2e), which is an aggregate measure of total greenhouse gas global warming potential described in terms of carbon dioxide, and accounts for the heat-trapping capacity of different gases. Present-day carbon dioxide concentrations in the atmosphere are around 400 parts per million (ppm), and by the end of the century, these levels are estimated to range somewhere between 450 to 936 ppm (GCRP, 2017).

In 2010, EPA promulgated the Tailoring Rule to address greenhouse gas emissions under the Clean Air Act permitting programs. As initially constituted, the Tailoring Rule specified that new sources, as well as existing sources with the potential to emit 90,718 metric tons [100,000 short tons] per year of CO_2e, were subject to EPA PSD and Title V requirements. Modifications at existing facilities that increase greenhouse gas emissions by at least 68,039 metric tons [75,000 short tons] per year of CO_2e were also subject to Title V requirements. Revisions to the rule have not resulted in different numerical values associated with greenhouse gas emission thresholds (EPA, 2016b).

3.8 Noise

This section provides a description of existing noise sources within the proposed CISF project area and surrounding area and noise receptors (such as residents or workers) that could be affected by noise generated from the proposed CISF project. The definition of noise is "unwanted or disturbing sound." Sound measurements are described in terms of frequencies and intensities. The A-scale on a sound level meter best approximates the audible frequency response of the human ear and is commonly used in noise measurements. Sound pressure levels measured in decibels on the A scale of a sound meter are abbreviated dBA. In noise measurements, sound pressure levels are typically averaged over a given length of time, because instantaneous levels can vary widely. The intensity of sound decreases with increasing distance from the source. Typically, sound levels for a point source will decrease by 6 dBA for each doubling of distance. This may vary depending on the terrain, topographical features, and frequency of the noise source. Generally, sound level changes of 3 dBA are barely perceptible, while a change of 5 dBA is readily noticeable by most

How is sound measured?

The human ear responds to a wide range of sound pressures. The unit of measure used to represent sound pressure levels is the decibel (dB). Another common sound measurement is the A-weighted sound level (dBA). dBA is a sound level measure designed to simulate human hearing by placing less emphasis on lower frequency noises, because the human ear does not perceive sounds at low frequencies in the same manner as sound at higher frequencies. Higher frequencies receive less A-weighting than lower ones.

people. A 10-dBA increase is usually perceived as a doubling of loudness. Sound levels can vary for indoor and outdoor noise sources. For example, a jet flying overhead at 0.3 km [1,000 ft] will produce a sound level of 100 dBA, the same as an underground subway train. A typical outdoor commercial area is equivalent to a normal speech conversation indoors, at 65 dBA, and a quiet rural nighttime environment will mimic an empty concert hall, at 25 dBA. A list of typical community sound levels and noise levels of common sources is shown in EIS Table 3.8-1.

Point sources of noise within a 3.0-km [1.8-mi] radius of the proposed CISF project area (EIS Figure 3.1-1) include several commercial facilities:

- Operations at WCS's existing hazardous waste and LLRW waste disposal facilities to the south, which consist of commuter and truck traffic; operating equipment (e.g., cranes, canister transport vehicles, and heavy-haul truck traffic); and rail and tractor-trailer traffic associated with waste shipments.

- Operations at NEF to the southwest, which consist predominantly of commuter and truck traffic.

- Operating equipment at the Permian Basin Materials sand and gravel quarry to the west, which consists of front-end loaders, conveyers, ready-mix concrete plants, and heavy-haul truck traffic (Permian Basin Materials, 2019).

- Operations at the Sundance Services oil recovery and solids disposal facility to the west, which consist predominantly of heavy-haul truck traffic and roll-off and container services (Sundance Services, Inc., 2019).

- Operations at the Lea County Sanitary Waste Landfill to the south/southwest, which consist predominantly of front-end loaders, graders, and heavy-haul truck traffic.

Line sources of noise in the proximity of the proposed CISF project area include vehicle traffic on State Highway 176 along the southern boundary of WCS's existing waste disposal facilities and train traffic on the railroad spur that encircles WCS's existing waste disposal facilities (EIS Figure 3.1-1). The TNMR rail line, which would be used for shipping SNF to the proposed CISF, runs through the communities of Jal and Eunice (EIS Figure 2.2-7). Noise levels in the range of 80 dBA are typical of freight trains at a distance of 30 m [100 ft] (OSHA, 2013).

Background noise level measurements were collected at three locations along the western boundary of the WCS facility and two locations within and along the southern boundary of the proposed CISF project area in July 2019 (EIS Figure 3.8-1). Measured background levels at these locations ranged from 36.3 dBA within the proposed CISF project area to 43.8 dBA near the NEF (URENCO USA) along the western boundary of the WCS facility (Nelson Acoustics, 2019). Roadway traffic on State Highway 176 was the primary contributor to background noise levels (ISP, 2020). The nearest residential noise receptors are homes located west of the proposed CISF project area on the east side of Eunice, New Mexico. The nearest residential noise receptor is located at a distance of approximately 6 km [3.8 mi] west of the proposed CISF project area (ISP, 2020).

Table 3.8-1	Noise Abatement Criteria: 1-Hour, A-Weighted Sound Levels in Decibels (dBA)	
Activity Category	**L_{eq}(h)***	**Description of Activity Category**
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purposes.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.
*Leq(h) is an energy-averaged, 1-hour, A-weighted sound level in decibels. Source: 23 CFR Part 772		

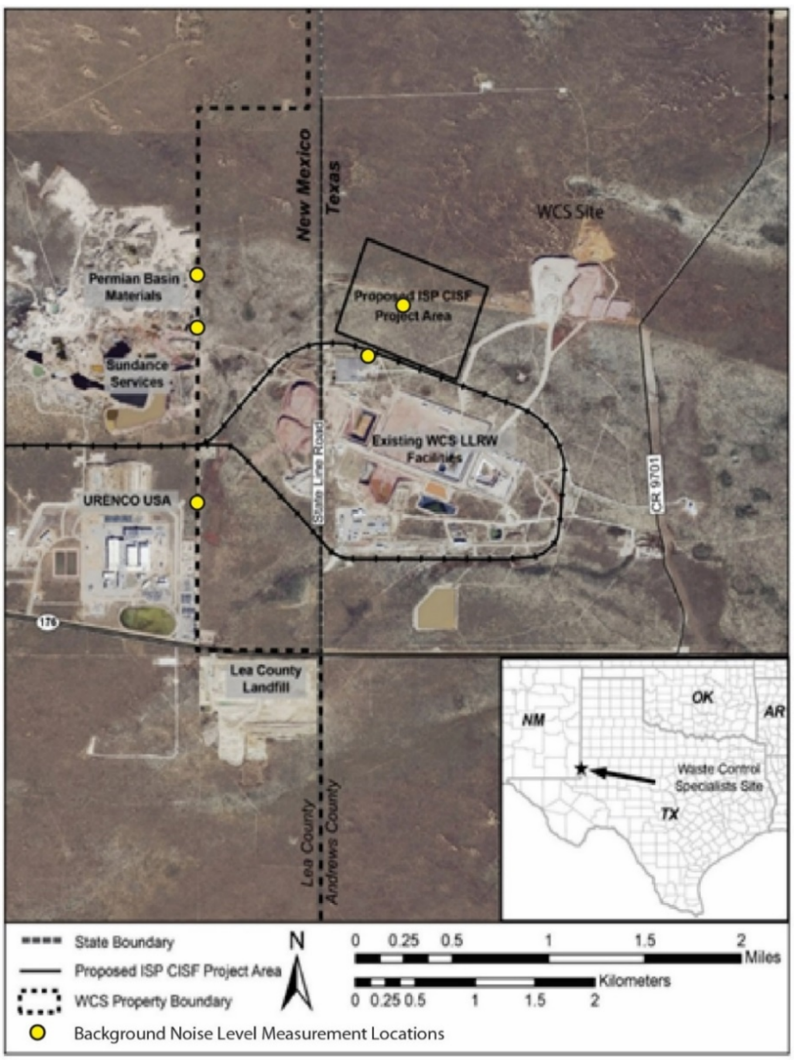

Figure 3.8-1 Map Showing Background Noise Level Measurement Locations Within and Surrounding the WCS Facility [Source: Modified from ISP (2020)]

Neither the City of Eunice, Andrews County, Lea County, the State of Texas, nor the State of New Mexico have ordinances or regulations governing noise. In addition, there are no affected Indian Tribes within the sensitive noise receptor distances from the proposed CISF project area. Therefore, the proposed CISF is not subject to local, Tribal, or State noise regulations. Federal agencies, including the EPA and the Occupational Safety and Health Administration (OSHA), establish noise level standards. The EPA has identified levels of environmental noise requisite to protect public health and welfare against hearing loss with the purpose of providing a basis for State and local governments to set standards (EPA, 1974). For residential communities, EPA identified a day night average sound level (L_{dn}) of 55 dBA as requisite to protect against hearing loss with an adequate margin of safety. The EPA's recommended L_{dn} for industrial sites is 70 dBA. OSHA standards prescribe the maximum noise levels that employees can be exposed to within a facility. For an 8-hour work period, sound levels must remain below 90 dBA or noise abatement measures must be taken in order to comply with OSHA regulations [29 CFR 1910.95(b)(2)].

3.9 Cultural and Historic Resources

Historic property means any prehistoric or historic district, site, building, structure, or object included on, or eligible for inclusion on, the National Register of Historic Places (NRHP), including artifacts, records, and material remains relating to the district, site, building, structure, or object. The criteria for eligibility are listed in 36 CFR 60.4 and include (a) association with events that have made a significant contribution to our broad patterns of history; (b) association with the lives of persons significant in our past; (c) embodiment of distinctive characteristics of type, period, or methods of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or (d) resources that have yielded or are likely to yield information important in prehistory or history (ACHP, 2012). The criteria also require that a property has integrity, or the ability of a property to convey its significance, to be listed in the NRHP (National Park Service, 2014).

The historic preservation review process, NHPA Section 106 process, is outlined in regulations the ACHP issued in 36 CFR Part 800. As allowed under 36 CFR 800.8, the NRC staff is conducting the Section 106 review process through NEPA for this proposed CISF project. The NRC staff will consult with the Texas State Historic Preservation Officer (SHPO), with interested Tribes, and with ISP when making determinations on the identification of historic properties and effects to those properties by the proposed CISF project. Under the assumption that the EIS would be issued in 2020 for public review and comment, and because most historic properties that are less than 50 years old are not considered eligible for the NRHP, anticipating a maximum of 5 years until project construction, cultural resources that will be 45 years or older by 2020 should be evaluated for listing in the NRHP as part of the identification of historic properties.

Cultural resources investigations for the proposed CISF project included a review of available archaeological literature, a search and evaluation of archaeological records and collections the Texas SHPO maintains, archaeological field investigations, and Tribal consultation. Based on these reviews and Section 106 consultation, this EIS section provides a description of historic and cultural resources within and surrounding the proposed CISF project area, considering the direct and indirect area of potential effects (APE) that could be affected by earthmoving activities, visual effects, and noise generated from the proposed CISF project.

3.9.1 Cultural History

The proposed CISF would be located in northwestern Andrews County along the Texas-New Mexico border. This location falls within the Southern High Plains (EIS Figure 3.4-1) on a large mesa known as the Llano Estacado or Staked Plains. This broad, flat expanse of plains is situated between the Mescalero Ridge to the west in New Mexico and dense beds of caliche, called Caprock Caliche that forms dense beds of the escarpment to the east in Texas (EIS Section 3.4.4).

Local culture history of the Llano Estacado has been only minimally defined (Godwin et al., 2001). Using what data were available for the prehistory of the Lower Plains, a broad outline of culture history for the larger region is summarized in this section of the EIS from Boyd et al., 1989 and Godwin et al., 2001. The entire prehistoric period in this region was one of a hunting and gathering way of life; there is no evidence that a sedentary agricultural way of life developed in the region.

The earliest identifiable cultural period is the Paleoindian (11,500 to 8,000 years before present [BP]). The earliest distinctive tool type of this period is the large fluted Clovis spearpoint. This culture-defining projectile point is named after the town of Clovis, New Mexico, where fluted points were documented in associated extinct Pleistocene megafauna at the Blackwater Draw site in the early 20th century. Clovis tools either evolved into or were supplanted by the smaller fluted Folsom point, presumably a dart point used with the atlatl, which is a tool used to propel darts. Both tool traditions included blade tools. The economy of the Paleoindian period arguably focused on hunting late Pleistocene megafauna but also surely incorporated hunting smaller mammals and gathering other plant and animal resources (Boyd et al., 1989; Godwin et al., 2001).

By the Archaic period (8000 to 2000 BP), late Pleistocene megafauna were extinct, and hunting necessarily focused on smaller game, such as bison; however, bison herds would have likely been fewer, smaller, and more mobile than those in the central and northern plains. A wider variety of dart points has been dated to the Archaic period, suggesting the development of distinct cultural groups, and there is evidence of greater use of traps and nets. The Archaic period gave way to the Late Prehistoric period (2000 BP to AD 1540) and coincided with the appearance of the bow and arrow and an increasing variety of arrow heads. Late Prehistoric groups continued in the mold of a hunting and gathering way of life (Boyd et al., 1989; Godwin et al., 2001).

The Historic period (AD 1541 to 1870) began with Spanish explorations of the region. The Spanish established no permanent settlements in this area; however, and the region was left largely to the Apache, who in the latter part of the Historic period were pushed out by the Comanche. The U.S. Army mapped the general area in 1849, and there followed several decades of U.S. military pressure on the Comanche in an effort to open the area for settlement by Euro-Americans. That pressure resulted in moving the Comanche from the region by the early 1870s.

In 1874, William Snyder established a trading post that later became the town of Snyder, Texas, in Scurry County. By the late 1870s, longhorn cattle were being driven into the area and a ranching economy had developed. Farming followed, but never on a large scale. The region was also part of the oil economy of the twentieth century (Boyd et al., 1989; Godwin et al., 2001).

The proposed CISF project is under a host agreement with Andrews County, Texas (ISP, 2020) and is subject to the Antiquities Code of Texas (9 TNRC 191), which requires consideration of effects on properties designated as or eligible as State Antiquities Landmarks (SALs). The Antiquities Code of Texas was enacted in 1969 to protect archeological sites and historic buildings on public land. The Antiquities Code requires State agencies and political subdivisions of the State, including cities, counties, river authorities, municipal utility districts, and school districts to notify the Texas SHPO of ground-disturbing activity on public land and work affecting State-owned historic buildings. Privately owned property may also be nominated for SAL designation by the property owner. SALs on private property receive the same protection under the Antiquities Code as resources on public property. The designation is recorded in county deed records and conveys when the property is sold.

3.9.2 Area of Potential Effect

The area the proposed activity may directly or indirectly impact represents the area of potential effect, or APE. The direct APE would coincide with the footprint of ground disturbance for the construction stage (e.g., cask-transfer building, storage pads, access roads, and rail sidetrack). The NRC staff anticipates that based on the extent of planned construction activities, the largest area would be disturbed during the construction stages of full build-out (Phases 1-8). In addition, construction of the rail sidetrack, site access road, and construction laydown area would contribute an additional area of disturbed soil such that the total disturbed area for construction of the proposed CISF would be approximately 133.4 ha [330 ac] (ISP, 2020). Therefore, the land disturbed during the construction stage at full build-out represents the upper bound of potential effects to the direct APE. The direct APE is an approximate 133.4-ha [330-ac] parcel of privately owned land corresponding to the area of land disturbance from the proposed project.

The indirect APE for the proposed CISF project would consist of visual effects and noise sources arising from the project. Because of the low profile of the proposed project and the existence of other buildings, roads, railroad spur, and structures (i.e., WCS waste management facilities), the extent of the visual APE (i.e., indirect APE) includes areas within a 1.6-km [1-mi] radius extending from the proposed project boundary.

Historic and Cultural Resources Investigations

Searches of the Texas Historic Sites Atlas, Texas Archaeological Sites Atlas, and the New Mexico Cultural Resources Information System were conducted to identify any previously recorded cultural resources. No previously identified resources have been recorded in the APEs for either direct or indirect effects. The closest known archaeological resources to the proposed CISF project are located immediately outside the 1.6-km [1-mi] buffer (i.e., the indirect APE) in New Mexico and consist of five prehistoric sites excavated in 2003 prior to the construction of a nearby uranium enrichment facility (URENCO NEF). The sites were all surface or near-surface scatters of fire-cracked rock, flaking debris, and ground stone within a dune field (NMDCA, 2015).

In 2015 and 2019, an ISP contractor conducted archaeological surveys to identify and document any cultural resources within the direct APE. Because of high ground surface visibility (50–90 percent), extensive previous mechanical clearing (i.e., prior use in oil and gas exploration and cattle grazing) and thin soils over the local caliche layer, no locations for productive shovel testing were found, and the survey consisted of surface examinations via pedestrian transects. A no-collection policy (i.e., field documentation only) was implemented for the surveys; however, no historic or prehistoric artifacts or cultural features were identified during the surveys of the direct APE.

As stated previously, no evidence of historic or prehistoric artifacts or cultural features was observed during field investigations of the direct APE in 2015. As discussed in EIS Section 1.7.2, the Texas SHPO explained that the proposed APE is different from the area where intensive archaeological survey had been previously conducted and, thus, the Texas SHPO found that an archeological survey was necessary for those portions of the current APE that do not overlap the previously surveyed areas. The license applicant conducted additional surveys in 2019 that covered the areas of concern the Texas SHPO identified. No evidence of historic or prehistoric artifacts or cultural features was observed. The NRC staff continues to consult with the Texas SHPO regarding the findings of the surveys and the NRC staff's determination of effects. Pending the Texas SHPO confirmation, no additional surveys or field studies would be recommended. Additionally, the applicant has committed to an inadvertent discovery plan for human remains or other items of archeological significance during construction (ISP, 2020). Work would cease immediately upon discovery and the area would be protected from further disturbance and appropriate agencies notified. The agencies would then determine how to treat the remains, and any necessary identification, consulting, and excavation would be completed according to the agency requirements before construction could resume.

3.9.3 Tribal Consultation

Cultural resources that are considered sensitive and potentially sacred to modern Indian Tribes include burials, rock art, rock features and alignments (such as cairns, medicine wheels, and stone circles), American Indian trails, and certain religiously significant natural landscapes and features. Some of these resources may be formally designated as Traditional Cultural Property (TCPs) or sites of religious or cultural significance to Indian Tribes. A TCP is a site that is listed or eligible for inclusion on the NRHP because of its association with cultural practices or beliefs of a living community, which are (i) rooted in that community's history and (ii) important in maintaining the continuing cultural identity of the community and meets the other criteria in 36 CFR 60.4.

The NRC staff contacted nine Tribes, including seven Federally recognized Tribes and two Tribes recognized by the State of Texas, that may attach religious and cultural significance to the proposed project site. The NRC staff sent letters to Tribal representatives for the Federally recognized Tribes on February 1, 2017; March 24, 2017; and May 6, May 7, and May 28, 2019. The letters included a brief description of the proposed undertaking, a site location map, an invitation for the Tribe to participate as a consulting party, and a response form. Two Tribes responded with interest to continue to be updated on the project. One of the Tribes recognized by the State of Texas also indicated interest in the project (EIS Section 1.7.2).

3.10 <u>Visual and Scenic Resources</u>

Land surrounding the proposed CISF project area is primarily classified as rangeland used for grazing cattle (EIS Section 3.2). The landscape is relatively flat and is characterized by gently undulating brushy grassland broken by sporadic brush-covered sand dunes. The landscape is dotted by numerous small surface depressions that seasonally fill with water and could provide important habitat for migratory birds. Modifications to the landscape surrounding the proposed project area include oil and gas production facilities and infrastructure (pump jacks), transportation infrastructure (paved highways and caliche service roads), an electric power substation, electric transmission lines, a rail line, and agricultural infrastructure (fences and windmills). Commercial development within 3 km [1.8 mi] of the proposed CISF project area includes a sand and gravel quarry, a uranium enrichment plant, a county landfill, a hazardous waste landfill and LLRW disposal facilities, and oilfield waste disposal facilities (EIS Section 3.2). Within the WCS site boundary, spoil piles consisting of soils excavated to support construction of the WCS's existing hazardous waste landfill and LLRW disposal facilities are located just southwest of the proposed CISF in Lea County, New Mexico.

ISP evaluated the visual and scenic resources of the proposed project area using the U.S. Bureau of Land Management (BLM) Visual Resource Management (VRM) system (ISP, 2020). The VRM system is the basic tool the BLM uses to inventory and manage visual resources of Federal lands (BLM, 1984, 1986). ISP conducted a photo inventory of the proposed CISF project area on April 7 and 8, 2015. This photo inventory is documented in Appendix C of ISP's ER (ISP, 2020) and includes photos illustrating (i) foreground and middle ground views taken from locations less than 8 km [5 mi] from the proposed CISF project area; (ii) photos illustrating background views taken from locations between 8 km [5 mi] and 16 km [10 mi] from the proposed CISF project area; and (iii) seldom-seen views taken from locations farther than 16 km [10 mi] from the proposed CISF project area.

The VRM system is used to evaluate the visual or scenic quality of the land using a visual resource inventory to assess the scenic value of a property and ensure that its value is preserved (BLM, 1986). In compiling the inventory, a scenic quality evaluation, a sensitivity-level analysis, and a delineation of distance zones for properties is completed. Each property or area is then assigned to one of four VRM classes described below (BLM, 1986).

- Class I Objective: Preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention.

- Class II Objective: Retain the existing character of the landscape. The level of change to the characteristic landscape should be low.

- Class III Objective: Partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate.

- Class IV Objective: Provide for management activities, which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high.

Class I is most protective of visual and scenic resources, and Class IV is least restrictive. Based on ISP's scenic quality evaluation, sensitivity-level analysis, and delineation of distance zones, the proposed CISF project area was assigned to VRM Class IV.

To evaluate the scenic quality of the proposed CISF project area, the key factors of landform, vegetation, water, color, influence of adjacent scenery, scarcity, and cultural modifications are evaluated and scored according to the rating criteria in BLM's Visual Resource Inventory guidance (BLM, 1986). The criteria for each key factor range from high-to-moderate to low quality, based on the variety of line, form, color, texture, and scale of the factor within the landscape. A score is associated with each rating criteria, with a higher score applied to greater complexity and variety for each factor in the landscape. Based on the scores assigned to the seven key factors of landform, vegetation, water, color, influence of adjacent scenery, scarcity, and cultural modifications, lands are given an A (score of 19 or more), B (score of 12-18), or C (score of 11 or less) rating. Lands with an A rating have a higher scenic quality or visual appeal, whereas lands with a C rating have a lower scenic quality or visual appeal.

The results of ISP's scenic quality evaluation are shown in EIS Table 3.10-1. Based on ISP's scenic quality evaluation, the proposed CISF project area received a total score of 2, or a C rating.

Table 3.10-1 Scenic Quality Evaluation Rating

Key Factor	Rating Criteria*	Score
Landform	Low rolling hills, foothills, or flat valley bottoms; few or no interesting landscape features.	1
Vegetation	Some variety of vegetation, but only one or two major types.	3
Water	Absent, or present but not noticeable.	0
Color	Subtle color variations, contrast, or interest; generally mute tones.	1
Influence of Adjacent Scenery	Adjacent scenery has very little or no influence on overall visual quality.	0
Scarcity	Interesting within its setting, but fairly common within the region.	1
Cultural Modifications	Modifications add variety but are very discordant and promote strong disharmony.	-4
	Total Score	**2**

Source: ISP, 2020
*Ratings developed from BLM, 1986

3.11 Socioeconomics and Environmental Justice

This section describes the context of the proposed CISF project and the socioeconomic resources that have the potential to be directly or indirectly affected as a result of the proposed action (Phase 1). The following subsections summarize the current socioeconomic environment for five primary topic areas: (i) demography (i.e., population characteristics), (ii) employment structure and personal income, (iii) housing availability and affordability, (iv) local finance (tax structure and distribution), and (v) community services. These subsections include discussions of spatial (e.g., regional, vicinity, and proposed CISF project area) and temporal considerations, and appropriate supporting information is provided in EIS Appendix B.

The NRC staff collected and analyzed regional socioeconomic data the U.S. Census Bureau (USCB) provided, including 5-year estimates that the USCB collects for commuting workers. The NRC staff considered the points of origin and destination of commuting workers within the 10 counties that fully or partly fell within an 80-km [50-mi] radius of the proposed CISF project, the largest population centers within 80 km [50 mi] of the proposed CISF, and residents with the appropriate skill set for the proposed action as influencing factors for determining the appropriate socioeconomic region of influence (ROI). Of the 10 counties, 8 are in Texas (Andrews, Ector, Gaines, Loving, Martin, Terry, Winkler, and Yoakum), and 2 counties are in New Mexico (Eddy County and Lea County). The socioeconomic ROI is larger than for some other resource areas evaluated in this EIS because of the potential for commuting workers, jobs, and social resources that could be impacted in communities that are further from the proposed project location.

The NRC staff reviewed commuting worker flow data for the years 2011 through 2015 the USCB provided (USCB, 2015). Commuting patterns of working residents 16 years old and older in Andrews County demonstrate a preference for a work site in Andrews and

Ector Counties, Texas. Approximately 80.5 percent of Andrews County workers (6,273 individuals) worked in Andrews County. Approximately 1,518 of Andrews County commuting workers work in other counties. The highest percentage of Andrews County commuting workers that work outside of the county travel to Ector County (about 6.7 percent). The existing NEF facility and the proposed Holtec CISF project are located in Lea County, New Mexico, within 80 km [50 mi] of the proposed ISP CISF project. The largest population centers within 80 km [50 mi] of the proposed ISP CISF are the communities of Hobbs and Eunice in Lea County, New Mexico, and the communities of Andrews in Andrews County, Texas, and Seminole in Gaines County, Texas. The NRC staff anticipates that because of these statistics and preferences, some residents with the appropriate skill set for employment related to the proposed action may commute from Lea County, New Mexico, and Andrews and Gaines Counties, Texas, to the proposed CISF for work. Thus, it is reasonable to assume that most of the direct workforce and induced population would reside in Andrews or Gaines County in Texas, or Lea County in New Mexico, and therefore those three counties are considered the socioeconomic ROI for the proposed ISP CISF.

3.11.1 Demography

3.11.1.1 Population Distribution in the Socioeconomic ROI

The proposed CISF would be located in Andrews County, Texas, near the border with Lea County, New Mexico. The population density of the three counties (Andrews and Gaines Counties in Texas, and Lea County in New Mexico) within the ROI as of July 1, 2018, ranged between 4.7 and 6.1 persons per km^2 [12.1 and 15.9 persons per square mile (mi^2) of land area] (USCB, 2018, 2010). The average State population densities of New Mexico and Texas were about 6.7 and 42.2 persons per km^2 [17.3 and 109.9 persons per mi^2] of land area, respectively.

The major communities and regional transportation routes in the vicinity of the proposed CISF are depicted in EIS Figure 3.3-1. Estimated populations for counties and communities in the ROI, as the USCB 2013–2017 5-year American Community Survey (ACS) determined, are provided in EIS Table 3.11-1. The largest populated area in Andrews County is the city of Andrews, and the largest populated area in Gaines County is the city of Seminole. The USCB 2013-2017 population estimates indicate that slightly more than half of Lea County's population resided in Hobbs, the largest municipality in the county (USCB, 2017b). Hobbs is the largest city in southeastern New Mexico and serves as a commercial center for the population within the ROI. The majority of the population in Gaines County does not live in a town or city where the USCB counts the population.

The annual population growth rates of the three counties in the study area between 2010 and 2017 were between 0.9 percent (Lea County) and 2.7 percent (Andrews County) (USCB, 2017a). The total population change of 106,971 people between 2013 and 2017 in the three counties in the ROI, and communities within those counties, is provided in EIS Figure 3.11-1. Because of the rapid rise and fall of populations because of the oil and gas industry's boom and bust cycle since the 1920s, population centers in the region have expanded to accommodate greater populations (Rhatigan, 2015; Sites Southwest, 2012). For example, Rhatigan (2015) references a population increase of 244 percent in Lea County between 1930 and 1940 and a population decline of 7 percent from 1960 to 1970. The primary economic factor in the ROI continues to be related to how the oil and gas industry performs (Economic Profile System, 2019a). While industry forecasts can change quickly (monthly) as oil and gas prices change, the U.S. Energy Information Administration predicts that oil production in the ROI (Permian Basin) will continue to increase through 2020 as rig efficiency and well-level productivity rises

Table 3.11-1 USCB Designated Places in the Socioeconomic Region of Influence	
Geographic Areas	**2013-2017 Population Estimate**
Andrews County, Texas	17,577
Andrews	13,333
McKinney Acres	1,033
Gaines County, Texas	19,889
Loop	427
Seagraves	2,737
Seminole	7,327
Lea County, New Mexico	69,505
Eunice	3,065
Hobbs	37,427
Jal	2,071
Lovington	11,558
Monument	104
Nadine	380
North Hobbs	6,083
Tatum	664
Source: USCB, 2017b	

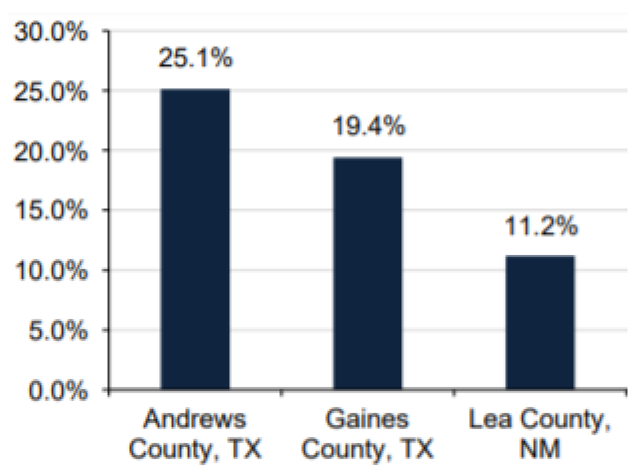

Figure 3.11-1 Percent of Total Population Change by County Between 2010 and 2017 in the Socioeconomic Region of Influence [Source: Modified from Headwaters Economics, 2019b]

(EIA, 2019). According to the BLM, there is high potential for oil and gas exploration and development to continue in the ROI over the next 20 years (2018 to 2038) (BLM, 2018 EIS). For these reasons, and particularly the oil and gas boom and bust cycles, population growth experienced in the socioeconomic study area cannot be reliably predicted. Therefore, the NRC staff does not provide population projections for the socioeconomic study area for the proposed 40-year license term of the proposed CISF project in this EIS to inform impact determinations. However, for comparison over the next 20 years, population estimates to 2040 in the counties within the ROI are provided in EIS Appendix B.

Localized Population Distribution

Several smaller communities of 500 people or less are present within the socioeconomic ROI, such as Humble City {48.3 km [30 mi] north}, Oil Center {24.1 km [15 mi] northwest}, Buckeye {56.3 km [35 mi] northwest}, and Knowles {41.8 km [26 mi] north} in Lea County, New Mexico. About 20,800 people (about 19 percent of the population) that live in the socioeconomic ROI live outside of cities or towns with populations the USCB reported. Therefore, the NRC staff also looked at 11 Census County Divisions (CCDs) within the socioeconomic ROI to analyze population characteristics on a smaller scale than the county level, but that also includes people that do not live within a USCB-designated area (EIS Figure 3.11-2). A CCD is an area within a county the USCB established and with local and State officials that provides a useful set of information that can be analyzed for planning purposes (USCB, 1994). Select information for the CCDs is provided in this section of the EIS as a comparison to other geographic areas such as counties.

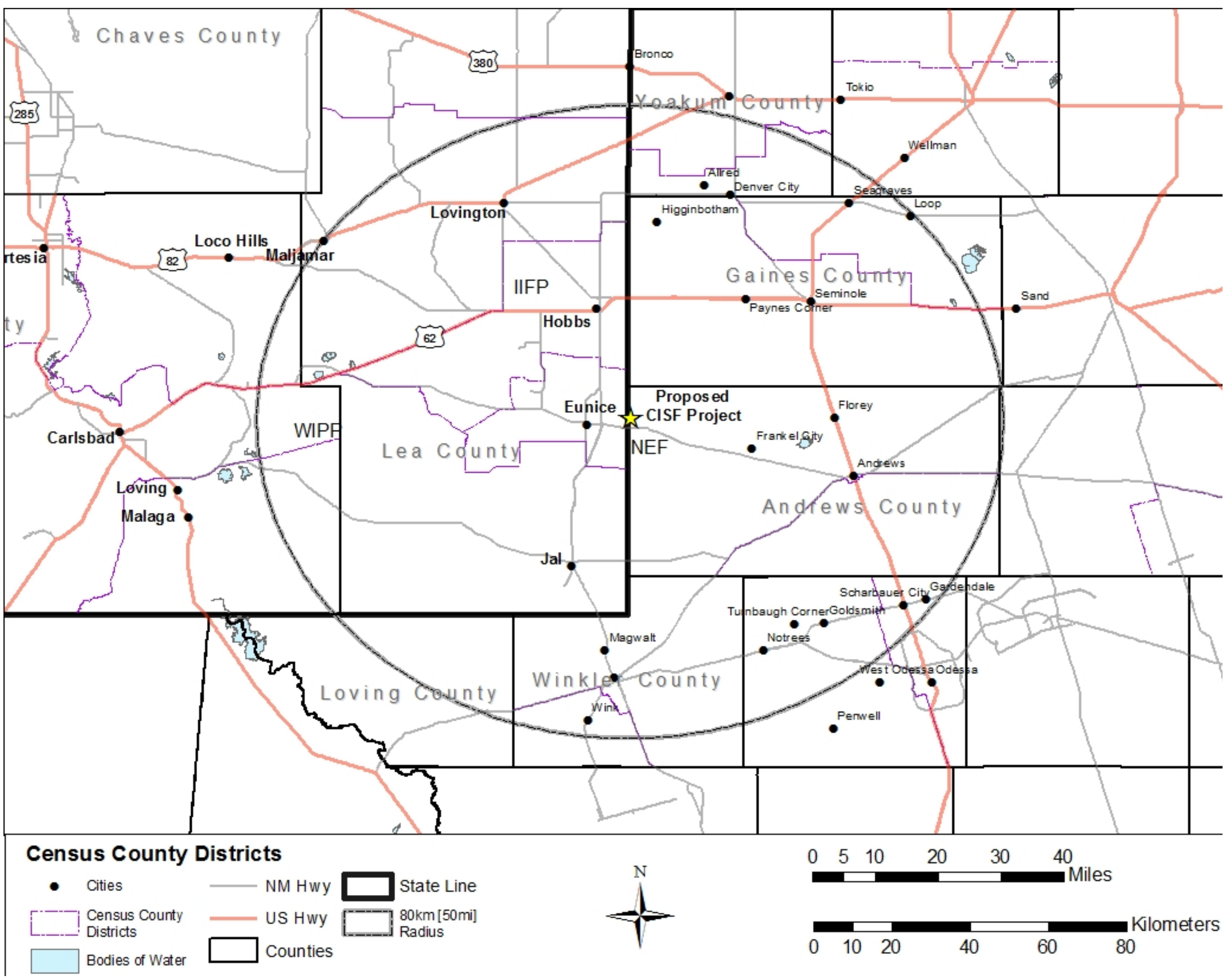

Figure 3.11-2 Census County Districts in the Socioeconomic Region of Influence

The cities of Andrews, Texas, and Eunice, New Mexico, are the closest commercial centers to the proposed CISF project area and so could be expected to supply the majority of retail and housing needs during the license term of the proposed project. However, Hobbs, New Mexico, located about 32 km [20 mi] north of the proposed CISF project area, is the largest city in the ROI and could also serve as a source of retail and housing needs for the workers employed at the proposed CISF. The population within the Andrews North, Eunice, and Hobbs CCDs represent approximately 31.5 percent of all people living in Andrews and Lea Counties.

3.11.1.2 Select Population Characteristics in the Socioeconomic ROI

EIS Table 3.11-2 lists selected population characteristics of the counties in the ROI, and for comparison, Texas and New Mexico. EIS Table 3.11-3 lists selected population characteristics of the CCDs in the ROI. Population characteristics, including race and ethnicity, of the counties in the study area broadly reflect those same characteristics in Texas and New Mexico. Race and ethnicity characteristics of the CCDs generally reflect the same range of characteristics compared to their respective counties and States, with some exceptions. The percentage of African Americans in the Hobbs CCD (5 percent) is slightly higher than the percentage of African Americans in Lea County (3.6 percent). The percentage of individuals of Hispanic ethnicity in the Seminole CCD is the lowest of all the CCDs, lower than both State averages, and lower than the average percentage of individuals of Hispanic ethnicity in the three counties in the ROI. The percentage of individuals of Hispanic ethnicity in the Seagraves CCD is the highest of all the CCDs and higher than that of Gaines County and Texas. The average of all individuals with Hispanic ethnicity (approximately 57,304 people) that reside in the ROI is 53.4 percent of the total population in the ROI.

Table 3.11-2 Select Population Characteristics of Counties Within the Socioeconomic Region of Influence and the States of Texas and New Mexico

State/County	African American (%)	American Indian and Alaskan Native (%)	Asian (%)	Native Hawaiian or Other Pacific Islander (%)	Some Other Race (%)	Two or More Races (%)	Hispanic Ethnicity (%)
Texas (State)	11.7	0.24	4.5	0.07	0.14	1.6	38.9
Andrews	1.5	0.09	0.2	0.05	0	1.6	55.4
Gaines	2.3	0.14	0.5	0.04	0.16	0.07	40.6
New Mexico (State)	1.8	8.7	1.3	0.05	0.19	1.6	48.2
Lea County	3.6	0.7	0.04	0.04	1.42	1.4	58.8

Source: USBC, 2017b

Table 3.11-3 Select Population Characteristics of Census County Districts Within the Socioeconomic Region of Influence							
Census County District	**African American (%)**	**American Indian and Alaskan Native (%)**	**Asian (%)**	**Native Hawaiian or Other Pacific Islander (%)**	**Some Other Race (%)**	**Two or More Races (%)**	**Hispanic Ethnicity (%)**
Andrews North CCD, Andrews County, Texas	1.26	0.11	0.26	0.06	0	1.96	56.9
Andrews South CCD, Andrews County, Texas	2.66	0	0	0	0	0	48.33
Seagraves CCD, Gaines County, Texas	2.25	0	0	0	0	0.12	75.61
Seminole CCD, Gaines County, Texas	2.28	0.18	0.58	0.05	0.20	0.06	31.49
Eunice CCD, Lea County, New Mexico	0	0.15	0	0	0	0	52.15
Hobbs CCD, Lea County, New Mexico	5.01	0.85	0.05	0.06	0.28	1.83	54.37
Jal CCD, Lea County, New Mexico	0	0.50	0.37	0	0	1.15	54.42
Lovington CCD, Lea County, New Mexico	0.73	0.14	0	0	0.21	0.55	66.35
Tatum CCD, Lea County, New Mexico	0	0.96	0	0	0	0.64	47.65
Source: USBC, 2017b							

3.11.1.3 Environmental Justice: Minority and Low-Income Populations

Methodology

A minority or low-income community may be considered as either a population of individuals living in geographic proximity to one another or a dispersed/transient population of individuals (e.g., migrant workers) where either type of group experiences common conditions of environmental exposure (NRC, 2003). NUREG–1748 defines minority categories as: African American, American Indian or Alaskan Native, Asian, Native Hawaiian or other Pacific Islander, some other race, and Hispanic or Latino ethnicity (of any race) (NRC, 2003). The 2000 Census introduced a multiracial category. Anyone who identifies themselves as white and a minority is counted as that minority group. Individuals who identify themselves as more than one minority are counted in a “two or more races” group (NRC, 2003). Low-income is defined as being below the poverty level, as the USCB defined (NRC, 2003). The NRC-recommended area for evaluating census data is the census block group, which the USCB delineated, and is the smallest area unit for which race and poverty data are available (NRC, 2003). The NRC staff used ESRI ArcGIS® online and the USCB website to identify block groups within 80 km [50 mi] of the proposed CISF project area. This radius was selected to be inclusive of (i) locations where people could live and work in the vicinity of the proposed project and (ii) of other sources of radiation or chemical exposure. The NRC staff included a block group if any part of the block group was within 80 km [50 mi] of the proposed CISF project area; 109 block groups were identified as being within, or partially within, the 80-km [50-mi] radius. The NRC guidance in NUREG–1748 (NRC, 2003) indicates that a potentially affected environmental justice population exists if at least one of these criteria exists: (i) either the minority or low-income population of the block group is more than 50 percent of the entire block group population; or (ii) the minority or low-income population percentage of the block group is significantly, or meaningfully, greater (typically by at least 20 percentage points) than the minority or low-income population percentage in the geographic areas chosen for comparative analysis.

Minority Populations

Using the USCB annual surveys conducted during 2013–2017 that represent characteristics during this period (American Community Survey 5-year estimates), the NRC staff calculated (i) the percentage of each block group's population represented by each minority category for each of the 109 block groups within the 80-km [50-mi] radius (the environmental justice study area), (ii) the percentage that each minority category represented of the entire populations of New Mexico and Texas, and (iii) the percentage that each minority category represented for each of the counties that has some land within the 80-km [50-mi] radius of the proposed CISF project area. If the percentage meets one of the above-stated criteria, then that block group was identified as having a potentially affected environmental justice population. If a block group met one or both of the criteria for either the State or the county, it was not double-counted. The Council on Environmental Quality (CEQ) recommends that Federal agencies follow this approach to identify minority populations (CEQ, 1997). In light of the high minority populations in the study area and to better meet the spirit of the NRC guidance to identify minority populations, the NRC staff included census block groups with a percentage of Hispanics or Latinos at least as great as the statewide average. According to the USCB, the percent of people who self-identify as Hispanic or Latino in the 2013–2017 period in Texas is 38.9 percent, and 48.2 percent in New Mexico.

Within 80 km [50 mi] of the proposed CISF project area, there are 47 block groups in Texas and 62 block groups in New Mexico that meet at least one of the two NRC guidance criteria previously described in this section, or the more inclusive definition applied to this analysis (i.e., including census block groups with a percentage of Hispanics or Latinos at least as great as the statewide average). Of the 109 block groups within the 80-km [50-mi] radius, 72 have Hispanic populations that exceed one of these criteria. The majority of the block groups with minority populations (37 out of 72 block groups) are located in Lea County, in and around the City of Hobbs. EIS Figure 3.11-3 provides a graphical representation of the block groups with potentially affected minority populations.

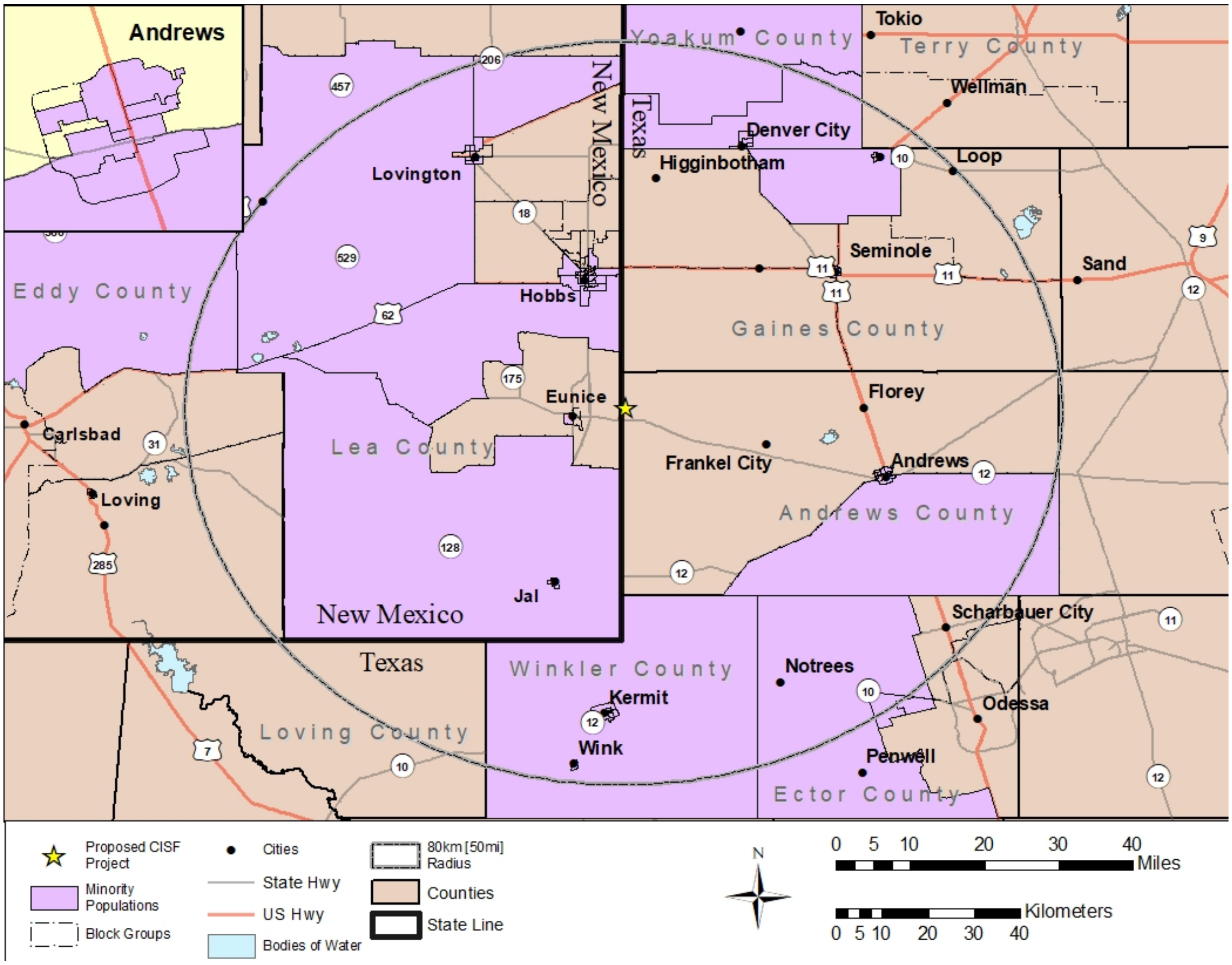

Figure 3.11-3 Block Groups With Potentially Affected Minority Populations Within 80 km [50 mi] of the Proposed CISF Project Area

Low-Income Populations

The NRC guidance defines low-income households based on statistical poverty thresholds (NRC, 2003), which is consistent with CEQ's recommendation for Federal agencies in assessing environmental justice (CEQ, 1997). Out of the 109 block groups located completely or partly within 80 km [50 mi] of the proposed CISF project area, there are 6 block groups with low-income families that meet one of the previously described criteria used in this EIS to identify potentially affected environmental justice populations. There are also 4 block groups with low-income individuals in the region that meet one of the criteria. EIS Figure 3.11-4 provides graphical representation of the block groups with potentially affected low-income populations.

EIS Figure 3.11-5 provides a comparison of low-income families and individuals by county. The estimated percentage of Texas families and individuals that lived below the poverty level between the period of 2013 and 2017 (i.e., the poverty rate) are 12.4 percent and 16.0 percent, respectively (USCB, 2017b). The estimated poverty rates during the same period in New Mexico for families and individuals are 15.6 percent and 20.6 percent, respectively (USCB, 2017b). The described poverty rates of the three counties within the region are below their respective State poverty rates. Appendix B provides additional detail about the low-income populations in the 109 block groups.

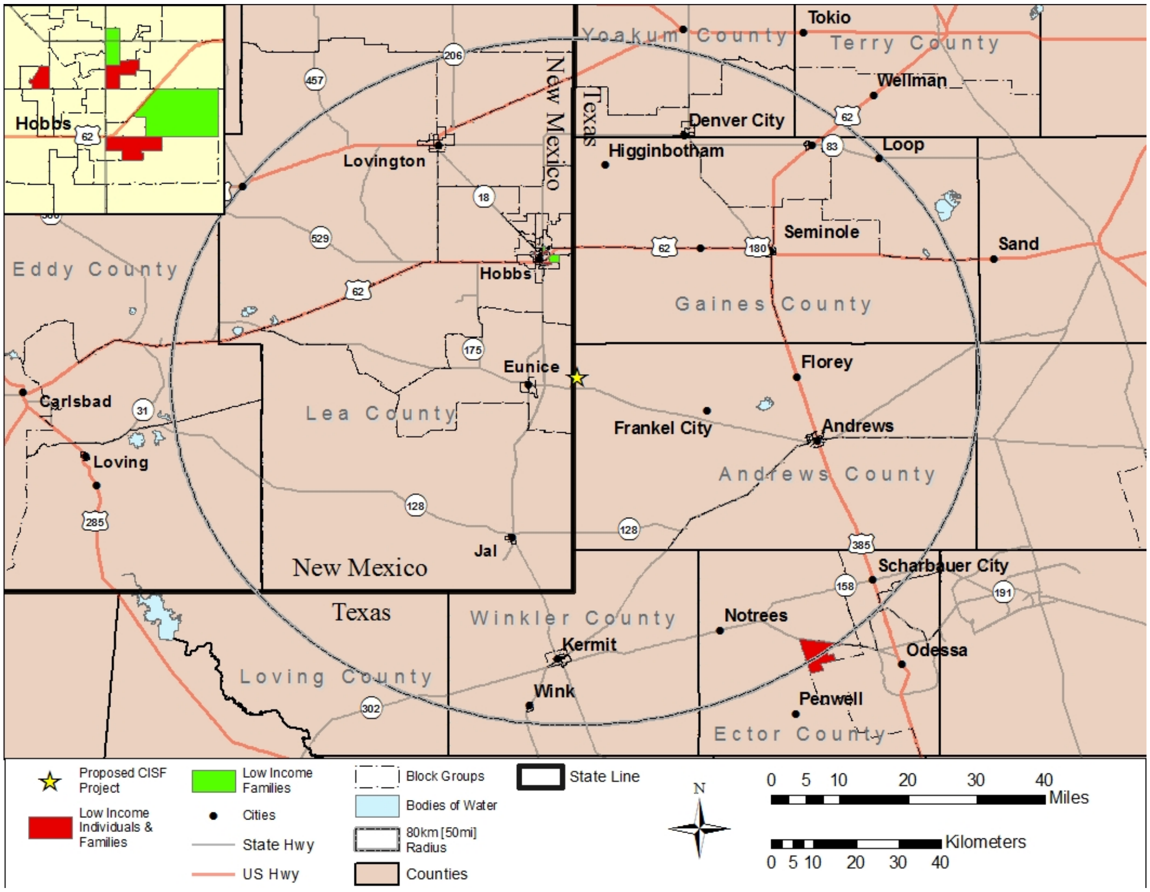

Figure 3.11-4 Block Groups With Potentially Affected Low-Income Populations Within 80 km [50 mi] of the Proposed CISF

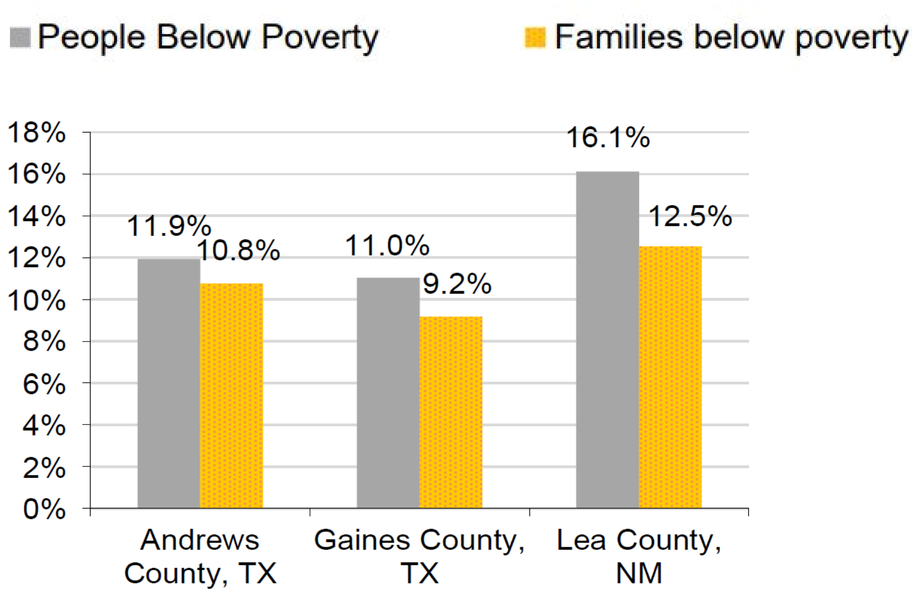

Figure 3.11-5 Percent of Individuals and Families Below Poverty Level by County (Source: Modified from Economic Profile System, 2019b)

3.11.2 Employment and Income

Employment

Employment by economic sector in the socioeconomic study area (ROI) over the 16 years between 2001 and 2017 is provided in EIS Table 3.11-4. The labor force in the ROI increased approximately 38 percent between 2001 and 2017. As demonstrated in EIS Table 3.11-4, in 2017, the mining industry (oil and gas and nonfuel mineral mining) provided more jobs (about 12,864 jobs or 22 percent of all jobs in the ROI) and has added the largest number of jobs over the last 16 years. In addition to mining, over 2,600 jobs were added in the ROI between years 2010 and 2017 in the construction and accommodation and food sectors (Economic Profile System, 2019a). Five facilities other than WCS are located between 0.8 km [0.5 mi] and 3 km [1.8 mi] from the proposed CISF: NEF, the Lea County Landfill, Sundance Specialists, a Permian Basin Materials ready-mix facility, and Sundance Service's Parabo Facility (EIS Section 5.1.1).

The 2017 average annual wage estimates for the industries shown in EIS Table 3.11-5 ranges from approximately $17,724 (leisure and hospitality) to $76,181 (mining including fossil fuels) (EPS, 2019a). The average income in the State of Texas in 2017 is estimated to be $60,419, and $52,203 in New Mexico. Median income refers to the amount that divides the income distribution into two equal groups, half having income above that amount, and half having income below that amount. The median income for workers in each county is higher than the median income for workers in New Mexico and Texas (USCB, 2017b). The estimated 2017 median income within the ROI ranges from $43,206 to $52,158. The median worker income in New Mexico in 2017 is estimated at $40,289 and $43,182, in Texas (USCB, 2017b).

The labor force participation rate (the sum of all workers who are employed or actively seeking employment divided by the total noninstitutionalized, civilian working-age population) in the ROI ranges from a low of 60.4 percent in Lea County, New Mexico, to a high of 66.3 percent in Andrews County, Texas. The average monthly unemployment rate for the three counties within the socioeconomic ROI between 2013 and 2017 ranged from 4.5 to 6.2 percent (USCB, 2017b). For comparison, the estimated unemployment rate between 2013 and 2017 for the 9 CCDs within the ROI ranged from 3.5 percent in Seminole CCD to 13.8 percent in Tatum CCD (USCB, 2017b). The estimated unemployment rate for the same time period was 5.8 percent in Texas and 7.7 percent in New Mexico.

While there is no significant agricultural activity within an 8-km [5-mi] radius of the proposed CISF (EIS Section 3.2.2), there is agricultural activity present within the socioeconomic ROI. According to the information provided in EIS Table 3.11-4, Employment by Industry, the farm, forestry, fishing, and agriculture industries employed approximately 3,000 workers in the ROI in 2017, which is about 5 percent of all jobs in the ROI (EPS, 2019b). According to the most recent agricultural census the USDA conducted in 2017, the majority of farms in New Mexico are located in the western half of the State, while the majority of Texas farms are located in the eastern half of the State (USDA, 2019). Approximately 0.3 percent of all farms in Texas are located in Andrews and Gaines Counties.

	2001	2010	2017	Change 2010-2017
Total Employment (number of jobs)	42,823	50,341	59,160	8,819
Non-services related	~15,188	~18,936	~23,363	~4,427
Farm	2,697	1,781	1,832	51
Forestry, fishing, & ag. services	~1,065	~1,009	~1,331	~322
Mining (including fossil fuels)	7,225	10,152	12,864	2,712
Construction	3,220	4,568	5,840	1,272
Manufacturing	981	1,426	1,496	70
Services related	~19,264	~24,951	~30,324	~5,373
Utilities	379	479	557	78
Wholesale trade	1,698	1,643	1,886	243
Retail trade	4,479	4,353	5,319	966
Transportation and warehousing	1,479	2,009	2,913	904
Information	349	445	408	-37
Finance and insurance	1,101	1,464	1,612	148
Real estate and rental and leasing	907	1,185	1,484	299
Professional and technical services	~757	~1,244	1,407	~163
Management of companies	~134	~173	259	~86
Administrative and waste services	~1,769	~2,313	2,154	-~159
Educational services	~177	~297	~405	~108
Health care and social assistance	~1,202	~3,337	~3,923	~586
Arts, entertainment, and recreation	~267	~590	~723	~133
Accommodation and food services	~1,997	~2,805	4,217	~1,412
Other services, except public admin.	2,569	2,614	3,057	443
Government	6,178	6,508	6,749	241

All employment data are reported by *place of work*. Estimates for data that were not disclosed are indicated with tildes (~).

Table 3.11-4 Employment by Industry in the Region of Influence in 2001, 2010, and 2017

Source: Modified from Economic Profile System, 2019a

Employment and Wages in 2017	Wage & Salary Employment	% of Total Employment	Avg. Annual Wages (2017 $s)
Total	42,043		$51,878
Private	35,600	84.7%	$53,258
Non-Services Related	15,186	36.1%	$68,697
Natural Resources and Mining	10,173	24.2%	$71,104
Agriculture, forestry, fishing & hunting	1,377	3.3%	$38,614
Mining (incl. fossil fuels)	8,797	20.9%	$76,181
Construction	3,834	9.1%	$60,465
Manufacturing (Incl. forest products)	1,179	2.8%	$74,697
Services Related	20,413	48.6%	$41,774
Trade, Transportation, and Utilities	8,410	20.0%	$48,887
Information	332	0.8%	$44,616
Financial Activities	1,582	3.8%	$56,406
Professional and Business Services	2,283	5.4%	$47,971
Education and Health Services	2,845	6.8%	$39,067
Leisure and Hospitality	3,894	9.3%	$17,724
Other Services	1,047	2.5%	$44,682
Unclassified	22	0.1%	$49,571
Government	6,443	15.3%	$44,256
Federal Government	128	0.3%	$56,740
State Government	315	0.7%	$47,512
Local Government	6,000	14.3%	$43,818

Table 3.11-5 Average Wages by Industry in the Region of Influence in 2017

Source: Modified from Economic Profile System, 2019a

3.11.3 Housing

During the 2013–2017 period, the estimated vacant housing rate in Andrews and Gaines Counties, Texas, was 12.2 and 10.9 percent, respectively, and 15.1 percent in Lea County, New Mexico (EPS, 2019b). The median monthly costs for owner-occupied mortgages and rent during the same period within the ROI are provided in EIS Figure 3.11-6. In the 2013–2017 period, Andrews County, Texas, had the highest estimated monthly mortgage costs and monthly rent in the ROI, and Gaines County, Texas, had the lowest (EPS, 2019b).

The City of Andrews, Texas, has experienced growth since 2003 and completed a comprehensive plan in 2013 to guide the city's growth and development (Freese and Nichols, 2013). A statewide Texas housing analysis conducted in 2011 and 2012 evaluated housing in rural counties, including Andrews and Gaines Counties (Bowen National Research, 2012). The report indicated that in the West Texas region, including Andrews and Gaines Counties, the housing stock was old and substandard (e.g., lacking complete indoor plumbing facilities), and that the greatest demand was for affordable one- through three-bedroom single-family homes or apartments. The report indicated that about 15 percent of the houses for sale were built over 50 years ago. Lea County, New Mexico, has experienced similar housing constraints since oil prices began to increase in 2013 (Rhatigan, 2015; State of New Mexico Interstate Stream Commission Office of the State Engineer, 2016). The cost of building housing is very high, particularly in rural areas. There is a lack of large national housing builders in the ROI, and developers worry about the "boom and bust" nature of the oil and gas industry; however, new residential projects are being planned in Lea County that would increase housing capacity in the ROI (State of New Mexico Interstate Stream Commission Office of the State Engineer, 2016; Midland Reporter-Telegram, 2019).

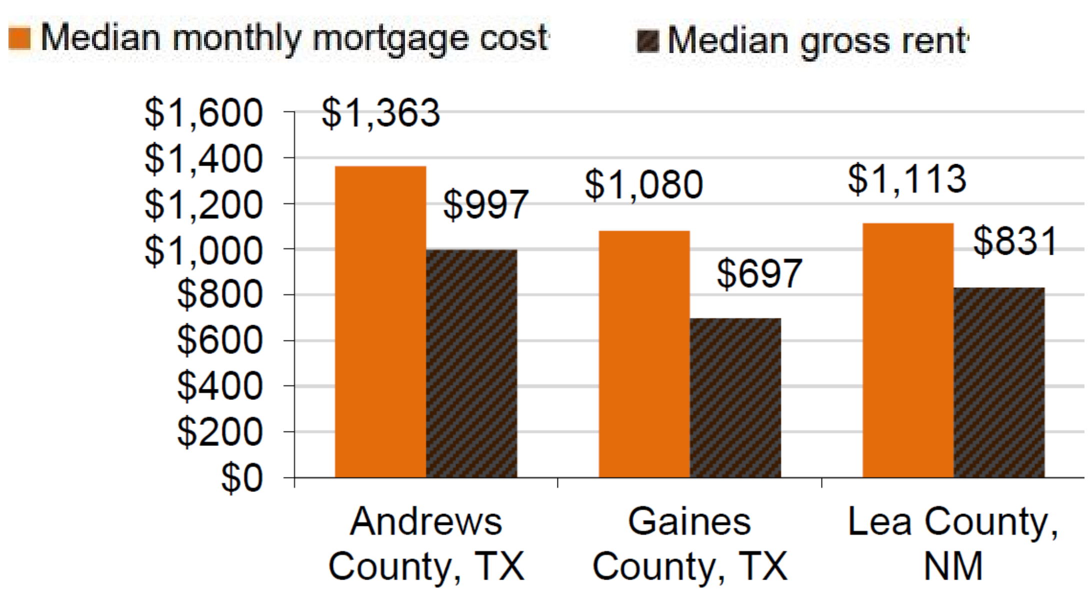

Figure 3.11-6 Median Monthly Mortgage Costs and Gross Rent in the 2013–2017 Period (Source: Modified from Economic Profile System, 2019b)

According to the U.S. Department of Housing and Urban Development, families who pay more than 30 percent of their income for housing are considered “cost burdened” (U.S. Department of Housing and Urban Development, 2018). The percent of owners and renters that spent more than 30 percent of their income on housing by each county in the study is provided in EIS Figure 3.11-7. In the 2013-2017 period, between 17.4 and 19.8 percent of homeowners in the ROI spent more than 30 percent of their income on housing, and between 15.2 and 33.0 percent of renters spent more than 30 percent of their income on housing. For comparison, in the 2013-2017 period, approximately 20.6 percent of homeowners in Texas and 14.9 percent of homeowners in New Mexico spent more than 30 percent of their income on housing. Approximately 44.3 percent of renters in Texas and 44.5 percent of renters in New Mexico spent more than 30 percent of their income on housing (USCB, 2017b).

3.11.4 Local Finance

Corporate Income Taxes

Texas does not impose a corporate income tax (H&R Block, 2019). According to the New Mexico Taxation and Revenue Department (NMTRD), New Mexico imposes a corporate income tax on the total net income (including New Mexico and non-New Mexico income) of every domestic and foreign corporation doing business in or from the State, or which has income from property or employment within the State. The percentage of New Mexico income is then applied to the gross tax. For the taxable years beginning on or after January 1, 2020, corporations with a total net income exceeding $500,000 annually, corporate income tax is $24,000 plus 5.9 percent of net income over $500,000. Corporations with a total net income below $500,000 are taxed at 4.8 percent of net income. New Mexico also levies a corporate franchise tax of $50 per year. (NMTRD, 2020a).

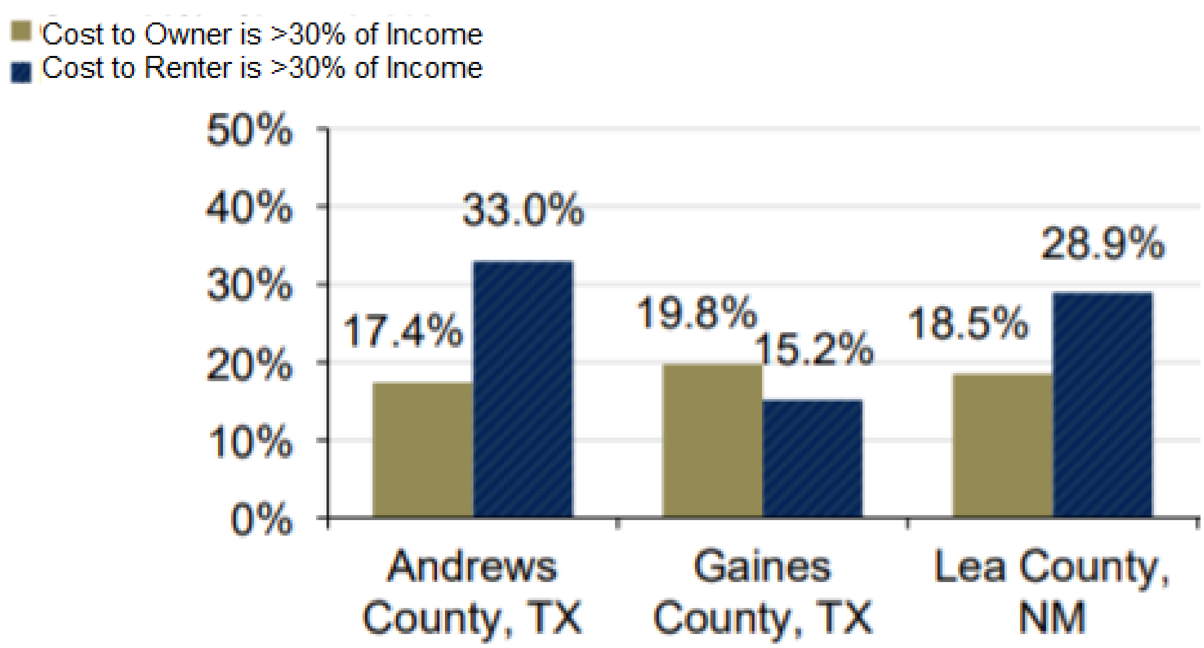

Figure 3.11-7 Housing Costs as a Percent of Household Income in the 2013-2017 Period (Source: Modified from Economic Profile System, 2019b)

Individual Income Taxes

Texas does not impose an individual income tax (H&R Block, 2019). New Mexico imposes an individual income tax on the net income of every resident and nonresident employed or engaged in business in or from the State or deriving any income from any property or employment within the State. The rates vary depending upon filing status and income. The top tax bracket is 4.9 percent (NMTRD, 2020b).

Sales and Gross Receipts Tax

According to the Texas Comptroller of Public Accounts (TCPA), Texas imposes a State sales and use tax of 6.25 percent on all retail sales, leases and rentals of most goods, as well as taxable services. Local taxing jurisdictions (cities, counties, special purpose districts and transit authorities) can also impose up to 2 percent sales and use tax for a maximum combined rate of 8.25 percent (TCPA, 2019b). While many counties do impose a countywide sales tax, Andrews and Gaines Counties do not (TCPA, 2020). Texas imposes a franchise tax on applicable taxable entities that provide goods and services. The franchise tax rate is based on an entities' profit margin as determined by a formula based on gross receipts (TCPA, 2019c). In addition, Texas imposes a miscellaneous gross receipts tax on utilities. The rate of the miscellaneous gross receipt tax on utilities is based on the population of the incorporated area where business is conducted, and ranges between 0.581 and 1.997 percent (TCPA, 2019d).

New Mexico has a gross receipts tax structure instead of a sales tax structure. This tax is mostly passed on to the consumer through increases in the cost of goods (ISP, 2020). The State gross receipts tax rate from July through December 2019 is 5.125 percent (NMTRD, 2019). The gross receipts tax rate varies throughout the State from 5.125 percent to 9.25 percent, depending on the location of the business. This rate varies because the total rate combines rates imposed by the State, counties, and, if applicable, municipalities where the businesses are located. The business pays the total gross receipts tax to the State, which then distributes the counties' and municipalities' portions to them. The State's portion of the gross receipts tax, which is also the largest portion of the tax, is determined by State law. Changes to the State rate occur no more than once a year, usually in July. The gross receipts taxes effective between July and December 2019 for communities in Lea County range from 5.5 to 7.4375 percent (NMTRD, 2019).

Property Taxes

In Texas, property taxes are based on the most current year's market value. In 2017, Andrews County, Texas, imposed property taxes (per $100 assessed value) at a rate of $0.6007, a school district tax rate of $1.2 per $100 assessed value, and a municipal tax rate for the City of Andrews of $0.189 per $100 assessed value (TCPA, 2017). Andrews County had a property tax base (total certified net taxable value) in 2017 of over $3.58 billion dollars (Andrews County, 2019). The 2017 county property tax rate for Gaines County is $0.593967, with municipal rates for the cities of Seminole and Seagraves of $0.54 and $0.86 per $100 assessed value, respectively (TCPA, 2017).

Property taxes in New Mexico are among the lowest in the United States. Four governmental entities within New Mexico are authorized to impose property taxes—the State, counties, municipalities, and school districts. Property assessment rates are 33.3 percent of the property value (NMDFA. 2017; ISP, 2020). Millage or mill rate is a term that municipalities use to calculate property taxes. The amount of municipal tax a property owner pays is calculated by multiplying the mill rate by the assessed value of a property and dividing by 1,000. New Mexico distributes revenues from property tax rate totals as follows: 11.85 mills to counties, 7.65 mills to municipalities, and 0.5 mills to school districts. Lea County has a large concentration of mineral extraction properties in the State, but very small portions of the State's residential property tax base. In 2017, *ad valorem* production and equipment represented 50.7 percent of net taxable property value in Lea County (NMDFA, 2017).

3.11.5 Community Services

The City of Andrews considers that Andrews, Texas is positioned to support community initiatives in the next several years, including further developing the downtown streetscape and business parks and securing long-term water needs (City of Andrews, 2016; Midland Reporter-Telegram, 2019). Gaines County invests heavily in its agribusiness, and the City of Seminole is considering transportation improvements for truck traffic (Seminole Economic Development Board, 2018; Permian Basin Regional Planning Commission, 2015).

Similar to the ongoing regional housing planning and development efforts described in EIS Section 3.11.3 (Housing), recent investments in community infrastructure projects such as water utility expansions, community centers, health clinics, and schools support continued growth in the Lea County communities (State of New Mexico Interstate Stream Commission Office of the State Engineer, 2016).

Education

The number of students enrolled in kindergarten through Grade 12 in the ROI is approximately 23,725 (USCB, 2017b). Andrews Independent School District is the only public school district in Andrews County and has one high school, one middle school, three elementary schools, and the Andrews Education Center (ISP, 2020; Andrews Independent School District, 2019). There are three public school districts in Gaines County, Texas: Loop Independent School District, Seagraves Independent School District, and Seminole Independent School District (Loop ISD, 2020; Seagraves ISD, 2020; Seminole ISD, 2020). There are five public school districts and four private schools in Lea County (ISP, 2020). In addition, New Mexico Junior College and University of the Southwest are located in Lea County (ISP, 2020). Additionally, Andrews County, Texas, hosts a business and technology center (ISP, 2020).

Hospitals

The Permian Regional Medical Center in Andrews, Texas, a 44-bed facility that provides emergency services, is located approximately 56 km [35 mi] by road from the proposed CISF (ISP, 2020). The Lea Regional Medical Center in Hobbs, New Mexico, also provides emergency services and is located approximately 48 km [30 mi] by road from the proposed CISF (ISP, 2020). The Artesia General Hospital in Artesia, New Mexico; Memorial Hospital in Seminole, Texas; and The Nor-Lea Hospital District in Lovington, New Mexico, support medical clinics in the ROI. Medical clinics in the towns of Jal (Jal Clinic) and Eunice (Eunice Health Clinic), New Mexico, also provide primary health care services in the ROI during weekdays (EDCLC, 2018).

Fire and Police

According to ISP's ER, the Andrews County Sheriff's Department and Police Department are staffed with 15 police officers certified in emergency services as paramedics or emergency medical technicians (ISP, 2020). The Andrews Volunteer Fire Department is staffed by a fire chief and 44 firemen with 23 trucks and a hazardous materials trailer. Gaines County also has a volunteer fire department in Seminole and Seagraves. The City of Eunice, New Mexico, is the closest city to the proposed CISF and identifies 13 employees in its police department and 11 employees in its fire and emergency medical services department (City of Eunice, 2012). The City of Hobbs has three fire stations (ISP, 2020). The City of Jal is served by six police officers and a chief of police, and an all-volunteer fire department (City of Jal, 2019). Lea County has three other volunteer fire departments located in Knowles, Maljamar, and Monument (ISP, 2020). ISP's ER states that updates of existing memorandums of understanding (MOUs) will be executed 90 days prior to the start of proposed CISF operations (ISP, 2020). Memoranda of understanding (MOUs) will be executed 90 days prior to the start of proposed CISF operations (ISP, 2020). The MOUs are between each of the following groups and WCS and ISP: City of Andrews, Andrews Police Department, Andrews County Sheriff's Office, Eunice Police Department, and Eunice Fire and Rescue, Carlsbad Medical Center, Lea Regional Medical Center, and Permian Regional Medical Center (ISP, 2020; EIS Table 1.6-1). If additional fire or police services are required, nearby communities, such as the Hobbs Fire Department, could provide additional response services (ISP, 2020).

3.12 Public and Occupational Health

This section summarizes the sources of radiation and chemical exposure at the proposed CISF project area and in the surrounding region {defined as encompassing an 80-km [50-mi] radius}, including natural background radiation levels. The radius was selected to be inclusive of (i) locations where people could live and work in the vicinity of the proposed project and (ii) of other sources of radiation or chemical exposure. Applicable radiation dose limits that have been established for the protection of public and occupational health and safety, potential exposure pathways and receptors, and available occupational and public health studies are described.

3.12.1 Sources of Radiation Exposure

Sources of radiation exposure at the proposed CISF project area and in the region surrounding the facility include background radiation and radiation from other sources such as nearby facilities or transportation.

3.12.1.1 Background Radiological Conditions

Radiation dose is a measure of the amount of ionizing energy that is deposited in the body. Ionizing radiation is a natural component of the environment and ecosystem, and members of the public are exposed to natural radiation continuously. Radiation doses to the general public occur from radioactive materials found in the Earth's soils, rocks, and minerals. Radon (Rn-222) is a radioactive gas that escapes into ambient air from the decay of uranium (and its progeny, radium-226) found in most soils and rocks. Naturally occurring low levels of uranium and radium are also found in drinking water and foods. Cosmic radiation from outer space is another natural source of exposure and ionizing radiation dose. In addition to natural sources of radiation, there are artificial or human-made sources that contribute to the dose the general public receives. Medical diagnostic procedures using radioisotopes and X-rays are a primary human-made radiation source. The National Council on Radiation Protection and Measurements (NCRP, 2009) estimates that the annual average dose to the public from all natural background radiation sources (radon and thoron, terrestrial, cosmic, and internal) is 3.1 millisieverts (mSv) [310 millirem (mrem)]. Because of the increase in medical imaging and nuclear medicine procedures, the annual average dose to the public from all sources (natural and human-made) is 6.2 mSv [620 mrem] (NCRP, 2009).

The highest average annual preoperational radiation dose that ISP reported in the ER from past monitoring near the proposed CISF project area was 0.168 mSv [16.8 mrem] (ISP, 2019a,b). This dose is based on quarterly readings WCS obtained in 2010 from dosimeters placed at locations at and near the location of the current WCS facility (adjacent to the proposed CISF project area) as part of a preoperational monitoring program. For context, this measured dose is slightly less than the U.S. average annual terrestrial radiation dose of 0.21 mSv [21 mrem] (NCRP, 2009) and is therefore generally consistent with the NRC staff's expectations for background radiation.

3.12.1.2 Other Sources of Radiation Exposure

The region surrounding the proposed CISF includes other projects that involve radioactive materials, including NEF and the other waste disposal facilities WCS operates. The estimated or measured maximum operational radiological doses to the public from these facilities are described in the following paragraphs.

NEF is located 1.6 km [1 mi] southwest of the proposed CISF project (ISP, 2020). NEF enriches uranium using a gas centrifuge process. The enriched uranium is used in the manufacture of nuclear fuel for commercial nuclear power reactors. The environmental impacts of the operation of the NEF are documented in NUREG–1790 (NRC, 2005). Impacts related to radiation exposure include small public and occupational health and transportation impacts during normal operations and small to moderate public and occupational health and transportation impacts under evaluated accident conditions. In that analysis, the highest estimated annual public dose from normal facility operations was 0.19 mSv [19 mrem] (NRC, 2005). A recent semi-annual radiological effluent release report submitted to NRC applicable to operations during the first half of year 2019 documented that concentrations of gross alpha radioactivity, gross beta radioactivity, and uranium isotopes in monitored liquid and airborne effluents at the discharge points were either below minimum detectable concentrations or less than 10 percent of the applicable concentration limits in 10 CFR 20, Appendix B (URENCO USA, 2019).

WCS operates two facilities authorized to dispose of mixed Class A, B, C LLRW within the existing WCS site that borders the proposed CISF project area to the southeast. The two facilities are referred to as the Compact Waste Disposal Facility (CWF) and Federal Waste Disposal Facility (FWF). The CWF serves the Texas LLRW Compact (Texas and Vermont), and the FWF serves the DOE. WCS also operates a facility authorized to dispose of Atomic Energy Act Section 11e.(2) byproduct material. Annual radiological doses to the public from existing WCS facility operations are documented every 6 months in a semi-annual Radiological Environmental Monitoring Program (REMP) Report to the TCEQ. The WCS REMP report for year 2014 operations documented the annual estimated public dose at 0.027 mSv [2.7 mrem] (WCS, 2015).

3.12.2 Pathways and Receptors

Under normal operations, the use of NRC-certified storage casks at the proposed CISF project would fully contain the stored radioactive material. Under these circumstances, the only applicable exposure pathway is individual workers and members of the public at or near the facility being exposed to direct radiation. Because direct radiation decreases with distance from the source, the level of exposure would vary based on the distance between the source and the receptor and the duration of the exposure (and, for workers, the amount of shielding during transfers). Therefore, the workers involved in canister transfers and the residents nearest the facility would be the individuals expected to receive the highest radiation exposures from the proposed CISF project.

The nearest resident to the proposed CISF project is located approximately 6 km [3.8 mi] to the west at a location east of Eunice, New Mexico (ISP, 2020). Nearby population centers include Eunice (population 3,065) approximately 8 km [5 mi] west of the proposed CISF project area, the city of Hobbs, New Mexico (population 37,427 persons) located 37 km [23 mi] northwest of the proposed CISF project area, and the city of Andrews, Texas (population 13,333) located approximately 52 km [32 mi] to the east/southeast of the proposed CISF project area (USCB, 2017b).

3.12.3 Radiation Protection Standards

The NRC has a statutory responsibility, pursuant to the Atomic Energy Act of 1954, as amended, to protect worker and public health and safety. The NRC's regulations in 10 CFR Part 20 specify annual worker dose limits including 0.05 Sv [5 rem] total effective dose equivalent (TEDE) and annual dose limits to members of the public including 1 mSv [100 mrem] TEDE with no more than 0.02 mSv [2 mrem] in any 1-hour period from any external sources. Additionally, 10 CFR Part 72 includes an annual public dose limit of 0.25 mSv [25 mrem] committed dose equivalent to the whole body. These public dose regulatory limits are a fraction of the background radiation dose, as discussed in EIS Section 3.12.1.1.

Exposure to radiation presents an additional risk of developing cancer or a severe hereditary effect within a person's lifetime. The annual dose limit set by the International Atomic Energy Agency (IAEA), as well as the NRC, to protect members of the public from the harmful effects of radiation is 1 mSv [100 mrem]. The additional risk of fatal cancer associated with a dose of 1 mSv [100 mrem], calculated using the scientific methods of the International Commission on Radiological Protection (ICRP, 2007) and applying a linear-no-threshold dose response assumption, is on the order of 1 in 20,000. This small increase in lifetime risk can be compared to the baseline lifetime risks of 1 in 3 for anyone developing a cancer and 1 in 5 for anyone developing a fatal cancer (ACS, 2018).

3.12.4 Sources of Chemical Exposure

Activities in the region surrounding the proposed CISF project area that may result in limited chemical exposure include oil and gas exploration and production, oil and gas-related service industries, surface recovery and land farming of oil field wastes, mineral extraction, uranium enrichment, municipal waste disposal, quarrying, livestock grazing, and agriculture (ISP, 2020). Activities nearest to the proposed CISF project area include the Permian Basin Materials gravel pit, the NEF uranium enrichment facility, the Sundance Services oil recovery and solids disposal facility, the municipal landfill, and other waste management activities occurring at the WCS facility.

The facility that WCS currently operates to store, treat, and dispose hazardous and toxic wastes is authorized by TCEQ under the RCRA and by EPA under The Toxic Substances Control Act (TSCA). Hazardous waste materials authorized for disposal include polychlorinated biphenyls, asbestos, and more than 1,000 different chemical wastes (TCEQ, 2005). The facility is also permitted to dispose of LLRW (that includes various materials composed of small amounts of uranium, thorium, radium, and other radionuclides) that the TCEQ has exempted (WCS, 2020, 2015; 2015 REMP). Regulatory oversight of the WCS operations includes provisions for protecting worker and public health and safety that include environmental monitoring, avoiding air pollution, and reporting noncompliances (TCEQ, 2005).

The NEF facility located 1.6 km [1 mi] southwest of the proposed CISF project (ISP, 2020), was previously evaluated for environmental impacts by NRC (NRC, 2005). The NEF facility enriches uranium using a gas centrifuge process that involves hydrogen fluoride and methylene chloride. Both chemicals are regulated under National Emission Standards for Hazardous Air Pollutants (NESHAP) in accordance with EPA and State of New Mexico regulations. The airborne release of hydrogen fluoride was previously estimated to not exceed 3.9 micrograms per cubic meter at the point of discharge. This concentration level was significantly below the OSHA and National Institute for Occupational Safety and Health limits for an 8-hour work shift of 2.5 milligrams per cubic meter (still current at the time of this writing); and therefore impacts to workers and the public from chemical exposures were found to be small (NRC, 2005).

Sundance Services, Inc. processes, treats, and manages the disposal and storage of waste materials associated with the exploration, development, or production of crude oil, natural gas, or geothermal energy, including nonhazardous produced water, basic sediment and water, tank bottoms, oil contaminated soils, drill cuttings, and cement and muds (Sundance Services, Inc., 2020). They also clean and recover oil from oil sludge pits and tanks. EPA recently conducted a national reevaluation of the hazards and risks to public health and the environment from the management of these types of wastes and the adequacy of applicable state regulatory programs (including in Texas) (EPA, 2019). EPA found that the hazards can be effectively managed by adequately containing wastes during storage, treatment, and disposal. EPA examined the frequency, magnitude, and extent of recorded releases and found that adverse effects can result from uncontrolled releases of these types of wastes; however, they found no evidence that releases were common, and a majority of recently identified release incidents were well-contained and addressed onsite. EPA concluded that the scope of existing regulatory programs is robust and reconfirmed the adequacy of the existing approach to managing wastes.

3.13 Waste Management

This section describes the environment that could potentially be affected by the disposition of liquid and solid waste streams the proposed CISF would generate. EIS Section 2.2.1 describes the types and volumes of liquid and solid waste that operation of the proposed CISF project could generate.

3.13.1 Liquid Wastes

Liquid wastes or effluents generated from the proposed CISF project are limited to stormwater, hazardous waste, and sanitary wastewater. Detailed descriptions of the liquid wastes the proposed CISF project would generate and the applicant’s proposed disposition are provided in EIS Section 2.2.1 and are briefly summarized here. The Solid Waste Disposal Act defines hazardous waste as a subset of solid waste; therefore, disposition of hazardous waste is addressed in EIS Section 3.13.2.

The affected environment for stormwater runoff includes the drainages adjacent to the proposed CISF and associated rail sidetrack. As described in EIS Section 3.5.1, the surface water features and surface water flow for the affected environment includes areas in both Texas and New Mexico. To protect jurisdictional waters from pollutants that could be conveyed in stormwater runoff, EPA developed the National Pollutant Discharge Elimination System (NPDES) program. Certain States can issue permits for this Federal program, which is the case for Texas (EIS Section 1.6.2). Within the State of Texas, TCEQ has authority to administer the NPDES program through its Texas Pollutant Discharge Elimination System (TPDES) stormwater permitting program. This program issues separate permits for construction and operations stages. The applicant states that the proposed CISF would require a TPDES general construction permit from the TCEQ, which would be updated as appropriate. Furthermore, the proposed CISF would require an operation permit from the TCEQ (ISP, 2020).

Sanitary wastes generated during the license term of the proposed CISF project would not be disposed at the site, based on the expected use of portable toilets, sewage collection tanks, and above-ground storage tanks (ISP, 2020). During construction of the proposed CISF, ISP would either dispose of sanitary waste using portable toilets or possibly follow the same disposal procedure that would be used during operations. For operations, ISP would dispose of sanitary wastewater using underground sewage tank systems that discharge into above-ground holding tanks with no onsite discharge. The resulting sewage would be removed from the tanks and disposed at an offsite permitted treatment facility (ISP, 2020).

3.13.2 Solid Wastes

Solid wastes generated from the proposed CISF project would include nonhazardous solid waste, LLRW, and hazardous waste.

All proposed stages (construction, operation, and decommissioning) of the proposed CISF would generate nonhazardous solid waste (e.g., typical office/personnel waste, and miscellaneous waste from construction activities). The applicant has proposed disposal of nonhazardous solid waste offsite in the Lea County Solid Waste Authority municipal landfill located approximately 3 km [1.8 mi] south/southwest of the proposed CISF (ISP, 2020). Based on annual reporting to the Solid Waste Bureau of the New Mexico Environment Department, the Lea County Solid Waste Authority municipal landfill received approximately 4.06 million metric tons [4.47 million short tons] of nonhazardous waste in 2017 and had an estimated remaining life of approximately 37 years (NMENV, 2019).

As discussed in EIS Section 2.2.1, generation of LLRW from the proposed CISF project would be limited to the operation and decommissioning stages. The applicant proposes that the LLRW [e.g., cloth swipes, paper towels, protective clothing, used high-efficiency particulate air (HEPA) filters] would be disposed at the adjacent WCS LLRW disposal facility. LLRW is managed under regional disposal compacts among States that provide for disposal and regulate some aspects of disposal for their member States. The Texas low level waste compact member States are Texas and Vermont (NRC, 2017a). Generators of LLRW in the Texas compact States can dispose of this waste at the WCS facility in Andrews, Texas (NRC, 2017b). This facility also accepts noncompact waste, if approved by the compact. The WCS LLRW disposal facility is licensed to accept Class A, B, and C LLRW for disposal. Over the first 5 years of operation (i.e., 2012 to 2017), the amount of LLRW annually disposed at the WCS facility ranged from 300.1 m^3 [10,599 ft^3] to 1,135.0 m^3 [40,081 ft^3] (NRC, 2018 l LLRW disposal site statistics).

Another option for disposal of LLRW from the proposed CISF would be the Energy*Solutions* facility in Clive, Utah. This facility is the largest commercial LLRW disposal facility in the United States, and it accepts waste for disposal from all regions in the United States (NRC, 2017b l LLRW disposal site locations). The Energy*Solutions* facility is licensed to receive byproduct material, Class A LLRW, mixed waste (combined radioactive and hazardous wastes), and naturally occurring radioactive material. The facility is accessible by both rail and highway and is located approximately 129 km [80 mi] west of Salt Lake City, Utah. Between 2005 and 2017, the amount of LLRW annually disposed at the Energy*Solutions* facility ranged from 30,119.0 m^3 [1,063,642 ft^3] to 142,007.0 m^3 [5,014,929 ft^3] (NRC, 2018 l LLRW disposal site statistics). An application for renewal of the LLRW disposal license is under review by the State of Utah.

ISP estimates that the hazardous wastes the proposed CISF project would generate would be less than 100 kg [220 lb] per month and, therefore, would qualify the proposed CISF project as a Conditionally Exempt Small Quantity Generator (CESQG) (ISP, 2020). WCS currently operates a hazardous waste treatment, processing, and disposal facility that is adjacent to the proposed CISF and permitted to treat, store, and dispose hazardous waste, and is authorized to store up to 1,758,476 m^3 [2,3100,000 yd^3] (TCEQ Permit, 2005). The applicant proposes to comply with all Federal and State requirements applicable to CESQGs (e.g., sampling, classification, inspection, records retention, notifications to applicable State and Federal agencies, annual reporting). Additional requirements, including a spill prevention, control, and countermeasures (SPCC) plan, would be applicable, based on the quantity of above-ground liquid fuel storage.

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4 ENVIRONMENTAL IMPACTS

4.1 Introduction

In this chapter of the environmental impact statement (EIS), the U.S. Nuclear Regulatory Commission (NRC) staff analyzes the potential environmental impacts associated with Interim Storage Partners' (ISP's) proposed construction, operation, and decommissioning of a Consolidated Interim Storage Facility (CISF) for spent nuclear fuel (SNF) at the Waste Control Specialists (WCS) site in Andrews County, Texas. As discussed in EIS Section 1.2, the proposed action (Phase 1) is the NRC's issuance, under the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 72, of a license authorizing ISP to construct and operate the initial phase of the proposed CISF. If granted as proposed, ISP would temporarily store up to 5,000 metric tons uranium (MTUs) of SNF for a licensing period of 40 years.

In its license application, ISP also has stated its future intent to construct seven additional expansion phases of the proposed CISF (Phases 2-8) during the 20 years following the anticipated licensing of the initial phase. The expansion phases would require a separate NRC licensing review and authorization. In this EIS, the NRC staff has, at its discretion, evaluated the potential impacts of the construction and operation of these expansion phases so as to provide a bounding evaluation of the proposed CISF temporarily storing up to 40,000 MTUs of SNF.

The construction stage of the proposed action (Phase 1) would include ISP's construction of the initial stage of the proposed CISF and the associated buildings and infrastructure, as well as a rail sidetrack. The operations stage of the proposed action would include operation of the proposed CISF (i.e., storage of the SNF in the CISF as ISP proposed) and also the defueling (i.e., removal of the stored fuel) (EIS Section 2.2.1.3.2) of the CISF with the transport of the SNF from the CISF to a permanent geologic repository.

Decommissioning of the proposed facility would occur following removal of the SNF and its shipment to the permanent geologic repository. The decommissioning discussion is based on the best currently available information. Because decommissioning is anticipated to take place well into the future, not all technological changes that could improve the decommissioning process can be predicted. As a result, the NRC requires that an applicant for decommissioning of a proposed independent spent fuel storage installation (ISFSI) submit, at least 12 months prior to the expiration of the NRC license, a Decommissioning Plan. The requirements for the Final Decommissioning Plan are delineated in 10 CFR 72.54(g)(1)–(6), 72.54(d), and 72.54(i). This plan would be subject to a future NRC staff review, including a National Environmental Policy Act of 1969, as amended, (NEPA) review.

The NRC staff also analyzes in this chapter the potential impacts of the No-Action alternative, wherein ISP would not be authorized to construct or operate a CISF at the WCS site. In the absence of a CISF, the NRC staff assumes that SNF would remain onsite in existing wet and dry storage facilities and be stored in accordance with NRC regulations and be subject to NRC oversight and inspection. Site-specific impacts at each of these storage sites would be expected to continue as detailed in generic (NRC, 2013, 2005a) or site-specific environmental analyses.

This chapter addresses the potential environmental impacts to the following resource areas: land use, transportation, geology and soils, water resources, ecology, noise, air quality, historic and cultural resources, visual and scenic resources, socioeconomics, environmental justice, public and occupational health, and waste management, as well as a discussion about accidents. The environmental impacts are based upon information provided in the applicant's Environmental Report (ER) (ISP, 2020), Safety Analysis Report (SAR) (ISP, 2018), and responses to NRC requests for additional information (RAIs) (ISP, 2019a) and supplemented by the best available information and established science the NRC staff identified.

The NRC staff uses the Council on Environmental Quality (CEQ) regulations-based standards of significance for assessing environmental impacts, as described in the NRC guidance in NUREG–1748 (NRC, 2003) and summarized as follows:

- SMALL: The environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource considered.

- MODERATE: The environmental effects are sufficient to alter noticeably but not destabilize important attributes of the resource considered.

- LARGE: The environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource considered.

4.2 Land Use Impacts

This section describes the potential environmental impacts on land use associated with the proposed action (Phase 1), full build-out (Phases 1-8), and the No-Action alternative. Impacts on land use result from commitment of the land for the proposed project and, therefore, its potential exclusion from other possible uses.

4.2.1 Impact from the Proposed CISF

As described in EIS Section 2.2.1, the proposed CISF would be located within the 5,666 hectares (ha) [14,000 (acres) ac] of the existing WCS property (hereafter referred to as the WCS site) in Andrews County, Texas, and would encompass an approximate 130-ha [320-ac] parcel of land (EIS Figure 3.1-1). In addition, construction of the rail sidetrack, site access road, and construction laydown area would contribute an additional area of disturbed soil such that the total disturbed area for construction of the proposed CISF would be approximately 133.4 ha [330 ac]. Although currently the parcel of land proposed for the CISF is unfenced and undeveloped land, it is within the WCS site and therefore unavailable for cattle grazing. Should ISP receive an NRC license to operate, the proposed CISF project area would be fenced and – like the other onsite WCS property – cattle grazing would be restricted (ISP, 2020).

Within the 5,666 ha [14,000 ac] WCS site, WCS operates low-level radioactive waste (LLRW) disposal facilities, which include a Federal waste facility, a compact waste facility, other disposal areas, stormwater retention and evaporation ponds, excavated material storage piles, multiple access and service roads, and buildings to support workers and operations (DOE, 2018). Because of current work contracts in place at the WCS facility that could last for the proposed CISF license term (WCS, 2019), the NRC staff concludes that these facilities and land uses would not be expected to change over the course of the proposed CISF license term.

The following sections discuss the potential environmental impacts on land use from construction, operation, and decommissioning stages of the proposed CISF.

4.2.1.1 Construction Impacts

Because the proposed CISF location is currently undeveloped, the primary land use impact would be land disturbance during construction (including site preparation). Construction activities would require conventional earthmoving and grading equipment to prepare and grade the land surface. For the proposed CISF project, approximately 133.4 ha [330 acres] (including the rail sidetrack, site access road, and construction laydown area) of land would be disturbed. Activities would include construction of the cask-handling building, security and administration building, and rail sidetrack. Outside of the fenced owner-controlled area (OCA) there would be 0.6 ha [1.5 acres] of land disturbance for the rail sidetrack along with 1.2 ha [3 ac] for construction of the 1.6 kilometers (km) [1 mile (mi)] site access road, and 1.6 ha [4 ac] for a construction laydown area south of the proposed CISF. Excavation for site grading would occur over the entire proposed project area as part of the proposed action (Phase 1) and the extent of the excavation would vary, with a maximum depth of approximately 2.1 meters (m) [7 feet (ft)] in some areas. Average excavation over the entire proposed project area would be approximately 0.9 m [3 ft], which results in a volume of approximately 496,961 m^3 [650,000 yds^3] of material. Excavation for all other features (e.g., rail sidetrack) would be approximately 38,228 m^3 [50,000 yd^3]. The total excavated material that would be stockpiled would be approximately 535,188 m^3 [700,000 yd^3] (ISP, 2020). Land used during construction for contractor parking and laydown areas would be restored (i.e., returned to its original state) after completion of the proposed action (Phase 1) or, if the NRC approves, the construction stage of Phase 8 (or earlier final expansion phase) (ISP, 2020). The area around the storage pads would be fenced to restrict access (hereafter referred to as the protected area). The approximate 130 ha [320 ac] of disturbed land from construction would be relatively small compared to available undisturbed land within the WCS-owned facility, 2.4 percent (ISP, 2020), leaving the remainder of the WCS property for other uses.

The applicant stated in ER Section 4.1 that to minimize construction impacts, best management practices would be implemented, such as minimizing the construction footprint to the extent possible, protecting undisturbed areas with silt fencing and straw bales as appropriate, and using site-stabilization practices (e.g., placing crushed stone on top of disturbed soil in areas of concentrated runoff). In addition, onsite construction roads would be periodically watered down, if required, to control fugitive dust emissions (ISP, 2020). The SNF storage area (i.e., storage pad) would be fenced to control access, as would the larger OCA.

Utilities required for the proposed CISF would include the installation of water, natural gas, and electrical utility lines and would be collocated with already disturbed land areas where possible. A new potable water supply line would be extended from the existing WCS potable water system. ISP states that any new water supply lines would be installed along existing roadways to minimize impacts to vegetation and wildlife (ISP, 2020). Additionally, electric service to the proposed CISF for the cask-handling building and the security and administration buildings would be supplied by overhead power lines from existing power lines northeast of the proposed CISF project area. A small transformer yard would be constructed and located within the proposed project area, and distribution to onsite facilities would be via buried electrical lines on existing onsite rights-of-way.

As described in EIS Section 3.2, existing land uses surrounding the proposed CISF project area (and the existing WCS site) include agriculture, cattle ranching, drilling for and production from oil and gas wells, quarrying operations, uranium enrichment, municipal waste disposal, and the surface recovery and land farming of oil field wastes (ISP, 2020). The WCS site in which the proposed CISF would be located is privately owned and operated and, as previously mentioned, cattle grazing is not permitted on the WCS site or within the CISF proposed project area. Additionally, there is no hunting or off-road vehicle use, because the land is privately owned with restricted access, and recreational activities are located outside of the land use study area (i.e., 8-km [5-mi] radius around the proposed CISF project area), as described in EIS Section 3.2.3. The proposed action is not expected to change existing land uses occurring outside the WCS site and proposed project area (e.g., cattle grazing would continue and not be impacted by construction and operation of the proposed CISF).

As discussed in EIS Section 3.2.4, the proposed project area is in a region of active oil and gas exploration and development. Because the oil and gas wells outside the proposed CISF project area are already constructed and operating and their owners would retain ownership or leasing rights to extract oil and gas, project construction activities would not disturb those oil and gas wells.

In the area surrounding the proposed CISF project, other land use activities (e.g., recreational activities, utilities), as described in EIS Sections 3.2.3 and 3.2.5, would not be affected by the construction of the proposed project. The NRC staff anticipates that the public would continue visiting public recreation locations, and utility and transportation projects would continue as scheduled.

In summary, the approximate 133.4 ha [330 ac] of land disturbance needed for full build-out (Phases 1-8) from construction would be relatively small (2.4 percent) compared to the 5,666 ha [14,000 ac] WCS site. For all phases, the applicant has committed to mitigation measures, such as stabilizing disturbed areas with natural landscaping and protecting undisturbed areas with silt fencing and straw bales to reduce the impacts of surface disturbance during construction. The ongoing prohibition on grazing within the fenced 130 ha [320 ac] OCA would have no impact on local livestock production, because there would continue to be abundant open land available for grazing outside of the WCS site. Likewise, because abundant open land would remain available around the outside of the WCS site, impacts to recreational activities would be minor. Current and future oil and gas development around the proposed project area would continue and fluctuate depending on the oil and gas demand. The use of mitigation measures, such as the limited construction footprint, site stabilization, wetting of roads, and use of existing rights-of-way to limit ground disturbance for water, electric, and natural gas lines, would reduce land disturbance. Therefore, the NRC staff concludes that the land use impacts during the construction stage for the proposed action (Phase 1) would be SMALL, and potential impacts for full build-out (Phases 1-8) would also be SMALL.

4.2.1.2 Operations Impacts

For the proposed action (Phase 1), there are no activities that would require additional ground disturbing activities during operations. Cattle grazing would continue to be prohibited within the WCS site, which includes the proposed CISF, and the protected area would continue to have restricted access. The primary changes to land use during the operations stage of the proposed action (Phase 1) would be land disturbance associated with construction of SNF storage pads and modules for subsequent phases (e.g., Phases 2-8), because the applicant intends to operate each phase concurrently with construction of new phases. To ensure that construction of additional SNF storage pads would not adversely impact operations, the applicant would maintain separation between operational and construction areas (ISP, 2020).

At full build-out (Phases 1-8), land use impacts from the operations stage of the proposed facility would be minimal because the proposed CISF is designed as a passive storage system that would not require any additional land use disturbance or restrictions. As with the proposed action (Phase 1), for Phases 2-8, cattle grazing would continue to be prohibited on the WCS site, and fencing would be in place (ISP, 2020). Because of the abundance of land for grazing surrounding the WCS site and because WCS privately owns the proposed CISF site, the impact on land use would not be significant; therefore, no additional land use impact would result from the operations stage of the proposed CISF beyond that for construction. Operation of the proposed CISF would not preclude access to rights-of-way for maintenance of existing infrastructure within the much larger WCS site (ISP, 2020). Because abundant land outside the WCS site would remain available for grazing and because land outside the 130-ha [320-ac] OCA would remain largely undeveloped, the NRC staff concludes that land use impacts associated with the operations stage for the proposed action (Phase 1) and for full build-out (Phases 1-8) of the proposed CISF project would be SMALL.

Defueling

Defueling the CISF would involve removal of SNF from the proposed CISF and transport of the fuel to a permanent geologic repository (EIS Section 2.2.1.3.2). Because ISP expects to use similar equipment to remove the SNF canisters from the storage facility to that used for emplacement, and no new construction is anticipated, defueling would have land use impacts similar to the earlier activities of the operations stage. For example, the previously constructed rail sidetrack would be utilized and maintained, but no additional land use impacts would be anticipated. Therefore, the NRC staff concludes that the land use impacts from defueling for the proposed action (Phase 1) and full build-out (Phases 1-8) of the proposed CISF during operations would be SMALL.

4.2.1.3 Decommissioning Impacts

At the end of the license term of the proposed CISF project, once the SNF inventory is removed, the facility would be decommissioned such that the proposed project area and remaining facilities could be released from the license and the license terminated. Decommissioning activities, in accordance with 10 CFR Part 72 and Part 20 requirements, would include conducting radiological surveys and decontaminating, if necessary. Decommissioning activities for the proposed action (Phase 1) and for Phases 2-8 would involve the same activities, but the activities would be scaled to address the overall size of the proposed CISF (i.e., the number of phases completed).

At the end of decommissioning, ISP (in coordination with WCS) may choose to either remove all the horizontal storage modules, the storage pads, and, at the discretion of ISP, the cask-handling and administration buildings and associated infrastructure or leave the facilities and infrastructure in place. The ISP lease of the proposed CISF project area from WCS would cease and control of the land would return to WCS (EIS Section 2.2.1.1 and 2.2.1.6 contain additional information on the land lease and decommissioning). Because the land use impacts for decommissioning do not exceed those for construction or operation of the proposed CISF, and the land is privately owned, the NRC staff concludes that the land use impact associated with the decommissioning stage for the proposed action (Phase 1) and for full build-out (Phases 1-8)of the proposed CISF project would be SMALL.

4.2.2 No-Action Alternative

Under the No-Action alternative, the NRC would not license the proposed CISF project. Therefore, impacts such as land disturbance and additional access restrictions on current land use would not occur. Construction impacts would be avoided, because SNF storage pads, buildings, and transportation infrastructure would not be built. Operational impacts would also be avoided, because no SNF canisters would arrive for storage. Impacts to land use from decommissioning activities would not occur, because unbuilt SNF storage pads, buildings, and transportation infrastructure require no decontamination. The land uses around the WCS site, including grazing and natural resource extraction, would remain unchanged under the No-Action alternative. No concrete storage pad or infrastructure (e.g., rail sidetrack or cask-handling building) for transporting and transferring SNF to the proposed CISF would be constructed. SNF destined for the proposed CISF would not be transferred from commercial reactor sites (in either dry or wet storage) to this proposed facility. In the absence of a CISF, the NRC staff assumes that SNF would remain onsite in existing wet and dry storage facilities and be stored in accordance with NRC regulations and be subject to NRC oversight and inspection. Site-specific impacts at each of these storage sites would be expected to continue as detailed in generic (NRC, 2013, 2005a) or site-specific environmental analyses. In accordance with current U.S. policy, the NRC staff also assumes that the SNF would be transported to a permanent geologic repository, when such a facility becomes available.

4.3 Transportation Impacts

The potential transportation impacts during the construction, operations, and decommissioning stages of the proposed action (Phase 1), full build-out (Phases 1-8), and the No-Action alternative of the CISF project are detailed in the following sections.

4.3.1 Impact from the Proposed CISF

As discussed throughout this section, potential transportation impacts may occur during all life cycle stages of the proposed CISF. Impacts such as increases in traffic, potential changes to traffic safety, and increased degradation of roads would result from the proposed use of roads for shipping equipment, supplies, and produced wastes, as well as from commuting workers during the lifecycle of the proposed CISF. Other impacts, including radiological and nonradiological health and safety impacts under normal and accident conditions, could result from the proposed use of national rail lines to transport shipments of SNF to and from the proposed CISF. These shipments could include relatively short segments of barge or heavy-haul truck transportation as needed to move the SNF from generator sites (or ISFSIs) (EIS Sections 2.2.1.2 and 2.2.1.3.2) to the nearest rail line when onsite rail access is limited. The following sections describe the potential transportation impacts during the construction, operations, and decommissioning stages of the proposed action (Phase 1), Phases 2-8, and the No-Action alternative.

4.3.1.1 Construction Impacts

During the construction stage of the proposed CISF, ISP would use trucks to transport construction supplies and equipment (e.g., concrete and conventional earthmoving and grading equipment) to the proposed project area. The regional and local transportation infrastructure that would serve the proposed CISF is described in EIS Section 3.3. Access to the proposed CISF from nearby communities would be from State Route 18, which connects the cities of Hobbs and Eunice, New Mexico, and Texas State Route 176, which travels past the proposed project area between the cities of Eunice, New Mexico, and Andrews, Texas. ISP proposes no new access road on Texas State Highway 176 to provide access to the proposed CISF. An existing roadway on the WCS property would be extended north to the proposed CISF.

The NRC staff's construction traffic impact analysis considered the volume of estimated construction traffic from supply shipments and workers commuting and determined the estimated increase in the applicable annual average daily traffic counts on the roads used to access the proposed project area. ISP estimated the number of supply shipments during construction of Phase 1 (the proposed action) would be 50 round trips per day, so the NRC staff estimated the increase in traffic from these shipments would be 100 truck trips considering travel in each direction to and from the proposed CISF project area. These shipments would occur as needed to support construction during the proposed 2.5 year period for the construction of Phase 1. The volume of daily truck traffic generated by this amount of shipping would increase the existing traffic on Texas State Route 176 (EIS Section 3.3) of 2,624 vehicles per day by approximately 4 percent and increase the truck traffic by approximately 7 percent. Further from the proposed project area on higher capacity roads such as State Route 18 or U.S. Highway 385, the proposed CISF shipments would be more dispersed along different routes and also represent a smaller percentage of existing traffic (EIS Section 3.3) than the 4 percent vehicle (7 percent truck) increase associated with Texas State Route 176 and would therefore be even less noticeable on these other roads. Therefore, the supply shipments for construction of Phase 1 (the proposed action) would have a minor impact on daily traffic on Texas State Route 176 near the proposed CISF and on other regional roads used to access the proposed project area. These minor increases in truck traffic on local and regional roads would result in minor increases in traffic hazards and road degradation relative to existing conditions. For the construction stages of Phase 2-8, the approximate volume of construction supplies and wastes would be less than that required for construction of the proposed action (Phase 1) because the proposed facilities and infrastructure (e.g., the buildings and rail sidetrack) would already be built. The NRC staff concludes that this increase in traffic would be less than for Phase 1 construction and therefore result in a minor impact to existing traffic conditions during the construction stages of Phases 2-8.

In addition to construction supply shipments, during construction of Phase 1 (the proposed action), an estimated peak construction work force of 50 workers would commute to and from the proposed CISF project area using individual passenger vehicles and light trucks on a daily basis (ISP, 2020). ISP expects that the construction workforce would vary over time and would range from 20 to 50 workers for 3 to 6 months at a time over the 30-month duration of construction (ISP, 2020). Based on the proposed phased approach to construct the full build-out (Phases 1-8) CISF (i.e., constructing sequential phases over time), this intermittent construction worker commuting volume would occur for at least a period of 20 years. During peak construction activities, these workers could account for an increase of 100 vehicles per day (50 vehicles each way) on Texas State Route 176 and nearby connecting roads during construction of any single phase. This increase amounts to an approximate 4 percent increase in average daily vehicle traffic on Texas State Route 176 and nearby connecting roads resulting from the proposed CISF construction. Based on this analysis, workforce commuting during the construction stage of the proposed action (Phase 1) would have a minor impact on the daily Texas State Route 176 traffic near the proposed CISF project area. Further from the proposed project area on higher capacity roads, such as State Route 18 or U.S. Highway 385, the proposed action (Phase 1) workforce commuting would be more dispersed along different routes and also represent a smaller percentage of existing traffic (draft EIS Section 3.3) than the 4 percent increase in vehicle traffic (7 percent increase in truck traffic) associated with Texas State Route 176 and would therefore be even less noticeable on these other roads. These minor increases in car and truck traffic on local and regional roads would result in minor increases in traffic hazards and road degradation relative to existing conditions. For the construction stage of Phases 2-8, facilities and infrastructure (e.g., the buildings and rail sidetrack) would already be constructed, so the same or a smaller construction worker commuting volume would occur as described previously for the construction phase of the proposed action (Phase 1) and would contribute the same or smaller transportation impacts.

Considering the combination of both the transportation impacts from the preceding analysis of construction supply shipments and workers commuting, including an overall change in existing vehicle traffic on local roads from both construction equipment and supply shipments and work force commuting of 8 percent, the NRC staff concludes that the transportation impacts from the construction stage of the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

4.3.1.2 Operations Impacts

Similar to the construction stage, during operation of the proposed CISF, ISP would continue to use roadways for supply and waste shipments in addition to workforce commuting. Additionally, ISP proposes using the national rail network for transportation of SNF from generator sites to the proposed CISF and eventually from the CISF to a geologic repository, when one becomes available. The regional and local transportation infrastructure that would serve the proposed CISF is described in EIS Section 3.3. The operations impacts the NRC staff evaluated include traffic impacts from shipping equipment, supplies, and produced wastes, and from workers commuting while the proposed CISF would be operating. Other impacts evaluated included the radiological and nonradiological health and safety impacts to workers and the public under normal and accident conditions from the proposed national rail transportation of SNF to and from the proposed CISF.

4.3.1.2.1 Transportation Impacts from Supply Shipments and Commuting Workers

The NRC staff’s traffic impact analysis for the operations stage of the proposed CISF considered the volume of estimated operations traffic from supply shipments, waste shipments, and workers commuting (EIS Table 2.2-5), then determined the estimated increase in the applicable annual average daily traffic counts on the roads used to access the proposed project area. ISP estimated that CISF operations truck shipments would not increase from the existing WCS facility shipping rate of 6 round trips per day (ISP, 2020). The NRC staff estimated the number of waste shipments from ISP’s estimated mass of operational waste, which resulted in approximately 1 round trip truck shipment every 10 days (EIS Section 2.2.1.5). Additionally, the proposed transfer and storage operations are not resource consumptive by nature, which is consistent with the overall low number of operational shipments ISP estimated (ISP, 2020). Based on this information, the NRC staff concludes that the traffic impacts of supply and waste shipments during the operations stage of the proposed action (Phase 1) and of Phases 2-8 would not noticeably contribute to traffic impacts.

ISP estimated that the operations workforce would include 45 to 60 regular employees (ISP, 2020). This workforce would commute to and from the proposed CISF project area using individual passenger vehicles and light trucks on a daily basis (ISP, 2020). These workers could account for an increase of 120 vehicles per day (60 vehicles each way) on Texas State Route 176 and nearby connecting roads during the operations stage of the proposed action (Phase 1). This would increase the existing daily traffic on Texas State Route 176 (EIS Section 3.3) of 2,624 vehicles per day by approximately 4 percent over the proposed CISF Phase 1 operation. Based on this analysis, the commuting workforce during the operations stage of the proposed action (Phase 1) would have a minor impact on the daily traffic near the proposed CISF project area. Further from the proposed project area on higher capacity roads such as State Route 18 or U.S. Highway 385, the proposed action (Phase 1) operations workforce commuting would be more dispersed along different routes and also represent a smaller percentage of existing traffic (EIS Section 3.3) than the 4 percent increase to the Texas State Route 176 traffic and would therefore be even less noticeable. These minor increases in car traffic on local and regional roads would result in minor increases in traffic hazards and road degradation relative to existing conditions.

During the operations stage of Phases 2-7, construction of subsequent phases would occur concurrently with operations; therefore, up to an additional 50 construction workers would be commuting during the same time period (100 trips in each direction) along with 50 construction supply shipments (100 trips in each direction). Therefore, the total workforce commuting during operations (combined with construction of next phases) could add 320 vehicles per day (160 vehicles each way) to the existing Texas State Route 176 traffic during operations. This would increase the existing daily traffic on Texas State Route 176 (EIS Section 3.3) of 2,624 vehicles per day by approximately 12 percent during the operation of each phase of Phases 2-7. Considering the proposed phased approach to construction and operation of project phases, construction worker commuting occurring concurrently with operations would occur for at least a period of 18 years after Phase 1 construction has been completed. Because Phase 8 is the last planned phase, no concurrent construction and operation would take place, and the commuting workforce and supply shipment impact on traffic would be reduced and is bounded by the impact from Phases 2-7. Based on this analysis, the NRC staff concludes that the proposed traffic from CISF operations during Phases 2-8 would have a minor impact on daily traffic on Texas State Route 176 near the proposed CISF project area. The NRC staff considers the impact minor because a 12 percent change in traffic is unlikely to be noticed by most drivers. Further from the proposed project area on higher capacity roads such as State Route 18 or U.S. Highway 385, the proposed action (Phase 1) workforce commuting would be more dispersed along different routes and also represent a smaller percentage of existing traffic (EIS Section 3.3) and would therefore be even less noticeable. These minor increases in car traffic on local and regional roads would result in minor increases in traffic hazards and road degradation relative to existing conditions.

Considering the combination of both the transportation impacts from the preceding analysis of operations supply shipments and commuting workers, including an overall change in existing vehicle traffic on local roads of 4 percent (proposed action Phase 1) and 12 percent for combined construction equipment and supply shipments and workforce commuting (Phases 2-8), the NRC staff concludes that the transportation impacts from the operations stage of the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

4.3.1.2.2 Transportation Impacts from Nationwide SNF Shipments to the CISF

During operation of any project phase (Phase 1 or Phases 2-8), SNF would be shipped from existing storage sites at nuclear power plants or ISFSIs to the proposed CISF. These shipments must comply with applicable NRC and U.S. Department of Transportation (DOT) regulations for the transportation of radioactive materials in 10 CFR Parts 71 and 73 and 49 CFR Parts 107, 171–180, 390–397, as appropriate to the mode of transport. These regulations comprehensively address several aspects of transportation safety, including testing and approval of packaging, proper placarding and labeling of packages and shipments, limiting the dose rate from packages and conveyances, approved routing for shipments of SNF, safeguards, and incident reporting.

The radiological impacts on the public and workers of SNF shipments from a reactor have been previously evaluated in several NRC assessments and found to be negligible (NRC, 2014a, 2001, 1977). Because operation of the proposed CISF would involve shipping SNF from reactors across the U.S. and eventually to a permanent geologic repository after temporary storage at the CISF, the radiological and nonradiological health impacts to workers and the public from this project-specific transportation, considering both incident-free and accident conditions, are evaluated in greater detail in this section.

The following analysis of SNF transportation impacts focuses on the proposed use of rail transportation. The higher capacity SNF canisters and casks that are expected to be used in a cross-country transportation campaign exceed the limits of legal truck weights. Heavy-haul trucks that are capable of hauling higher-capacity SNF casks are oversized vehicles that are less practical for long-distance cross-country transportation as demonstrated by challenges that have been documented traveling short distances (DOE, 2014). The NRC staff is aware that some existing reactors lack direct rail access and would need to use supplemental transportation involving heavy-haul truck or barge (for those with water access) from the reactor site to the nearest rail access. The impacts of using these other modes to supplement rail transportation of SNF was previously evaluated by the U.S. Department of Energy (DOE) (DOE, 2008, 2002) and found to not significantly change the minor radiological impacts from a national mostly rail SNF transportation campaign and therefore are not evaluated further in this EIS. This DOE analysis evaluated the differences in estimated impacts of using barge to transport SNF from 17 of 24 reactor sites (that did not have direct rail access but were located along waterways) to the nearest barge dock with rail access. The estimated incident-free radiological and nonradiological impacts for national SNF transportation under the mostly rail with barge transportation scenario were the same or less than the minor impacts DOE estimated for the mostly rail scenario (for example, 1.7 latent cancer fatalities for involved workers; 0.7 latent cancer fatalities for the public). DOE also found minor radiological and nonradiological accident impacts that were the same or not notably different between the mostly rail and mostly rail with barge transportation scenarios.

Some reactor sites, in particular, those that have been shut down or decommissioned but continue to store SNF in dry storage casks, may require local transportation infrastructure upgrades to remove the SNF from the site (DOE, 2014). These upgrades, for example, could include installing or upgrading rail track, roads, or barge slips necessary to transfer SNF offsite. Because these infrastructure upgrades would be needed – regardless of whether the proposed CISF project is approved – to allow shipment of SNF from reactor sites to a repository in accordance with the Nuclear Waste Policy Act of 1982 (NWPA), these enhancements are beyond the scope of the proposed action and are therefore not evaluated further. Additionally, because these infrastructure improvements are expected to be small construction projects limited to preexisting, previously disturbed, and previously evaluated reactor sites that are dispersed throughout the U.S., the environmental impacts are expected to be minor and are not evaluated further for cumulative impacts in Chapter 5 of this EIS.

4.3.1.2.2.1 Radiological Impacts to Workers from Incident-Free Transportation of SNF

The potential radiological health impacts to workers from incident-free transportation of SNF to and from the proposed CISF would occur from exposures to the radiation emitted from the loaded transportation casks that would be maintained at or below specified regulatory limits. The highest occupational exposures would occur to workers who spend the most time within close proximity to loaded SNF transportation casks. This includes the transportation crew, escorts, inspectors, and possibly rail yard workers.

In response to NRC staff requests for additional information, ISP calculated incident-free radiological impacts to workers involved in transportation of SNF using the RADTRAN 6 transportation risk-assessment code (ISP, 2019b; Weiner et al., 2014). ISP applied a unit risk factor approach to conducting calculations that involved executing the code for a single shipment for a unit distance through a unit population density and multiplying the results by the applicable shipment distance and population densities for specific routes that were evaluated using the WebTRAGIS code (Johnson and Michelhaugh, 2003). ISP evaluated SNF shipments to the proposed CISF from decommissioned reactors, as shown in EIS Table 3.3-1, including from a reactor located in Maine (Maine Yankee), which is the longest distance from a reactor to the proposed CISF and is therefore bounding in the incident-free occupational radiation collective dose calculations. ISP also evaluated doses and risks from shipments from the CISF to the proposed repository at Yucca Mountain, Nevada. Collective occupational doses were calculated for the train crew, rail yard workers, handlers, escorts, inspectors, and first responders. The resulting incident-free occupational doses for the route from Maine Yankee to the proposed CISF are summarized in EIS Table 4.3-1. In tabulating the ISP results, the NRC staff multiplied ISP's results for a single SNF shipment from Maine Yankee to the CISF by the proposed number of canisters shipped per phase (3,400 canisters / 8 phases = 425) to assess the impacts of Phase 1. The NRC staff did not include the handler and first responder doses in EIS Table 4.3-1 because (i) accident impacts are considered separately in the following paragraphs and (ii) loading and unloading of the majority of SNF packages that would not involve intermodal transfer of casks (e.g., from truck to rail) would be performed at the origin and destination locations, and these exposures are addressed in EIS Section 4.13.

If DOE transports the SNF, occupational exposures would be controlled by administrative provisions to an annual dose of 5 mSv [500 mrem] (DOE, 2008), which is a fraction of the 10 CFR Part 20 annual occupational dose limit of 0.05 Sv [5 rem]. If an NRC licensee ships the SNF (i.e., a private company), then the occupational doses to workers would be required to be limited to the 10 CFR Part 20 standard of 0.05 Sv [5 rem].

In response to the NRC staff RAIs, ISP provided more detailed proprietary documentation of their transportation dose and risk calculations that the NRC staff reviewed. The NRC review found that the methods ISP used to calculate SNF transportation impacts followed an approach similar to that used in NUREG–2125 (NRC, 2014a). Both the NRC transportation risk assessment calculations in NUREG–2125 and the ISP calculations used the RADTRAN 6.0 risk assessment code (Weiner et al., 2014) and the WebTRAGIS routing code (Johnson and Michelhaugh, 2003). RADTRAN transportation risk calculations (supported by WebTRAGIS routing data) are acceptable for use in the current impact analysis because the models were developed for the purpose of assessing risks to workers and the public from the transportation of SNF to support impact analyses under NEPA, and the codes are established tools for conducting such calculations (and have been for several decades).

Table 4.3-1 ISP Estimates of Single-Shipment Incident-Free Occupational Collective Doses for the Bounding Maine Yankee Route Scaled by Total Shipments per Phase to Estimate the Impacts for Any Individual Phase

Occupational Receptor	Calculated Collective Dose (Person-Sv)*
Train Crew	1.74×10^{-2}
Rail Yard Workers	8.04×10^{-2}
Escorts	1.03×10^{-2}
Inspectors	4.06×10^{-1}
Total	5.14×10^{-1}

*Values from the source were multiplied by 425 canister shipments per phase. Multiply person-Sv by 100 to convert to person-rem. Tabulated results are applicable to Phase 1 and any other individual phase based on equal allocation of ISP's proposed total number of shipments (approximately 3,400) by 8 phases.
Source: (ISP, 2019b)

The NRC staff evaluated the ISP input parameter selections and found them to be adequate for the incident-free SNF transportation calculations included in the impact analysis. Most of the input parameters were based on values used in the NUREG–2125 (NRC, 2014a) national SNF transportation risk assessment or the SAR for the NUHOMS MP-197 transportation package that is referenced in the NRC certificate of compliance for that package (NRC, 2014b). NUREG–2125 is the most recent NRC-sponsored SNF transportation risk assessment. NUREG–2125 addresses cross-country transportation of SNF, which is comparable to the proposed CISF SNF transportation. The NUHOMS MP-197 is one of many potential casks that could be used to transport SNF to the CISF and the information in the referenced SAR was previously reviewed and approved by NRC staff (NRC, 2014c). The current NRC staff review of the CISF proposal found the input parameters derived from the NUHOMS MP-197 were not bounding for all packages that might be used (e.g., gamma fraction of 0.41) but were within a reasonable range. It is noteworthy that ISP selected a value for the hourly dose rate at 1 m [3.3 ft] from the package surface, an important input parameter for all incident-free dose calculations, at 0.14 mSv [14 mrem] (ISP, 2020), which was derived from the maximum hourly rate allowed by regulation at 2 m [6.6 ft] from the package surface of 0.10 mSv [10 mrem] (10 CFR 71.47(b)) and therefore bounding in these calculations. As part of this review, the NRC staff conducted independent confirmatory calculations as additional confirmation of the technical adequacy of the calculations and results. These calculations are described in more detail in the following paragraphs.

The NRC staff estimated the potential radiological impacts to workers from the proposed transportation of SNF from generator sites to the proposed CISF based on prior NRC transportation risk estimates in NUREG–2125, Spent Fuel Transportation Risk Assessment (NRC, 2014a). In the NUREG–2125 analysis, the NRC staff executed the RADTRAN 6 transportation risk assessment code (Weiner et al., 2014) to calculate worker and public doses and risks from the transportation of SNF along various representative national routes under incident-free and accident conditions. In that analysis, the NRC staff calculated occupational doses for groups of workers, including rail crew, escorts in transit, and railyard workers, as well as crew and escorts at stops. Because the resulting dose estimates were presented for single shipments and for each kilometer traveled and for each hour of transportation, the NRC staff scaled the results by these variables (e.g., number of shipments, distance, and time) to generate estimates that were applicable to the proposed CISF project (SwRI, 2019). The NRC staff selected a representative route that was bounding for the proposed shipments of SNF to the proposed CISF and scaled the calculated doses to match the number of proposed shipments and, as applicable, the shipment distance and time.

The representative route selected from NUREG–2125 for the NRC staff's CISF analysis was rail transport from the Maine Yankee nuclear power plant to the town of Deaf Smith, Texas. The reported distance for this shipment was 3,362 km [2,089 mi] (NRC, 2014a). This route was selected as bounding because most of the potential origins (U.S. nuclear power plants) for shipments destined for the proposed CISF are located east of the proposed CISF and the distance of the selected representative route is longer than the actual distances that would be traveled from most U.S. nuclear power plants to the proposed CISF. Furthermore, (for the public dose calculations described in the following section) the transportation characteristics along the route from Maine to Texas would be diverse and include several rural small towns as well as suburban and urban areas that would have dose- and risk-related conditions that are representative of conditions on railways that could be potentially used for the proposed project. Railways across the nation also share consistent characteristics, including minimum rail setbacks from public buildings and other publicly accessible areas. Because dose estimates increase with shipment distance, selecting a route with a larger distance than that actually expected is bounding. Additionally, NUREG–2125 included separate dose calculations for two types of NRC-certified rail casks (characterized as rail-lead and rail-steel). For the proposed CISF incident-free dose analyses, the NRC staff selected dose results for the rail-lead cask because the external dose rate was set at the regulatory maximum and was therefore a bounding, incident-free dose rate for any NRC-certified transportation cask that might be used for future shipments of SNF of various specifications (including, for example, high-burnup fuel).

To estimate the potential radiological impacts to workers from the proposed transportation of SNF from generator sites to the proposed CISF, the NRC staff scaled single-shipment dose estimates [for the in-transit train crew and escorts and the railyard workers and inspectors at stops based on dose results in NUREG–2125 (NRC, 2014a)] by the number of shipments. The NRC staff scaled reported rail crew and escort in-transit doses by the distance traveled and shipment duration, respectively, to derive the single-shipment in-transit dose estimates for these groups of workers. The NRC staff calculated the shipment duration by dividing the reported distances traveled on the representative route in rural, suburban, and urban population zones by the applicable train speeds in those zones. The single-shipment railyard worker dose estimates were the sum of the origin and destination rail classification stop doses in NUREG–2125. The single-shipment dose-to-rail inspectors at stops was estimated by scaling the one-hour SNF truck inspection dose in NUREG–2125 by the duration and number of in-transit rail inspections per shipment that were described in NUREG–2125 (i.e., three 4-hour inspections). This approach was considered adequate by the NRC staff because in both inspections (truck and rail) the inspector works within close proximity to the shielded SNF cask and is exposed to direct radiation for the duration of the inspection.

All single-shipment doses were summed and then scaled by the number of shipments for the proposed action (Phase 1) and full build-out (Phases 1-8) to calculate incident-free occupational population doses that were converted to health effects by applying a current cancer risk coefficient assuming a linear, no-threshold dose response. A linear, no-threshold dose response assumes, for radiation protection purposes, that any increase in dose, however small, results in an incremental increase in health risk. The cancer risk coefficient is 5.7×10^{-2} health effects per person-Sv [5.7×10^{-4} per person-rem] (ICRP, 2007), where the health effects include fatal cancers, nonfatal cancers, and severe hereditary effects. The NRC staff's calculated incident-free dose and health effects risk results for the proposed CISF SNF transportation are provided in EIS Table 4.3-2. An estimate of the expected nonproject baseline cancer that would occur in a population of comparable size to the exposed population (that does not include the estimated health effects from the proposed transportation) is also provided in EIS Table 4.3-2 for comparison. Both the National Council on Radiation Protection and Measurements (NCRP) and the International Commission on Radiological Protection (ICRP) suggest that when the collective (population) dose is less than the reciprocal of the risk coefficient (i.e., less than $1/5.7 \times 10^{-2}$ health effects per person-Sv or 17.54 person-Sv) the assessment should find that the most likely number of excess health effects is zero.

Based on this consideration, the occupational health effects estimates for the proposed action (Phase 1) of the proposed CISF project and for full build-out (Phases 1-8) are most likely zero. By comparison, the estimated baseline cancer within the same population was 250 for the proposed action (Phase 1) and full build-out (Phases 1-8). This result suggests that among the 748 workers included in the analysis, 250 workers would be expected to get cancer from natural or other nonproject related causes, and most likely no workers would be expected to get cancer or hereditary health effects from project-related, incident-free transportation radiation doses under the proposed action (Phase 1) or full build-out (Phases 1-8).

The NRC staff also compared the estimated incident-free occupational collective doses with the expected background radiation doses for the same population over the proposed duration of the SNF shipments. These background collective doses were calculated by taking the product of the national annual average background radiation dose of 3.1 mSv [310 mrem] (EIS Section 3.12.1.1), the proposed duration of the SNF transportation of 2.5 years for the proposed action (Phase 1) and 20 years for full build-out (Phases 1-8), and the number of individuals in the exposed population of 748 workers. The resulting background collective doses were 5.8 person-Sv [580 person-rem] for the proposed action (Phase 1) and 46 person-Sv [4,600 person-rem] for full build-out (Phases 1-8). In comparing the estimated project collective doses with the comparable background collective doses, the estimated occupational incident-free collective doses for the proposed action (Phase 1) SNF shipments of 1.1 person-Sv [110 person-rem] and full build-out (Phases 1-8) of 8.6 person-Sv [860 person-rem] are small fractions of the comparable background collective doses for the same population.

The NRC-estimated occupational collective dose for the proposed action (Phase 1) of 1.1 person-Sv [110 person-rem] is approximately double the 0.514 person-Sv [51.4 person-rem] occupational dose ISP calculated (EIS Table 4.3-1). This difference in results is attributable to a difference in the number of in-transit inspections assumed in each calculation. Both sets of results are minor when considered in the context of the low health effects estimates for the larger NRC result for the proposed action (Phase 1) and full build-out (Phases 1-8).

Considering the low calculated doses, estimated relative health effects, the comparison with comparable collective background doses, and radiation dose limits, the radiological impact to workers from incident-free transportation of SNF to and from the proposed CISF project during the operations stage of the proposed action (Phase 1) and the operations stages of all phases to full build-out (Phases 1-8) would be minor. This conclusion applies regardless of which radiation dose limits are applied (e.g., the DOE administrative limit or the NRC standard).

Table 4.3-2	Comparison of NRC Staff's Estimated Population Doses and Health Effects from Proposed Transportation* of SNF to the Proposed CISF Along a Representative Route with Nonproject Baseline Cancer					
	Incident-Free			**Accident**		
Exposed Population	**Collective Dose (person-Sv)**	**Health Effects†**	**Nonproject Baseline Cancer‡**	**Collective Dose (person-Sv)**	**Health Effects†**	**Nonproject Baseline Cancer‡**
Occupational						
Phase1	1.1	0.061	250	Emergency Responder (consequence) 0.92 mSv [92 mrem]		
All Phases	8.6	0.49	250			
Public						
Phase 1	0.15	0.0088	440,000	0.028	0.0016	440,000
All Phases	1.2	0.071	440,000	0.22	0.013	440,000

*425 shipments of SNF (Phase 1) occurring over an approximated 2.5 year operational period; approximately 3,400 shipments of SNF (All Phases) occurring over an approximated 20 years of operational periods within a 40 year license term.
[1]Health effects includes fatal cancer, nonfatal cancer, and severe hereditary effects. Estimated by multiplying the collective dose by the health risk coefficient of 5.7×10^{-2} health effects per person-Sv.
[2]Nonproject baseline cancer is estimated by multiplying the exposed population by the U.S. risk of getting a cancer (1/3) (EIS Section 3.12.3). Estimated occupational population (748 total) includes 3 crew and 1 escort on each of 12 trains (48 total), and 2 rail yard workers at each of 2 classification stops per shipment at 100 different rail yards (400 total) to account for dispersed actual routes, and 1 inspector at 3 stops per shipment at 100 different rail yards (300 total). Public population is based on NUREG-2125 reported population along representative route of 1,321,024.
To convert Person-Sv to Person-Rem, multiply by 100

4.3.1.2.2.2 Radiological Impacts to Members of the Public from Incident-Free Transportation of SNF

The potential radiological health impacts to the public from incident-free transportation of SNF to and from the proposed CISF would occur from exposures to the radiation emitted (during transportation) from the loaded transportation casks that would be maintained at or below specified regulatory limits. Because the applicable gamma and neutron radiation fields associated with a loaded SNF transportation cask naturally decrease with distance from the source, past analyses of the doses members of the public received from transportation of SNF indicate low doses that are well below regulatory limits and are a small fraction of the annual dose attributable to naturally occurring background radiation (NRC, 2014a, 2001; DOE, 2008). The highest accumulated exposures over time to this low level of radiation to members of the public would occur to those individuals who spend the most time within close proximity to the rail lines used for SNF transportation. This includes individuals who may live or work adjacent to rail lines used for SNF transportation.

In response to NRC staff RAIs, ISP calculated incident-free radiological impacts to the public from the proposed transportation of SNF using the RADTRAN 6 transportation risk assessment code (ISP, 2019b; Weiner et al., 2014). ISP applied a unit risk factor approach in conducting these calculations (EIS Section 4.3.1.2.2.1). Collective public doses were calculated by ISP for members of the public within 800 m [875 yd] of either side of the SNF transportation cask shipped by rail. Because radiation decreases with distance from the SNF cask, the 800 m [875 yd] distance perpendicular from the track is a conservative distance for defining the population exposed to radiation from the passing shipment because it is sufficient to include a broad range of doses within this population from highest to very low levels (Weiner et al., 2014). The resulting annual incident-free collective public dose for shipping 200 SNF casks under the proposed action (Phase 1) along the Maine Yankee to proposed CISF route was 0.0873 person-Sv [8.73 person-rem]. The NRC staff converted this result to 0.186 person-Sv

[18.6 person-rem] by multiplying the result by 2.125 (the ratio of 425 shipments to 200 shipments) to address the full 425 shipments for the proposed action (Phase 1). ISP provided more detailed proprietary documentation of their transportation dose and risk calculations that was the NRC staff reviewed. The NRC review found that the methods ISP used to calculate the incident-free SNF transportation impacts to the public were acceptable, as described previously for the ISP transportation worker dose calculations (EIS Section 4.3.1.2.2.1). As part of this review, the NRC staff conducted independent confirmatory calculations as an additional check of the technical adequacy of the calculations and results. The NRC calculation results are described in the following paragraphs.

The NRC staff evaluated the potential radiological impacts to the public from the proposed incident-free transportation of SNF from generator sites to the proposed CISF based on an approach similar to the approach NRC staff applied in the preceding analysis of the occupational radiological impacts (EIS Section 4.3.1.2.2.1). This approach involved scaling prior NRC transportation risk estimates in NUREG–2125 (NRC, 2014a) by the number of proposed shipments, converting collective doses to health effects, and interpreting health effects results using ICRP guidance (SwRI, 2019). NUREG–2125 includes calculations of in-transit, incident-free public doses to residents along the route, to occupants of vehicles sharing the route, and to residents near SNF transportation stops. The resulting incident-free doses and health effects for the proposed CISF SNF transportation are provided in EIS Table 4.3-2.

All of the estimated public cancer and hereditary health effects from the proposed incident-free SNF transportation during the operations stage of the proposed action (Phase 1) and all of the operations stages to full build-out (Phases 1-8) are below the aforementioned ICRP threshold (i.e., less than $1/5.7 \times 10^{-2}$ health effects per person-Sv or 17.54 person-Sv) (ICRP, 2007) and therefore are most likely to be zero. By comparison, the estimated nonproject baseline cancer within the same population of 1,321,024 was 440,000. This result suggests that among the 1,321,024 members of the public included in the analysis, 440,000 people would be expected to get cancer from natural or other nonproject related causes, and most likely no members of the public would be expected to get cancer or hereditary health effects from project-related, incident-free transportation radiation doses.

The NRC staff also compared the estimated incident-free public collective doses with the expected background radiation doses for the same population over the proposed duration of the SNF shipments. These background collective doses were calculated by taking the product of the national annual average background radiation dose of 3.1 mSv [310 mrem] (EIS Section 3.12.1.1), the proposed duration of the SNF transportation of 2.5 years for the proposed action (Phase 1) and 20 years for full build-out (Phases 1-8), and the number of individuals in the exposed population of 1,321,024. The resulting background collective doses were 1.02×10^4 person-Sv [1.02×10^6 person-rem] for the proposed action (Phase 1) and 8.2×10^4 person-Sv [8.2×10^6 person-rem] for full build-out (Phases 1-8). In comparing the estimated project collective doses with the comparable background collective doses, the estimated public incident-free collective doses for the proposed action (Phase 1) SNF shipments of 0.15 person-Sv [15 person-rem] and full build-out (Phases 1-8) of 1.2 person-Sv [120 person-rem] are small fractions of the comparable background collective doses for the same population.

The NRC staff also evaluated the radiological impact of the proposed SNF transportation on a maximally exposed individual member of the public based on the transportation risk analysis provided in NUREG–2125 (NRC, 2014a). The maximally exposed individual in this calculation is the member of the public that could receive a much higher dose from passing SNF shipments relative to other members of the public based on their close proximity to the rail track and the number of shipments they are exposed to. In this calculation, the maximally exposed individual is located 30 m [98 ft] from the rail track and is exposed to the direct radiation emitted from all 3,400 passing rail shipments of SNF at full build-out (Phases 1-8) under normal operations. The resulting accumulated dose is 0.019 mSv [1.9 mrem]. For any individual phase (including the proposed action, Phase 1) assuming the number of shipments is 425, the maximally exposed individual dose result was 0.0024 mSv [0.24 mrem]. For comparison, the NRC limits public doses from licensed facility operations to 1mSv [100 mrem] (10 CFR Part 20) and the average annual background radiation exposure in the U.S. is 6.2 mSv [620 mrem] (EIS Section 3.11.1.1).

Based on the preceding analysis of the potential radiological impacts under incident-free conditions, the NRC staff concludes that the radiological impacts to the public from proposed SNF transportation during the operations stage of the proposed action (Phase 1) and the operations stages up to full build-out (Phases 1-8) would be minor.

4.3.1.2.2.3 Radiological Impacts to Workers and the Public from SNF Transportation Accidents

The potential radiological health impacts to workers and the public from SNF transportation to and from the proposed CISF under accident conditions would occur from exposures to the radiation emitted from the loaded transportation casks after an accident has occurred and during the time when emergency response actions are taken to address the accident scene. Under some accident conditions, the radiation shielding on the transportation cask can be damaged, causing the radiation dose in the proximity of the package to increase. Under rare severe accident conditions, the potential for breaching a transportation cask and releasing a fraction of the radioactive contents is possible and has been considered in past SNF transportation risk assessments (NRC, 2014a, 2001; DOE, 2008). These prior assessments conservatively modeled accidental releases of radioactive material during transportation and did not specifically account for the added containment canisters provide. All SNF proposed to be transported to and from the proposed CISF would be shipped in canisters that are placed in NRC-certified transportation casks. In the most recent analysis (NRC, 2014a), as described in more detail in this section, the NRC staff concluded that an accidental release of canistered fuel during transportation did not occur under the most severe impacts studied, which encompassed all historic and realistic accident scenarios.

ISP evaluated radiological impacts to workers and the public from the transportation of SNF under accident conditions using the RADTRAN 6 transportation risk assessment code (ISP, 2019b; Weiner et al., 2014) and previous analyses including NUREG–2125 (NRC, 2014a). ISP evaluated radiation doses and risks from accidents where cask shielding would remain intact, where shielding has been damaged, and assuming a release of radioactive material. For accidents involving no release or loss of shielding, ISP estimated a maximum occupational dose to a first responder that spent 10 hours at 3 meters [3.3 yards] from the SNF cask of 1.6 mSv [160 mrem]. For a loss of shielding accident, ISP estimated a first responder at 5 m [5.5 yd] from the cask would receive a dose rate of 8.1 mSv/hr [810 mrem/hr] from the damage to cask shielding that a fire caused or 7.1 mSv/hr [710 mrem/hr] from the damage that impact force caused. For an accident involving a release, ISP estimated a maximum individual occupational dose to a first responder of 0.0771 Sv [7.71 rem] when spending a day at 33 meters from the cask.

ISP also evaluated maximally exposed individual dose risks and collective dose risks to the public from the transportation of SNF under accident conditions involving a release under a variety of accident configurations. The highest reported individual public dose risk was 2.62×10^{-11} Sv [2.62×10^{-9} rem] once an accident has occurred. Therefore, when the NRC staff scales the result by the probability of an accident occurring (1.1×10^{-7} rail accidents per km) (NRC, 2014a), the shipment distance for ISP's longest route {5,043 km [3,134 mi]} and the total number of proposed shipments over the duration of the project (3,400), the resulting maximum individual dose risk is low at 4.3×10^{-11} Sv [4.9×10^{-9} rem]. Additionally, the highest collective public dose risk ISP reported, assuming all shipments take the longest SNF transportation route, was also low at 4.59×10^{-9} person-Sv [4.59×10^{-7} person-rem]. ISP acknowledged the consideration of accidents involving a release for canistered SNF is conservative because of the conclusion in NUREG–2125 (NRC, 2014a) that no radioactive material would be released in an accident if SNF was contained in an inner welded canister (ISP, 2019b).

ISP provided more detailed proprietary documentation of their transportation dose and risk calculations that NRC staff reviewed. The NRC staff's review found that the methods ISP used to calculate SNF transportation impacts were similar to methods used in NUREG–2125 (NRC, 2014a) to calculate cross-country SNF transportation accident dose risks and therefore were acceptable. The NRC staff considered the evaluation of loss of shielding accidents to be reasonable, but the low risks that were consistent with prior results (NRC, 2014a) did not warrant further detailed consideration. Additionally, the NRC staff found the consideration of accidents involving releases for canistered SNF to be excessively conservative, inconsistent with prior results (that showed no release would occur under the most severe impacts studied, which encompassed all historic or realistic accidents) (NRC, 2014a) and therefore also did not warrant detailed consideration. As part of the NRC staff's review, the staff conducted independent calculations as additional confirmation of the technical adequacy of the calculations and results that are most informative to the analysis of impacts. The NRC calculation results are described in the following paragraphs.

The NRC staff evaluated the potential occupational impacts of the proposed SNF transportation under accident conditions. NUREG–2125 reports an average freight rail accident frequency of 1.32×10^{-7} per railcar-mile based on DOT historic accident frequencies from 1991 to 2007 (NRC, 2014a). This frequency applies to all accidents ranging from minor to severe. The frequency further decreases by orders of magnitude when the focus narrows to specific less-frequent accident scenarios, such as severe accidents. While the actual rail configurations and routes that would be used to ship SNF to the proposed CISF would be determined prior to shipping and are currently unknown, considering the previously described bounding representative route (Maine Yankee) with a distance of 3,362 km [2,089 mi] and assuming a 3-car train, after 425 shipments for the proposed action (Phase 1) and 3,400 shipments at full build-out (Phases 1-8), no accidents of any severity would be expected during the proposed action (Phase 1) and less than three accidents of any severity would be expected to occur over a 20-year period applicable to full build-out (Phases 1-8).

In NUREG–2125, the NRC staff conducted detailed engineering analyses of transportation accident consequences including cask and SNF responses to severe accident conditions involving impact force and fire (thermal effects) within and beyond the hypothetical accident conditions found in 10 CFR 71.73 (NRC, 2014a). The results of the study concluded that no SNF releases would occur from a severe long-lasting fire. Additionally, for the evaluation of impact accidents, the steel-shielded cask with inner welded canister (i.e., rail-steel cask) had no release and no loss of gamma shielding effectiveness under the most severe impacts studied, which encompassed all historic or realistic accidents. Because the proposed design of the CISF would require SNF to be contained within inner welded canisters, the transportation of the SNF to the proposed CISF would also require SNF to be in canisters that would be shipped in transportation casks similar to the configuration evaluated in NUREG–2125. Therefore, the NRC staff considers the conclusion in NUREG–2125 regarding the resiliency of the rail-steel cask to severe accident conditions (resulting in no release under severe accident conditions) applicable to the evaluation of potential CISF SNF transportation impacts under accident conditions.

Under accident conditions with no release, NUREG–2125 evaluated the dose consequence to an emergency responder that spends 10 hours at an accident site at an average distance of 5 m [5.5 yd] from the cask to be 0.69 mSv [69 mrem] for the rail-steel cask and 0.92 mSv [92 mrem] for the rail-lead cask (NRC, 2014a). The exposure time of 10 hours is a conservative assumption based on a prior DOE study (DOE, 2002) that indicated first responders would take about an hour to secure the vehicle and the accident scene. This result compares with ISP's more conservative first responder dose estimate of 1.6 mSv [160 mrem] for a responder that spent 10 hours at 3 m [3.3 yd] from the SNF cask. These same consequences would apply for an accident during any phase (Phases 1-8) of the proposed CISF project. For comparison, the NRC annual public dose limit applicable to licensed operating facilities in 10 CFR Part 20 is 1 mSv [100 mrem], and worker doses should not exceed 0.05 Sv [5 rem]. Based on this information, the NRC staff concludes that the occupational radiological impacts from the proposed SNF transportation under accident conditions during the operations stage of the proposed action (Phase 1) and the operations stages of full build-out (Phases 1-8) would be minor.

The NRC staff also evaluated the potential radiological impacts to the public from the proposed SNF transportation under accident conditions. As with the preceding analysis of occupational radiological impacts from accidents, based on the analyses in NUREG–2125 (NRC, 2014a), the NRC staff considers the conclusion in NUREG–2125 regarding the resiliency of the rail-steel cask to severe accident conditions (resulting in no release under severe accident conditions) applicable to the evaluation of potential CISF SNF transportation impacts under accident conditions. Under accident conditions with no release, NUREG–2125 estimated the dose-risk to the public as a population dose that accounts for the accident probability. The accident scenario involves a 10-hour delay in movement of the cask at the accident scene where members of the public in the surrounding area {800 m [2,625 ft] in all directions} are exposed to direct radiation from the cask. The NRC staff used the same NUREG–2125 representative route as described previously for the occupational dose impact analysis and scaled the resulting population dose by the number of shipments and converted the population dose to health effects using the same cancer risk coefficient (SwRI, 2019). The public dose-risk and health effects from proposed CISF SNF transportation under accident conditions are provided in EIS Table 4.3-2. While ISP did not conduct a similar analysis, the NRC public collective dose risk accident results in EIS Table 4.3-2 are much higher than the collective dose risks ISP calculated because the scenario that the NRC staff evaluated (a no-release scenario with shielding intact) is more likely to occur than the scenarios involving loss of shielding or release that were ISP evaluated. Therefore, the overall dose risk is relatively higher in the NRC staff's calculations but still low when considered as estimated health effects. All of the estimated radiological health effects to the public from the proposed SNF transportation under accident conditions are below the aforementioned ICRP threshold (i.e., less than $1/5.7 \times 10^{-2}$ health effects per person-Sv or 17.54 person-Sv) (ICRP, 2007) and are therefore likely to be zero.

The NRC staff also compared the estimated public collective dose risks under accident conditions with the expected background radiation doses for the same population over the proposed duration of the SNF shipments. These background collective doses were calculated by taking the product of the national annual average background radiation dose of 3.1 mSv [310 mrem] (EIS Section 3.12.1.1), the proposed duration of the SNF transportation of 2.5 years for the proposed action (Phase 1) and 20 years for full build-out (Phases 1-8), and the number of individuals in the exposed population of 1,321,024. The resulting background collective doses were 1.02×10^4 person-Sv [1.02×10^6 person-rem] for the proposed action (Phase 1) and 8.2×10^4 person-Sv [8.2×10^6 person-rem] for full build-out (Phases 1-8). In comparing the estimated project collective dose risks with the comparable background collective doses, the estimated public collective dose risks under accident conditions for the proposed action (Phase 1) SNF shipments of 0.028 person-Sv [2.8 person-rem] and full build-out (Phases 1-8) of 0.22 person-Sv [22 person-rem] are small fractions of the comparable background collective doses for the same population.

Based on the preceding analysis, the NRC staff concludes that the radiological impacts to workers and the public from the proposed SNF transportation under accident conditions during the operations stage of the proposed action (Phase 1) and the operations stage of Phases 2-8 would be minor.

4.3.1.2.2.4 Nonradiological Impacts to Workers and the Public from SNF Transportation

Nonradiological impacts to workers and the public from incident-free SNF rail transportation and from rail accidents would also occur during the period of operations. The nonradiological impacts associated with incident-free SNF transportation include potential impacts to existing rail traffic flow from the addition of SNF shipments, occupational injuries, and diesel emissions such as typical air pollutants and greenhouse gas emissions. The potential impacts to air quality from nonradiological emissions are evaluated in EIS Section 4.7.1.

The potential impacts of the additional SNF shipments to the local rail traffic on the Texas-New Mexico Railroad (TNMR) traveling north from the Union Pacific connection at Monahans, Texas, to Lovington, New Mexico, would be minor because the 170 or fewer proposed annual SNF shipments to the CISF would not be a large addition to the existing railcar traffic of 22,500 railroad carloads per year (EIS Section 3.3) and the speed of all traffic would be limited based on the class of the track, thereby limiting the potential for delays resulting from differences in the speed of travel. On the broader national rail network, the potential traffic impacts of the additional SNF shipments would be addressed by rail industry traffic flow monitoring and routing and therefore the NRC staff expects it to be minor.

The nonradiological occupational impacts associated with transportation of SNF by rail under both normal and accident conditions includes injuries and fatalities. Considering the occupational fatality and injury rates for workers involved in transportation and warehousing in EIS Table 4.13-1, and assuming 24 additional workers to operate 12 locomotives for the single year of the operations stage of the proposed action (Phase 1), the NRC staff estimated that there would be a low number of additional injuries (1.1) and fatalities (3.1×10^{-3}). For each of the operations stages of Phases 2-8, the same estimated annual injuries and fatalities would apply. If all operations stages for the full build-out (Phases 1-8) were conducted over a period of 20 years, the cumulative total injuries and fatalities would still be low (22 injuries and 6.2×10^{-2} fatalities).

The potential nonradiological impacts to the public from transportation accidents include traffic fatalities (e.g., accidents at rail crossings) and fatalities involving individuals trespassing on railroad tracks. The potential fatalities to members of the public from any rail accidents was estimated by taking the product of the fatalities (worker and public) per distance each railcar traveled (2.27×10^{-8} fatalities per railcar-km) (Saricks and Tompkins, 1999) and a bounding estimate of the total railcar distance associated with SNF transportation of $8.6 \times 10^{+6}$ railcar-km [$5.4 \times 10^{+6}$ railcar-mi]. The total railcar distance was estimated by assuming each of the 425 canisters per phase was shipped on a three-car train the distance from Maine Yankee to Deaf Smith, Texas {3,362 km [2,089 mi]} (NRC, 2014a), and the result was doubled to address two-way travel. This resulted in an estimated 0.20 (less than one) fatalities for shipping all SNF from reactors to the proposed CISF for the proposed action (Phase 1).

The potential fatalities to members of the public from any rail accidents applicable to full build-out (Phases 1-8) was estimated conservatively by taking the product of the fatalities (worker and public) per distance each railcar traveled (2.27×10^{-8} fatalities per railcar-km) (Saricks and Tompkins, 1999) and a bounding estimate of the total railcar distance associated with SNF transportation of $6.9 \times 10^{+7}$ railcar-km [$4.3 \times 10^{+7}$ railcar-mi] at full build-out (Phases 1-8). The total railcar distance was estimated by assuming each of the 3,400 canisters was shipped on a three-car train the distance from Maine Yankee to Deaf Smith, Texas {3,362 km [2,089 mi]} (NRC, 2014a), and the result was doubled to address two-way travel. This resulted in an estimated 1.6 fatalities for shipping all SNF from reactors to the proposed CISF.

The rail accident fatality rate (Saricks and Tompkins, 1999) used in the preceding calculations was based on an analysis of accident fatality data from 1994 through 1996. NRC staff considered this fatality rate to be conservative when applied to current rail transportation because the reported fatalities from rail accidents have decreased since 1996 (USDOT, 2018). For shipments of SNF from the proposed CISF to a geologic repository, the same number of shipments would occur over a shorter distance and therefore the estimate of 1.6 fatalities would be bounding, and the total accident fatalities for SNF shipments to and from the proposed CISF would be approximately 3 fatalities over the assumed 40-year license term. For comparison, 34,840 fatalities would be expected if the annual number of U.S. rail accident fatalities from 2017 (871) (USDOT, 2018) occurred for a similar 40-year period.

Based on the preceding analysis, the NRC staff concludes that the nonradiological impacts to workers and the public from SNF transportation to the CISF during the operations stage of the proposed action (Phase 1) and subsequent operations stages through full build-out (Phases 1-8) would be SMALL.

4.3.1.2.2.5 Defueling

When a permanent geologic repository becomes available, the SNF stored at the proposed CISF would be removed and sent to the repository for final disposal. Removal of the SNF from the proposed CISF, or defueling (EIS Section 2.2.1.3.2), would contribute to additional transportation impacts that would be similar in nature to the impacts evaluated for shipping SNF from generator sites to the proposed CISF that were described in EIS Section 4.3.1.2.2 with workforce commuter traffic impacts similar to those discussed under the emplacement activities earlier in the operations stage. These additional shipments of SNF to a repository would involve different routing and shipment distances than from the generation sites to the proposed CISF. Therefore, this section includes additional impact analyses of the radiological and nonradiological health and safety impacts to workers and the public under normal and accident conditions from the proposed national rail transportation of SNF from the proposed CISF to a repository.

In response to NRC staff RAIs, ISP calculated incident-free radiological impacts to the public from the transportation of SNF to a repository using the RADTRAN 6 transportation risk assessment code (ISP, 2019b; Weiner et al., 2014). ISP applied a unit risk factor approach described in EIS Section 4.3.1.2.2.2. The resulting annual incident-free collective public dose for shipping 200 SNF casks to the proposed Yucca Mountain repository under the proposed action (Phase 1) was 0.0157 person-Sv [1.57 person-rem]. The NRC staff converted this result to 0.334 person-Sv [3.34 person-rem] by multiplying the result by 2.125 (the ratio of 425 shipments to 200 shipments) to address the full 425 shipments for the proposed action (Phase 1). ISP did not conduct separate calculations for occupational and accident impacts. However, because the occupational and accident calculations described in EIS Sections 4.3.1.2.2.1 and 4.3.1.2.2.3 are applicable to all proposed SNF shipments on the longest distance route, the NRC staff considered those calculation results and resulting impact conclusions to be bounding for the SNF shipments to a repository. ISP provided more detailed proprietary documentation of their transportation dose and risk calculations that NRC staff reviewed. The NRC staff's review found that the methods ISP used to calculate SNF transportation impacts were acceptable as described previously for the ISP incident-free transportation worker dose calculations (EIS Section 4.3.1.2.2.1). As part of this review, the NRC staff also conducted independent confirmatory calculations as an additional check of the technical adequacy of the ISP's calculations and results. The NRC calculation results are described in the following paragraphs.

The NRC staff estimated the potential radiological impacts to workers and the public from the transportation of SNF from the proposed CISF to a geologic repository under incident-free and accident conditions based on the same general approach applied in the preceding analysis of incident-free radiological impacts of SNF shipments to the proposed CISF (EIS Sections 4.3.1.2.2.1 and 4.3.1.2.2.2). This approach involved selecting a representative route from the NRC transportation risk assessment in NUREG–2125 (NRC, 2014a) that adequately bounded the distance expected to be taken by the proposed shipments and then scaling the NUREG–2125 dose results for that route by the number of proposed shipments and, as applicable, the shipment distance, duration, and the number and duration of inspections (SwRI, 2019). As before, the population dose results were converted to health effects using the same ICRP cancer risk coefficient of 5.7×10^{-2} health effects per person-Sv [5.7×10^{-4} per person-rem] (ICRP, 2007), where the health effects include fatal cancers, nonfatal cancers, and severe hereditary effects.

The assumed route of SNF shipments would travel from the proposed CISF to the proposed repository at Yucca Mountain, Nevada. The representative route selected from NUREG–2125 for the NRC staff's CISF defueling analysis travels by rail from the town of Deaf Smith, Texas, to the Idaho National Engineering Laboratory. The reported distance for this shipment was 1,913 km [1,189 mi] (NRC, 2014a). This route was selected because the distance was bounding and the NRC staff considered the varied conditions (e.g., population characteristics) to be adequate to represent the routes that would be taken by actual SNF shipments from the proposed CISF for the purpose of evaluating the potential radiological impacts of the proposed SNF transportation. By comparison, ISP's calculations included a representative route from the proposed CISF to the proposed Yucca Mountain repository that was based on modeling the rail distance from Monahans, Texas, to Jean, Nevada, a distance of 1,935 km [1,202 mi]; therefore, the NRC staff's representative route selection is comparable to the approximate distance between the two project areas.

The occupational and public radiation dose and health effects estimates from the proposed CISF SNF transportation to a repository under incident-free and accident conditions are provided in EIS Table 4.3-3. An estimate of the expected nonproject baseline cancer that would occur in a population of comparable size to the exposed population (that does not include the estimated health effects from the proposed transportation) is also provided in EIS Table 4.3-3 for comparison. Both the NCRP and the ICRP suggest that when the collective (population) dose is less than the reciprocal of the risk coefficient (i.e., less than $1/5.7 \times 10^{-2}$ health effects per person-Sv or 17.54 person-Sv) the assessment should find that the most likely number of excess health effects is zero (ICRP, 2007). All of the estimated radiological health effects to workers and the public from the proposed SNF transportation under incident-free and accident conditions are below the aforementioned ICRP threshold and are therefore likely to be zero. For example, the incident-free public dose results suggests that among the 298,590 members of the public included in the analysis, 99,530 people would be expected to get cancer from natural or other nonproject-related causes, and most likely no members of the public would be expected to get cancer or hereditary health effects from project-related, incident-free transportation radiation doses. These results are within expectations because the methods applied are similar to the preceding analysis of SNF shipments from reactors to the CISF but with a shorter route distance, which reduces the estimated doses and health effects.

Table 4.3-3 Comparison of NRC Staff's Estimated Population Doses and Health Effects from the Proposed Transportation of SNF Along a Representative Route* to a Repository with Nonproject Baseline Cancer

Exposed Population	Incident-Free			Accident		
	Collective Dose (person-Sv)	Health Effects[1]	Nonproject Baseline Cancer[2]	Collective Dose (person-Sv)	Health Effects[1]	Nonproject Baseline Cancer[2]
Occupational						
Phase 1	0.41	0.024	10	Emergency Responder (consequence) 0.92 mSv [92 mrem]		
All Phases	3.3	0.19	10			
Public						
Phase 1	0.075	0.0043	99,530	0.028	0.0016	99,530
All Phases	0.60	0.034	99,530	0.22	0.013	99,530

*425 shipments of SNF (Phase 1) occurring over an estimated 2-year operational period; approximately 3,400 shipments of SNF (All Phases) occurring over an approximated 17-year period within a 40-year license term.
[1]Health effects includes fatal cancer, nonfatal cancer, and severe hereditary effects. Estimated by multiplying the population dose by the health risk coefficient of 5.7×10^{-2} health effects per person-Sv.
[2]Nonproject baseline cancer is estimated by multiplying the exposed population by the U.S. risk of getting a cancer (1/3) (EIS Section 3.12.3). Estimated occupational population (29 total) for single point-to-point route includes 3 crew and 1 escort on each of 6 trains (24 total), 1 inspector at 1 stop (1 total), plus 2 railyard workers at 2 assumed classification stops (4 total). Public population is based on NUREG–2125 reported population along representative route of 298,590.
To convert Person-Sv to Person-Rem multiply by 100.

The NRC staff also compared the estimated public collective doses under incident-free conditions with the expected background radiation doses for the same population over the proposed duration of the SNF shipments. These background collective doses were calculated by taking the product of the national annual average background radiation dose of 3.1 mSv [310 mrem] (EIS Section 3.12.1.1), the proposed duration of the SNF transportation of 2 years for the proposed action (Phase 1) and 17 years for full build-out (Phases 1-8), and the number of individuals in the exposed population of 298,590. NRC staff estimated the shipping durations based on ISP's total number of canisters (approximately 3,400) divided by ISP's maximum annual receipt of SNF delivery to the CISF of 200 canisters per year (ISP, 2020). The resulting background collective doses were 1.8×10^3 person-Sv [1.8×10^5 person-rem] for the proposed action (Phase 1) and 1.6×10^4 person-Sv [1.6×10^6 person-rem] for full build-out (Phases 1-8). In comparing the estimated project collective doses with the comparable background collective doses, the estimated public collective doses under incident-free conditions for the proposed action (Phase 1) SNF shipments of 0.075 person-Sv [7.5 person-rem] and full build-out (Phases 1-8) of 0.6 person-Sv [60 person-rem] are small fractions of the comparable background collective doses for the same population.

The NRC estimated incident-free public collective dose for the proposed action (Phase 1) shipments to the proposed repository of 0.075 person-Sv [7.5 person-rem] is higher than the 0.0334 person-Sv [3.34 person-rem] incident-free public dose ISP calculated (as adjusted for the total Phase 1 shipments by NRC staff). This difference in results is explained by different input parameter values that define separate fractions of gamma and neutron radiation in the SNF package dose rate. The ISP values were based on canistered BWR assemblies in a NUHOMS MP197 shipping cask that exhibited a gamma fraction that was more than half of the more conservative value that was used in the NRC calculations (based on uncanistered PWR assemblies loaded in a rail-lead cask evaluated in NUREG–2125) (NRC, 2014a). Both sets of results are minor when considered in the context of the low health effects estimates for the larger NRC result that are likely to be zero for both the proposed action (Phase 1) and full build-out (Phases 1-8). Additionally, because the nonradiological impacts associated with these SNF shipments would be similar to the nonradiological impacts evaluated for the incoming SNF shipments to the CISF but would scale lower with the reduced shipment distance, the nonradiological impacts for the repository shipments would be smaller than the incoming shipment impacts previously evaluated in this EIS section.

Based on the preceding analysis, the NRC staff concludes that the radiological and nonradiological impacts to workers and the public from SNF transportation from the CISF project to a geological repository during the operations stage of the proposed action (Phase 1) and during the operations stages of full build-out (Phases 1-8) would be SMALL.

4.3.1.3 Decommissioning Impacts

At the end of the license term of the proposed CISF project, once the SNF inventory is removed, the facility would be decommissioned such that the proposed project area and remaining facilities could be released, and the license terminated. Decommissioning activities, in accordance with 10 CFR Part 72 requirements, would include conducting radiological surveys and decontaminating, if necessary. Decommissioning activities for the proposed action (Phase 1) and for full build-out (Phases 1-8) would involve the same activities, but the activities would be scaled to address the overall size of the CISF (i.e., the number of phases completed). EIS Sections 2.2.1.5 and 2.2.1.3.3 describe the decommissioning activities.

During the decommissioning stage of the proposed CISF project, the primary transportation impacts would be traffic impacts from the commuting workforce. Based on the low levels of decommissioning-related transportation (EIS Section 2.2.1.5), the NRC staff concludes that the decommissioning transportation impacts during the decommissioning stage of Phase 1, any number of additional phases, or at full build-out (Phases 1-8) would be negligible. Therefore, the proposed CISF project would have SMALL transportation impacts during the decommissioning stage of the proposed action (Phase 1) and of full build-out (Phases 1-8).

4.3.2 No-Action Alternative

Under the No-Action alternative, the NRC would not license the proposed CISF project. Therefore, transportation impacts such as increased traffic from proposed transportation and radiation exposures to workers and the public from the transportation of SNF to and from the proposed CISF project would not occur. Construction impacts would be avoided, because SNF storage pads, buildings, and transportation infrastructure would not be built. Operational impacts would also be avoided, because no SNF transportation to and from the proposed CISF would occur. Transportation impacts from the proposed decommissioning activities would not occur, because unbuilt SNF storage pads, buildings, and transportation infrastructure require no decommissioning. The current transportation conditions on and near the project would remain unchanged by the proposed CISF under the No-Action alternative. In the absence of a CISF, the NRC staff assumes that SNF would remain onsite in existing wet and dry storage facilities and be stored in accordance with NRC regulations and be subject to NRC oversight and inspection. Site-specific impacts at each of these storage sites would be expected to continue as detailed in generic (NRC, 2013, 2005a) or site-specific environmental analyses. In accordance with current U.S. policy, the NRC staff also assumes that the SNF would be transported to a permanent geologic repository, when such a facility becomes available.

4.4 <u>Geology and Soils Impacts</u>

This section describes the potential environmental impacts to geology and soils for the proposed action (Phase 1), full build-out (Phases 1-8), and the No-Action alternative.

4.4.1 Impacts from the Proposed CISF

As described in EIS Section 3.4.2, the ground surface at the proposed project area is covered by a veneer of sandy silt and sand from the Blackwater Draw Formation. The Blackwater Draw Formation consists of fine to very-fine-grained sand with minor amounts of clay. The topsoil consists of silty sand that contains sparse vegetation, debris, and roots. Beneath the topsoil is a variable sequence of calcium carbonate-cemented Caprock Caliche. The Caprock Caliche thickness varies but can reach up to 3.7 m [12 ft]. The Caprock Caliche has a general trend of decreased cementation and increased silt, sand, and gravel content with depth. As shown in EIS Figures 3.4-6 and 3.4-7, sand at the surface increases to the north and east and thins to the south and west (ISP, 2019c).

4.4.1.1 Construction Impacts

As described in EIS Section 3.4.2, site topography ranges in elevation from 1,072 to 1,061 m [3,520 to 3,482 ft] across the proposed CISF project area with a gentle slope of approximately 2.4 to 3 m/km [8 to 10 ft/mi] to the southeast (ISP, 2020, 2019c). Construction for the proposed action (Phase 1) and for Phases 2-8 of the proposed CISF project would require an area of flat terrain; therefore, some portions of the proposed CISF would require ground surface grading.

Excavation activities would include site grading, drainage berm and ditch construction, foundation work for storage pads and buildings, and rail construction. Excavation for site grading would occur over the entire proposed project area as part of the proposed action (Phase 1) and the extent of the excavation would vary, with a maximum depth of approximately 2.1 m [7 ft] in some areas. Average excavation over the entire proposed project area would be approximately 0.9 m [3 ft], which results in a volume of approximately 496,961 m^3 [650,000 yds^3] of material. Excavation for all other features (e.g., rail sidetrack) would be approximately 38,228 m^3 [50,000 yd^3]. The total excavated material that would be stockpiled would be approximately 535,188 m^3 [700,000 yd^3]. To minimize the impacts of surface grading of the proposed project area, ISP expects to use materials excavated from higher portions of the site for fill at the lower portions of the site to the extent possible (ISP, 2020).

Because the proposed CISF location is currently undeveloped, the primary impact to geology and soils would be land disturbance during construction (including site preparation). Construction activities would require conventional earthmoving and grading equipment to prepare and grade the land. Soils would be disturbed by excavation and grading for building sites, access roads, and for the rail sidetrack. Excavation and grading for the proposed CISF would disturb soils to a depth of about 3 m [10 ft] below grade involving the removal of the sediments of the Blackwater Draw Formation and, in some locations, portions of the Caprock Caliche (ISP, 2020). For the proposed CISF project, 130 ha [320 ac] of land surface would be disturbed with 3.4 ha [9 ac] of land used for the rail sidetrack, access road, and laydown areas. Excavation activities would likely result in soil erosion from wind and water. ISP would use various temporary and permanent best management practices (BMPs) throughout all stages of the proposed CISF, including silt fences, diversion ditches, berms, designated concrete washout locations, designated tire washout locations, straw bales, check dams, and straw mats. Additionally, as part of the proposed action (Phase 1), berms and ditches would be constructed up-gradient of the OCA from onsite available compacted red bed clay reinforced with onsite available caliche in order to minimize erosion and seepage (ISP, 2020, 2019c). Inspection of the berms for erosion and ditches for sediment buildup would be part of the ongoing routine inspection during all stages. The area between the berms and the storage pads would also be routinely inspected for erosion, especially after a rainfall. Any areas erosion and sediment buildup impact would be repaired and regraded. Stormwater runoff could also potentially impact nearby drainages by increasing the sediment load. As described in EIS Section 4.5.1, stormwater runoff during construction and operations would be regulated under Texas Pollutant Discharge Elimination System (TPDES) permit requirements. Stormwater runoff from the proposed CISF would be directed to and integrated into the existing WCS engineered drainage system (ISP, 2020).

If approved by the NRC, construction of Phases 2-8 would more extensively disturb land for constructing additional SNF storage modules and pads (ISP, 2020). The NRC staff expects that mitigation measures put in place as part of the proposed action (Phase 1) would also be implemented for Phases 2-8.

In addition, as part of the proposed action (Phase 1), ISP has proposed to construct a rail sidetrack to transfer the SNF to the proposed CISF. The impacts of the construction of the rail sidetrack would be because of soil disturbance, soil erosion, and potential soil contamination from leaks and spills of oil and hazardous materials.

For both the proposed action (Phase 1) and Phase 2-8, leaks and spills of oil and hazardous materials from construction equipment could impact soils. As part of its TPDES permit, ISP would implement a Spill Prevention, Control, and Countermeasures (SPCC) Plan to minimize the impacts of potential soil contamination (ISP, 2020). Spills of oil or hazardous materials could also run off into nearby drainages during storm events. The SPCC Plan would identify sources, locations, and quantities of potential spills, as well as response measures. The SPCC Plan would also identify individuals and their responsibilities for implementation of the plan and provide for prompt notifications of State and local authorities, as required (ISP, 2020).

For both the proposed action (Phase 1) and Phases 2-8, construction of the proposed CISF would not use any additional geologic resources based on the relatively shallow excavation depth {i.e., 3 m [10 ft]}. Similarly, the proposed CISF would not impact seismicity, cause subsidence, or create sinkholes due to its distance from the nearest active fault, the passive nature of the proposed facility, and lack of effluents from the facility.

Utilities required for the proposed CISF would include the installation of water, natural gas, and electrical utility lines, and lines would be collocated with already disturbed land areas where possible. A new potable water supply line would be extended from the existing WCS potable water system. To minimize land disturbance to soils, vegetation, and wildlife, ISP states that it would utilize already-disturbed land areas when installing any new water supply lines (ISP, 2020). A small transformer yard would be constructed and located on the proposed project area and distribution to onsite facilities would be via buried electrical lines on existing onsite rights of way to minimize the disturbed land and reduce the potential for soil loss (ISP, 2020).

Impacts to geology and soils during the construction stage for the proposed action (Phase 1) and Phases 2-8, including the construction of the rail sidetrack, would include soil disturbance, soil erosion, and potential soil contamination from leaks and spills of oil and hazardous materials. Mitigation measures and TPDES permit requirements ISP implemented (including spill prevention and cleanup plans) will limit soil loss, avoid soil contamination, and minimize stormwater runoff impacts. Additionally, seismicity, subsidence, and sinkholes would not be impacted by construction of the proposed CISF. Therefore, the NRC staff concludes that the potential impacts to geology and soils from the construction stage for the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

4.4.1.2 Operations Impacts

Operations of the proposed CISF would not be expected to impact underlying bedrock or soil, because the SNF would be stored on concrete pads, either in vertical arrays or in horizontal storage modules, both of which are passive systems (i.e., they have no moving parts). The applicant would conduct routine monitoring and inspections to verify that the proposed CISF is performing as expected (ISP, 2020, 2019c). Leaks and spills of oil and hazardous materials from equipment and vehicles used to operate the facility could contaminate soils or run off into nearby drainages during storm events. As in the construction stage, the applicant would continue to implement a spill prevention and cleanup plan to minimize the impacts of potential soil contamination, and stormwater runoff would continue to be regulated under TPDES permit requirements.

Operation of the proposed action (Phase 1) and Phases 2-8 would not be expected to be impacted by seismic events, subsidence, or sinkhole development. The proposed CISF would be located in an area of west Texas that has low seismic risk. The proposed CISF would be a surface facility with a total excavation depth of 3 m [10 ft] and therefore would not intersect any active faults. The NRC's safety review will determine whether the proposed CISF project would be constructed in accordance with 10 CFR 72.122, General Design Criteria, Overall Requirements, which requires that structures, systems, and components important to safety be designed to withstand the effects of earthquakes without impairing their capability to perform safety functions. Therefore, the NRC staff does not expect that the operation of the proposed CISF would impact seismic activity at the proposed project location nor be impacted by seismic events.

As described in EIS Section 3.4.4, approximately 460 m [1,500 ft] below the surface and the proposed CISF, halite and other soluble evaporites are present (Holt and Powers, 2007). However, the subsurface geologic conditions at the proposed project area are not conducive to karst development with little potential for future dissolution (Holt and Powers, 2007). Therefore, due to the subsurface geologic conditions and the depth below the surface of the evaporites, and because the proposed CISF project operations do not produce any liquid effluent that could facilitate dissolution of evaporites, the NRC staff does not anticipate that the proposed CISF would lead to the development of subsidence or sinkholes.

In summary, the operations stage of the proposed action (Phase 1) and Phases 2-8 would not be expected to impact underlying bedrock or soil, because storage structures built during construction are passive systems and designed to contain radiological materials. The applicant would be expected to implement the SPCC Plan to minimize the impacts of potential soil contamination, and stormwater runoff would be regulated under TPDES permit requirements. ISP would also implement mitigation measures for spill prevention and stormwater management. Operation of the proposed CISF project would not be expected to impact or be impacted by seismic events or sinkhole development. Criteria would be incorporated into the facility design to prevent damage from seismic events such as earthquakes. Therefore, the NRC staff concludes that the potential impacts to geology and soils associated with the operations stage for the proposed action (Phase 1) and for full build-out (Phases 1-8) of the proposed CISF project would be SMALL.

Defueling

Defueling the proposed CISF would involve removal of the SNF from the proposed CISF and transport of SNF to a permanent geologic repository (EIS Section 2.2.1.3.2). Because activities for defueling are similar to those during the emplacement of fuel earlier during the operations stage, defueling is not anticipated to result in the usage of any additional geology or soil resources. Impacts to geology and soils for defueling would therefore be bounded by those evaluated under the construction stage. The NRC staff concludes that the geology and soil impacts from defueling the proposed CISF for the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

4.4.1.3 Decommissioning Impacts

At the end of the license term of the proposed CISF project, once the SNF inventory is removed, the facility would be decommissioned such that the proposed project area and remaining facilities could be released, and the license terminated. Decommissioning activities, in accordance with 10 CFR Part 72 and Part 20 requirements, would include conducting radiological surveys and decontaminating, if necessary. Decommissioning activities for the proposed action (Phase 1) and for Phases 2-8 would involve the same activities, but the activities would be scaled to address the overall size of the CISF (i.e., the number of phases constructed).

Contaminated soils would be disposed at approved and licensed waste disposal facilities. If any portions of the proposed CISF require dismantling during decommissioning, soil disturbance could occur from the use of heavy equipment, such as bulldozers and graders, to demolish SNF storage facilities, buildings, and associated infrastructure. This soil disturbance would be limited to areas previously disturbed during the construction and operations stages. Mitigation measures used to reduce soil impacts during construction would be applied during decommissioning. Decommissioning impacts to geology and soil would be bounded by those during the construction stage, and similarly would be minimal. Therefore, the NRC staff concludes that the potential impact of decommissioning on geology and soils for the proposed action (Phase 1) and full build-out (Phases 1-8) of the proposed CISF would be SMALL.

4.4.2 No-Action Alternative

Under the No-Action alternative, the NRC would not license the proposed CISF project. Therefore, impacts such as soil disturbance or contamination would not occur. Construction impacts would be avoided because SNF storage pads, buildings, and transportation infrastructure would not be built. Operational impacts would also be avoided because no SNF canisters would arrive for storage. Impacts to geology and soils from decommissioning activities would not occur, because unbuilt SNF storage pads, buildings, and transportation infrastructure require no decontamination or decommissioning. The current geology and soil conditions on and near the project would remain essentially unchanged under the No-Action alternative. In the absence of a CISF, the NRC staff assumes that SNF would remain onsite in existing wet and dry storage facilities and be stored in accordance with NRC regulations and be subject to NRC oversight and inspection. Site-specific impacts at each of these storage sites would be expected to continue as detailed in generic (NRC, 2013, 2005a) or site-specific environmental analyses. In accordance with current U.S. policy, the NRC staff also assumes that the SNF would be transported to a permanent geologic repository, when such a facility becomes available.

4.5 <u>Water Resources Impacts</u>

This section describes the potential impacts to water resources (surface water and groundwater) for the proposed action (Phase 1), full build-out (Phases 1-8), and the No-Action alternative.

4.5.1 Surface Water Impacts

Impacts to surface waters at the proposed CISF may result from short-term increases in soil resuspension, erosion, sediment runoff, disruption of natural drainage, spills or leaks of fuels or lubricants, and stormwater discharges.

4.5.1.1 Impact from the Proposed CISF

As described in EIS Section 3.5.1.2, no perennial streams or other surface water bodies are located within the proposed project area. Grading would take place within the protected area (i.e., the storage pad area) such that all surface water drainage would be directed towards natural channels and would drain into the large drainage depression adjacent to the proposed CISF on the Texas side of the WCS property, potentially overflowing to the south over the existing railroad spur and toward Ranch House Draw (ISP, 2020, 2018). Surface water drainage outside the protected area (e.g., not from the storage pad area) both inside and outside of the OCA on the northwestern and western portion of the proposed project area would flow into New Mexico towards Baker Spring as a result of grading and the exploitation of natural channels (ISP, 2018). Baker Spring is a man-made ephemeral pond with a total dissolved solids (TDS) concentration of 96 mg/L [96 ppm], a pH of 7.46, and a total alkalinity of 77.6 mg/L [77.6 ppm] (ISP, 2019c).

ISP would obtain a TPDES General Permit for Construction to address potential impacts on water and provide mitigation as needed to maintain water quality standards and avoid degradation to water resources at or near the proposed CISF project and new rail sidetrack. As part of the TPDES permit, ISP would develop a Storm Water Pollution Prevention Plan (SWPPP) and an SPCC Plan, both of which would prescribe BMPs to be employed to reduce impacts to water quality during the license term. The TPDES General Permit for Construction would be issued by the TCEQ with oversight by EPA Region 6. The TPDES permit, the SWPPP, and the SPCC Plan would be required to remain valid throughout all phases of the proposed project.

4.5.1.1.1 Construction Impacts

During construction of the proposed action (Phase 1), clearing, cut-and-fill operations, and grading of the site for the SNF pads, buildings, the rail sidetrack, and associated infrastructure would cause temporary surface disturbances, resulting in soil erosion and sediment runoff into nearby drainages. During construction activities, ISP would implement soil-erosion and sediment-control BMPs, including sediment fences, earthen berms, and diversion ditches, to reduce adverse impacts on surface water such as soil erosion and sedimentation of natural drainages (ISP, 2020). Leaks and spills of fuels and lubricants from construction equipment and stormwater runoff from impervious surfaces resulting from the proposed facility construction could impact surface water quality. To prevent spills and leaks and to minimize any adverse environmental impacts, ISP would develop and implement an SPCC Plan (ISP, 2020). The SPCC Plan would identify potential sources or spills or leaks, as well as response measures. It would also identify individuals and their responsibilities for plan implementation and provide for prompt notifications of State and local authorities, as required. ISP would develop and implement a SWPPP, as TCEQ requires, which would further minimize adverse impacts from spills or leaks and construction activities by prescribing additional BMPs. BMPs include designated washout areas, designation of vehicle and equipment maintenance areas, and areas for collection of oil, grease, and hydraulic fluids. Construction equipment and vehicles would be operated with standard pollution-control devices and would be in good working order. Additionally, construction vehicles would be washed with water only as needed, and runoff would be diverted to onsite retention basins (ISP, 2020).

As described in EIS Section 3.5.1.2, the proposed project area is not located in a floodplain (ISP, 2018). ISP would use drainage berms and grade the site during construction to exploit natural drainage ways and prevent the formation of standing water, directing stormwater runoff from the proposed CISF toward natural drainages (ISP, 2020). Based on a flooding analysis, ISP stated that the existing natural large drainage depression (EIS Figure 3.5-2) would be able to accept runoff from a 100-year, 24-hour storm event, which would total 15.24 cm [6 in] of precipitation, without overflowing (ISP, 2018). However, during the 500-year, 24-hour storm {22.12 cm [8.71 in] of rainfall} and the Probable Maximum Precipitation (PMP), 72-hour storm {102.87 cm [40.5 in] of rainfall}, the large drainage depression would overflow, having a maximum discharge of 85.1 m^3/s [3,005 cfs] and a water depth of 0.46 m [1.5 ft] over the railroad tracks southeast of the proposed CISF (ISP, 2018).

As described in EIS Section 3.5.1.3, no jurisdictional wetlands have been identified within or in the immediate vicinity of the proposed project area. As stated in EIS Section 3.5.1.5, soil and water in surface depressions that would potentially receive stormwater runoff from the proposed

CISF are highly mineralized and therefore are not favorable for the development of aquatic or riparian habitat.

In summary, ISP would (i) implement mitigation measures to control erosion, stormwater runoff, and sedimentation; (ii) develop and comply with an SPCC Plan; and (iii) obtain the required TPDES permit to address potential impacts for discharge to surface water and provide mitigation, as needed, to maintain water quality standards. Therefore, the NRC staff concludes that the potential impacts to surface waters during the construction stage of the proposed action (Phase 1) would be SMALL.

For the construction stages of Phases 2-8, additional land would be disturbed to construct the additional storage facility pads, resulting in additional impervious cover. Surface disturbance would result in additional soil erosion and sediment runoff into nearby drainages. ISP would continue to implement erosion and sediment control BMPs as directed in applicable permits, as during the construction stage of the proposed action (Phase 1). The potential for leaks and spills of fuels and lubricants from construction equipment would continue to be mitigated by BMPs (e.g., earthen berms, sediment fences), and ISP would continue to abide by the requirements of applicable permits and plans (TPDES, SWPPP, and SPCC Plan). As additional phases are added, ISP would implement BMPs appropriate for each size increase in the footprint of the proposed facility and would implement storage pad designs that would adequately direct drainage over impervious surfaces during each phase addition up to full build-out (Phases 1-8). ISP's flood analysis was conducted for full build-out (Phases 1-8) of the proposed facility (i.e., not just Phase 1 but all Phases 1-8), so the addition of these Phases 2-8 is unlikely to cause additional flooding over the railroad spur track southeast of the proposed CISF, at the large drainage depression's discharge point (ISP, 2018). Therefore, the NRC staff concludes that the impacts to surface water and wetlands from the construction stage of Phase 1 (the proposed action) would be SMALL, and potential impacts for full build-out (Phases 1-8) would also be SMALL.

4.5.1.1.2 Operations Impacts

During the operation of the proposed CISF (Phase 1 through full build-out), the primary impact to surface water would be the potential for contamination from stormwater runoff. SNF storage pads would be the largest contributor to stormwater runoff and would be designed to direct stormwater runoff to natural drainages (ISP, 2020). The robust design and construction of the SNF storage systems and environmental monitoring program make the potential for a release of radiological material from the proposed CISF project very unlikely. SNF contains no liquid, and the dry storage casks would be sealed (welded shut) to prevent liquid from contacting the SNF assemblies (ISP, 2020). Therefore, there is no potential for a liquid pathway (such as stormwater runoff) to contaminate nearby surface waters with radiological materials (for information about accident events, see EIS Section 4.15). Furthermore, ISP's environmental monitoring program would include a two-step process to detect potential radiological contamination in stormwater runoff. First, all casks would be checked weekly and all storage pads would be checked monthly for surface contamination (ISP, 2020). Second, soil samples would be collected on a quarterly basis along surface water drainage paths (ISP, 2020). If radioactive contaminants exceeding action levels were detected, ISP would require an immediate investigation and corrective action to protect human health and prevent future occurrences.

ISP would continue to implement erosion and sediment control BMPs during operations to minimize any adverse effects of stormwater runoff. BMPs would include protection of undisturbed areas with silt fencing and straw bales, and prompt revegetating of disturbed or bare areas with native plant species to minimize adverse impacts (ISP, 2020). ISP would also continue to implement the BMPs specified in the SPCC Plan to address potential leaks or spills of fuels or lubricants from equipment, including maintaining equipment in good repair and berming all above-ground diesel storage tanks (ISP, 2020). To operate the proposed CISF, ISP is required to obtain a TPDES General Permit for Industrial Storm Water for point-source discharge of stormwater runoff from industrial or commercial facilities to surface waters. As part of the TPDES permit, ISP would develop a SWPPP that would prescribe BMPs to reduce impacts to water quality from point-source discharges of stormwater during operations. The TPDES Storm Water Permit would be issued by the TCEQ with oversight review by EPA Region 6.

During operations, similar to the construction stage discussed in EIS Section 3.5.1.2, based on a flooding analysis, ISP stated that the large drainage depression adjacent to the proposed CISF (EIS Figure 3.5-2) would accept stormwater runoff from a 100-year, 24-hour storm event totaling 15.24 cm [6 in] without overtopping (ISP, 2018). As described in EIS Section 3.5.1.3 for the construction stage, no jurisdictional wetlands have been identified within or in the immediate vicinity of the proposed project area. Conditions in the large drainage depression that would receive surface stormwater runoff from the proposed CISF during operations would continue to be unfavorable for the development of aquatic or riparian habitat.

In summary, for the proposed action (Phase 1), the design and construction of the SNF storage system and environmental monitoring measures that ISP would take make the potential for a release of radiological and nonradiological material from the proposed CISF very unlikely during operations. To minimize potential adverse impacts to surface water from stormwater runoff, ISP would (i) implement mitigation measures to control soil erosion, stormwater runoff, and sedimentation; (ii) develop and comply with an SPCC Plan; (iii) obtain a required TPDES permit to address potential impacts of point-source, stormwater discharge to surface water; and (iv) develop a SWPPP prescribing mitigation as needed to maintain water quality standards. The adjacent large drainage depression would have adequate capacity to accept runoff from 100-year, 24-hour storm event, and conditions in this depression are not favorable for development of an aquatic or riparian habitat (ISP, 2020). Therefore, the NRC staff concludes that the potential impacts to surface waters during the operation of the proposed action (Phase 1) would be SMALL.

The NRC staff anticipates that the mitigation measures implemented for operation of the proposed action (Phase 1) would continue to be implemented throughout operation of subsequent Phases 2-8. Although the amount of impervious surface would increase, thereby increasing surface runoff, the design of the proposed facility is such that the mitigation measures would be scaled appropriately. Therefore, the NRC staff concludes that the potential impacts to surface waters and wetlands during the operation of the proposed action (Phase 1) would be SMALL, and the potential impact for full build-out (Phases 1-8) would also be SMALL.

Defueling

Defueling the proposed CISF project would involve removal of SNF from the proposed CISF. Defueling would not result in use of additional surface water resources. Impacts to surface water would be bounded by those evaluated under the construction stage and earlier operations activities because while similar preventive and mitigation measures would be used, there would be less soil disturbance during defueling than during construction and the potential of spills and leaks during defueling would be similar to the potential for spills and leaks during operation activities. Therefore, the NRC staff concludes that the surface water impacts from defueling of all phases (Phase 1-8) of the proposed CISF during operations would be SMALL.

4.5.1.1.3 Decommissioning Impacts

At the end of its license term, once the SNF is removed, the proposed rail sidetrack and proposed CISF would be decommissioned, such that the proposed project area and remaining facilities could be released, and the license terminated. Decommissioning activities for the proposed action (Phase 1) and for Phases 2-8 would involve the same activities, but the activities would be scaled to address the overall size of the proposed CISF (i.e., the number of phases completed). Decommissioning of the proposed CISF project and rail sidetrack would be based on an NRC-approved decommissioning plan, and all decommissioning activities would be carried out in accordance with 10 CFR Part 72 and Part 20 requirements. ISP would submit a final decommissioning plan detailing activities and procedures for surveying, and if necessary, decontaminating the proposed CISF and its rail sidetrack. EIS Section 2.2.1.6 describes the decommissioning activities that would be necessary for the proposed CISF project. These decommissioning activities would have little to no surface water impacts, since no water would be used during the surveying and no soil disturbances are expected to occur. Therefore, the NRC staff concludes that the potential impacts to surface waters during decommissioning of both the proposed action (Phase 1) and full build-out (Phases 1-8) of the proposed CISF and of the rail sidetrack would be SMALL.

4.5.1.2 No-Action Alternative

Under the No-Action alternative, the NRC would not license the proposed CISF project. Therefore, impacts to surface water such as erosion, stormwater runoff, sedimentation, and other contamination from the proposed CISF project would not occur. Construction impacts would be avoided because SNF storage modules, buildings, and transportation infrastructure would not be built. Operational impacts would also be avoided because no SNF canisters would arrive for storage. Impacts to surface water and wetlands from decommissioning activities will not occur, because unbuilt SNF storage structures, buildings, and transportation infrastructure require no decontamination, and undisturbed areas need no reclamation. The current surface water and wetland conditions on and near the proposed project area would remain essentially unchanged under the No-Action alternative. In the absence of a CISF, the NRC staff assumes that SNF would remain onsite in existing wet and dry storage facilities and be stored in accordance with NRC regulations and be subject to NRC oversight and inspection. Site-specific impacts at each of these storage sites would be expected to continue as detailed in generic (NRC, 2013, 2005a) or site-specific environmental analyses. In accordance with current U.S. policy, the NRC staff also assumes that the SNF would be transported to a permanent geologic repository, when such a facility becomes available.

4.5.2 Groundwater Impacts

Impacts to groundwater at the proposed project area may result from pumping water (i.e., use of groundwater resources) to meet required consumptive water demands or from potential nonradiological contamination.

4.5.2.1 Impacts from the Proposed CISF

As described in EIS Section 3.5.2, groundwater resources in Andrews County, Texas, underlying the proposed CISF include the minor aquifers of the Triassic Dockum Group (i.e., the

Santa Rosa Formation, the Trujillo Formation, and isolated saturated zones occurring within the Cooper Canyon Formation red beds), and laterally discontinuous pools of groundwater within the overlying undifferentiated Ogallala–Antlers–Gatuña (OAG). Potable water for livestock watering in the vicinity of the site is generally obtained from discontinuous pools of groundwater in the Antlers Formation atop the Cooper Canyon Formation aquitard. Potable water for construction and operation of the proposed CISF would be provided by the City of Eunice's Water and Sewer Department through new potable water supply pipelines, extended from the existing potable water system at the WCS LLRW site (ISP, 2020). The new supply lines would be buried along existing roadways to minimize environmental impacts and land disturbances (ISP, 2020). Drinking water for the City of Eunice (and therefore for ISP) is pumped by the City of Hobbs Water Department from six groundwater wells screened in the Ogallala Aquifer, southwest of Hobbs, New Mexico (ISP, 2018).

4.5.2.1.1 Construction Impacts

As described in EIS Section 4.5.2.1, potable water for construction of the proposed CISF would be provided by the City of Eunice's Water and Sewer Department through new potable water supply pipelines. This water would be supplied by the City of Eunice from wells completed in the Ogallala Aquifer (ISP, 2020). Consumptive water use of Ogallala Aquifer water during construction would result from all onsite activities requiring potable water. Water use during the construction stage of the proposed action (Phase 1) of the proposed CISF would be approximately 9.46 million liters per year [2.5 million gallons per year], dropping down to approximately 7.57 million liters per year [2 million gallons per year] during the construction of Phases 2-8 (ISP, 2020).

As described in EIS Section 3.5.2.2, three wells exhibiting groundwater, which were located on the eastern edge of the WCS property over 4.1 km [2.5 mi] from the proposed CISF project area, were said to have been screened in the Ogallala Formation; however, the Ogallala Aquifer is not present beneath the proposed CISF site (Lehman and Rainwater, 2000). Groundwater studies at the proposed CISF project area encountered discontinuous, shallow pockets of groundwater in the undifferentiated OAG at a depth of approximately 27 to 30 m [90 to 100 ft] from the ground surface (ISP, 2020, 2019c). These groundwater depths are relatively deep in comparison to the maximum depth of excavation of 3 m [10 ft] for the proposed SNF storage pads (EIS Section 4.4.1.1). These pockets of groundwater are results of localized recharge to the undifferentiated OAG and are not hydrologically connected to the three wells in Ogallala Aquifer on the WCS site or indicative of lateral groundwater flow (Davidson et al., 2019; Lehman and Rainwater, 2000). Thus, the NRC staff does not expect that excavation of site soils for construction of the SNF storage pads during the proposed action (Phase 1) or Phases 2-8 would encounter groundwater.

During construction of the proposed action (Phase 1), the water quality of shallow undifferentiated OAG groundwater has the potential to be affected by infiltration of stormwater runoff and leaks or spills of fuels or lubricants. ISP's required TPDES permit would set limits on the amounts of pollutants entering ephemeral drainages or surface depressions that may be hydraulically connected to shallow Antlers Formation groundwater. To minimize and prevent spills, ISP would maintain construction equipment in good repair without visible leaks of oil, grease, or hydraulic fluids and berm all above-ground diesel storage tanks (ISP, 2020). The TPDES permit and associated SWPPP and SPCC Plan would specify additional mitigation measures and BMPs to prevent and clean up spills.

In summary, for the construction stage of the proposed action (Phase 1), potable water for construction of the proposed CISF would be supplied by the City of Eunice Water and Sewer Department, which would support the water demands of all support buildings (ISP, 2020). Excavation of site soils for construction of the SNF pads is not expected to encounter groundwater, because shallow groundwater is discontinuous and deeper groundwater is at sufficient depth {over 18 m [60ft]} below the 3 m [10 ft] excavation depth. TPDES permit requirements and implementation of BMPs would protect groundwater quality in the shallow undifferentiated OAG. Specifically, TPDES permit requirements would provide controls on the amounts of pollutants entering ephemeral drainages that may recharge the undifferentiated OAG at the site and would specify mitigation measures and BMPs to prevent and clean up spills. Therefore, the NRC staff concludes that the impacts to groundwater during construction of the proposed action (Phase 1) would be SMALL.

Construction of Phases 2-8 would each have reduced water consumptive requirements compared to Phase 1 (the proposed action) because all facilities and infrastructure for the proposed CISF project, such as the cask-handling building, the security and administration building, and the rail sidetrack, would have been built. Similar to the proposed action (Phase 1), the excavation of soils to construct Phases 2-8 would not be expected to encounter groundwater, and the TPDES permit and other applicable permits and plans acquired for the proposed action (Phase 1) would continue to protect the groundwater quality. Therefore, the NRC staff concludes that the impacts to groundwater during construction of the proposed action (Phase 1) would be SMALL, and the potential impacts for full build-out (Phases 1-8) would also be SMALL.

4.5.2.1.2 Operations Impacts

The operation of the proposed action (Phase 1) would consume less water than that of the construction stage by an annual decrease in water demand of at least 1.89 million liters [500,000 gallons]. To reduce consumptive water use, ISP would use water conservation practices, including using low-flow toilets, sinks, and showerheads; planting low-water consumption landscaping; monitoring and controlling dust-suppressing water sprays; and using mops and self-contained cleaning machines for localized floor cleaning (ISP, 2020).

Because of the design and construction of the SNF storage systems and the geohydrologic conditions of the proposed project area, potential radiological contamination of local groundwater is very unlikely. SNF contains no liquid, and the dry storage casks would be sealed (welded shut) to prevent external liquid from contacting the SNF assemblies (ISP, 2020). Therefore, there is no potential for a liquid pathway (such as a leaking cask) to contaminate underlying groundwater.

As described in EIS Section 3.5.2.2, exploratory boreholes installed near the proposed CISF site did not encounter groundwater in the Ogallala Aquifer. The Ogallala Aquifer does not underlie the proposed CISF site and is not hydraulically connected to groundwater or aquifers beneath the proposed project area. The nearest Ogallala Aquifer boundary is located at distances between 14 and 19 km [9 and 12 mi] from the proposed CISF project area near Monument Draw, Texas (Rainwater, 1996).

Groundwater at the proposed CISF site is located deep within the Dockum Aquifer (i.e., in the Santa Rosa and Trujillo Formations and in discontinuous saturated zones within the overlying Cooper Canyon Formation red beds), as well as that in the overlying undifferentiated OAG. As discussed in EIS Section 3.5.2.1, water level and geohydrologic information collected from exploratory boreholes at the proposed CISF project site indicates that saturated zones in the undifferentiated OAG are laterally discontinuous (Davidson et al., 2019; ISP, 2020).

During operations, groundwater quality in the shallow undifferentiated OAG may be affected by infiltration of stormwater runoff and leaks or spills of fuels or lubricants. ISP's required TPDES permit sets limits on the amounts of pollutants entering ephemeral drainages that may recharge shallow groundwater. To minimize and prevent spills, ISP would maintain equipment in good repair without visible leaks of oil, grease, or hydraulic fluids, and berm all above-ground diesel storage tanks (ISP, 2020). The TPDES permit, associated SWPPP, and SPCC Plan would specify additional mitigation measures and BMPs to prevent and clean up spills.

In summary, for the operation of the proposed action (Phase 1), because of the design of the SNF dry storage casks, geohydrologic conditions, the depth of the groundwater, and the discontinuity of shallow groundwater, potential radiological contamination of groundwater is unlikely. TPDES permit requirements and implementation of BMPs would protect groundwater quality in shallow aquifers. Specifically, the TPDES permit requirements provide controls on the amounts of pollutants entering ephemeral drainages that may recharge shallow groundwater at the site and specifies mitigation measures and BMPs to prevent and clean up spills. ISP has committed to reduce consumptive use of potable water (i.e., using water conservation practices). Accordingly, no significant impacts are expected on the availability of groundwater from the water source for all current and future users. Therefore, the NRC staff concludes that the impacts to groundwater during the operations stage of the proposed action (Phase 1) would be SMALL.

The operations stage of Phases 2-8 would have the same impacts and mitigation measures as the operations stage of the proposed action (Phase 1) and have approximately the same consumptive water use demand. Similarly, because of the design and construction of the SNF storage systems, geohydrologic conditions, and the depth of groundwater, potential radiological contamination of groundwater is very unlikely during the operations stage of any phase. The requirements of the TPDES permit, SWPPP, SPCC Plan and another other necessary plans and permits would protect groundwater quality in shallow aquifers by restricting the amount of pollutants entering ephemeral drainages and specifying mitigation measures and BMPs to prevent and clean up spills. Therefore, the NRC staff concludes that the impacts to groundwater during the operations stage of the proposed action (Phase 1) would be SMALL, and the potential impact for full build-out (Phases 1-8) would also be SMALL.

Defueling

Defueling would involve removal of SNF from the proposed CISF. Defueling would not result in consumptive use of groundwater resources other than the uses described for other operations activities. Impacts to groundwater would be bounded by those evaluated under the construction phase. Therefore, the NRC staff concludes that the groundwater impacts from defueling the proposed CISF would be SMALL.

4.5.2.1.3 Decommissioning Impacts

At the end of its license term, once the SNF is removed, the proposed facility would be decommissioned, such that the proposed project area and remaining facilities could be released, and the license terminated. Decommissioning activities for the proposed action (Phase 1) and for Phases 2-8 would involve the same activities, but the activities would be scaled to address the overall size of the proposed CISF (i.e., the number of phases completed). Decommissioning of the proposed CISF project and rail sidetrack would be based on an

NRC-approved decommissioning plan, and all decommissioning activities would be carried out in accordance with 10 CFR Part 72 and Part 20 (ISP, 2020). ISP would submit a final decommissioning plan detailing activities and procedures for surveying, and if necessary, decontaminating the proposed CISF and its rail sidetrack. EIS Section 2.2.1.6 describes the decommissioning activities that would be necessary for the proposed CISF project.

These decommissioning activities would have little to no groundwater impacts, since no groundwater would be used during the surveying and no contaminated groundwater recharge is expected. Therefore, the NRC staff concludes that the potential impacts to groundwater during decommissioning of the proposed action (Phase 1) and full build-out (Phases 1-8) of the proposed CISF and the rail sidetrack would be SMALL.

4.5.2.2 No-Action Alternative

Under the No-Action alternative, the NRC would not license the proposed CISF project. Therefore, impacts to groundwater such as stormwater runoff and potential radiological contamination would not occur. Construction impacts would be avoided because SNF storage modules, buildings, and transportation infrastructure would not be built. Operational impacts would also be avoided because no SNF canisters would arrive for storage. Impacts to groundwater from decommissioning activities would not occur, because unbuilt SNF storage modules, buildings, and transportation infrastructure require no decontamination, and undisturbed areas need no reclamation. The current groundwater conditions on and near the project would remain essentially unchanged under the No-Action alternative. In the absence of a CISF, the NRC staff assumes that SNF would remain onsite in existing wet and dry storage facilities and be stored in accordance with NRC regulations and be subject to NRC oversight and inspection. Site-specific impacts at each of these storage sites would be expected to continue, as detailed in generic (NRC, 2013, 2005a) or site-specific environmental analyses. In accordance with current U.S. policy, the NRC staff also assumes that the SNF would be transported to a permanent geologic repository, when such a facility becomes available.

4.6 <u>Ecological Impacts</u>

4.6.1 Impacts from the Proposed CISF

This section discusses the potential impacts of site preparation and construction of the proposed CISF. Field studies conducted at the proposed CISF and the results of consultation activities with the FWS and TPWD described in EIS Section 3.6 indicate that the FWS identified one Federally listed species under the Endangered Species Act (ESA), the Northern aplomado falcon (*Falco femoralis septentrionalis*), that may occur at the proposed CISF project area (FWS, 2020). This species is designated as Federally endangered in Texas and a nonessential experimental population in New Mexico. As stated in EIS Section 3.6.4, reintroduction efforts for the Northern aplomado falcon were initiated in west Texas and New Mexico in the early 2000s; however, the success rate sharply declined around 2010 and there are no known pairs of breeding falcons in west Texas (FWS, 2014). None of these falcons have been observed during ecological surveys conducted at the WCS site or at the proposed CISF project area (ISP, 2020, 2019d). Therefore, it is reasonable to determine that this species is not likely to occur at the proposed CISF project area or the rail sidetrack. Three other bird species were identified by the U.S. Fish and Wildlife Service (FWS) field office in Austin, Texas (least tern [*Sterna antillarum*], piping plover [*Charadrius melodus]*, and red knot [*Calidris canutus rufa*]). However, according to FWS, those species only need to be considered for wind energy projects and, therefore, are not considered further in this EIS (FWS, 2020). The proposed project does not occur on FWS-designated critical habitat for any Federally threatened or endangered plant or animal species. Because no Federally listed, proposed, or candidate wildlife or plant species or their critical habitats are likely to occur or be affected by the proposed CISF, all phases of the proposed CISF would have "No Effect" on Federally listed species, and have "No Effect" on existing or proposed critical habitats.

No State (Texas and New Mexico) threatened or endangered plant species have been reported at the proposed CISF project area, and none are expected to occur in Andrews County or Lea County (TPWD, 2019; New Mexico State Forestry, 2017; New Mexico Rare Plant Technical Council, 2018). As stated in EIS Section 3.6.4, however, there are three Texas State-designated threatened or endangered species that could potentially occur in Andrews County and eight New Mexico State-designated threatened or endangered species that could potentially occur in Lea County (TPWD, 2019; NMDGF, 2019). Based on the descriptions of these species in EIS Section 3.6.4, the Texas horned lizard *(Phrynosoma cornutum*) (a TPWD threatened species), and the dunes sagebrush lizard (*Sceloporus arenicolus*) (a New Mexico endangered species and species of greatest conservation need) have been observed at or near the proposed CISF project area (EIS Section 3.6.4). Loss of shinnery oak habitat complexes, the presence of overhead power lines, and other human activities could impact the viability of these species where the species are present (75 FR 77801), pertaining to a past proposal by FWS to list the species as endangered that was never adopted). EIS Section 4.6.1 provides an analysis of potential impacts on these species from the proposed CISF project.

The TPWD provided the NRC with comments on the proposed project including recommendations for mitigating impacts to wildlife that are described in the following subsections (TPWD, 2017). The NRC staff requested information on rare species, native plant communities, and animal aggregations from the TPWD Texas Natural Diversity Database (TXNDD) in November 2018; however, the Texas Natural Diversity Database (TXNDD) does not currently have any records for the proposed CISF project area (TPWD, 2018). Additionally, the NRC staff independently consulted the Biota Information System of New Mexico (BISON-M) tool and confirmed that there are no New Mexico State-listed species that may occur at the proposed CISF project area (NMDGF, 2019). The NRC staff did not identify other State-listed species that are likely to occur at the proposed CISF.

The proposed CISF project area is currently unfenced and undeveloped land except for a gravel-covered road and railroad spur that borders the south side of the proposed CISF footprint. However, the WCS-controlled land is fenced, and cattle grazing is not permitted on WCS-controlled land, including the proposed CISF project area, but ranchers do graze cattle on other nearby properties throughout the year. There are no documented wildlife corridors that support the migration of land animals at the proposed CISF project area (TPWD, 2018; TPWD, 2012; ISP, 2020). Migratory birds fly between northern nesting grounds and southern wintering grounds in the Central Flyway corridor that is centered approximately 483 km [300 mi] east of the proposed CISF project area and use the playa lakes in this region, depending on the available food and water present (FWS, 2019; ISP, 2020).

The potential environmental impacts and related mitigation measures for ecological resources for the proposed action and No-Action alternative are discussed in the following sections.

4.6.1.1 Construction Impacts

The applicant proposes to construct Phase 1 of the CISF on approximately 130-ha [320-ac] of land north of WCS's existing disposal facilities (EIS Figure 2.2-2). Phase 1 activities that would affect ecological resources include construction of the first storage pad (in the southeastern portion of the storage and operations area) capable of storing 5,000 MTU, and the other major components of the proposed CISF, including the cask-handling building, security and administration building, and rail sidetrack. The most significant level of construction impacts would occur during year 1 when the first storage pad and the other major components of the proposed action (Phase 1) are constructed. ISP anticipates that the total area of land to be disturbed within the OCA would be approximately 130 ha [320 ac], and that the total disturbed area for construction of the proposed CISF would be approximately 133.4 ha [330 ac] (EIS Section 4.2.1) (ISP, 2020). Excavation and grading for the proposed CISF would disturb soils to a depth of about 3 m [10 ft] below grade (EIS Section 4.4.1). Potential ecological disturbances during construction of the proposed action (Phase 1) could include (i) habitat loss from land clearing, (ii) noise and vibrations from heavy equipment and traffic, (iii) fugitive dust, (iv) collisions of wildlife with power lines, (v) increased soil erosion from wind and surface water runoff and stockpiling soil, (vi) sedimentation of downstream environments, (vii) exposure to light at night, and (viii) the presence of construction personnel.

Clearing and grading of soils may result in soil erosion from wind and water. Excavated material storage piles would be produced from the excavation activities at the proposed project site. ISP anticipates that the excavated material will be stockpiled at the existing material stockpiles northeast of the proposed CISF location; therefore, the potential impact on wildlife habitat and vegetative communities from soil erosion would be limited (ISP, 2020). Maintenance practices such as the use of chemical herbicides to control the introduction of nonnative vegetation, including noxious and invasive weeds, along the approximate perimeter of the rail sidetrack, roadway, and protected area {approximately 8 km [5 mi] total} would also disturb vegetation.

Construction-related disturbances of Phase 1 would mostly affect the Apacherian-Chihuahuan mesquite upland scrub ecological systems but would also affect the sandy shinnery shrubland vegetation type (USGS, 2011). During the last century, the area this system occupies has increased through conversion of desert grasslands as a result of drought, overgrazing by livestock, and/or decreases in fire frequency. Construction-related disturbances would mostly affect the mesquite shrubland vegetation type. The dominant shrub species associated with this classification at the proposed CISF generally consist of sparse, low desert grasses and cacti, with a woody shrub cover dominated by honey mesquite, shinnery oak, and sand sagebrush (ISP, 2020, 2019d). In general, areas construction activities affect could experience a loss of shrub species and an increase in annual species. The colonization of reclaimed disturbed areas by species from nearby native communities in this area could be slow and may require decades to reestablish (BLM, 2017; Fulbright, 1997; Peterson and Boyd, 1998). A shift in the plant community could also lead to localized changes in the animal community that depends on the plant community for food and shelter. The colonization of disturbed areas by species from nearby native communities in the Apacherian-Chihuahuan mesquite upland scrub ecological system could be slow (BLM, 2017). According to the BLM, establishment of mature, native plant communities may require decades. While the proposed rail sidetrack has a somewhat different proportion of vegetative communities, the difference is minor, and the impacts on habitats from the construction of the rail sidetrack would not significantly differ from the potential impacts on habitats from construction of the proposed CISF.

During construction activities, ISP would implement soil-erosion and sediment-control BMPs, including sediment fences, earthen berms, and diversion ditches to reduce adverse impacts on surface water such as soil erosion and sedimentation of natural drainages as necessary during all phases of construction to limit runoff capable of causing siltation or scouring of streams (ISP, 2020; EIS Sections 4.4.1.1 and 4.5.1.1.1). Disturbed areas would be stabilized as part of construction work with native grass species, pavement, and crushed stone to control erosion, and eroded areas that may result would be repaired (ISP, 2020). ISP would be required to comply with a TPDES general construction permit from the TCEQ; however, the proposed action (Phase 1) would not require an operation permit from the TCEQ, because facility operations would not discharge any process wastewater (ISP, 2020). These mitigation measures would also benefit ecological resources because they would reduce the potential impacts to surface water runoff receptors by limiting channel siltation and silt deposition and maintain State water quality standards.

Based on the NRC staff's assessment in EIS Section 3.6, the NRC staff considers that the Texas horned lizard and the dunes sagebrush lizard may be present at the proposed CISF project area during the construction stage (Phase 1). According to ISP's contractor, Cox McLain Environmental Consulting, Inc. (CMEC) that conducted an ecological survey at the proposed CISF in 2019, approximately 30.8 ha [76 ac] of the sandy shinnery shrubland vegetation type that could support the dunes sagebrush lizard is present in the northern third of the proposed CISF project area where the proposed protected area fence and OCA fence are planned (EIS Section 3.6) (ISP, 2020). Therefore, construction of the fence around the 130-ha [320-ac] OCA and the double fence that would surround the approximate 41-ha [100-ac] protected or restricted-access area within the OCA could potentially disturb or kill lizards during Phase 1 construction, but not in sufficient numbers to affect the local populations of these species. Proposed disturbances associated with the cask storage pad, buildings, and rail sidetrack for the proposed action (Phase 1) are not located within the sandy shinnery shrubland vegetation type that could support the dunes sagebrush lizard. The dunes sagebrush lizard is not a highly mobile species and is confined to small home ranges within the active sand dune-shinnery oak habitat type, between 0.044 to 0.28 ha [0.1 to 0.7 ac] in size. Because of the small amount of potential habitat that is present at the proposed CISF necessary for dunes sagebrush lizard survival in the northern half of the proposed CISF project area, the small amount of disturbance planned in that habitat for fences during the proposed action (Phase 1), and the mitigation measures that ISP commits to implement (described at the end of this section) that would limit impacts to lizards, such as stabilizing and revegetating disturbed areas, the NRC staff concludes that there would be minor impacts on the dunes sagebrush lizard from the construction of the proposed CISF during Phase 1. The Texas Comptroller of Public Accounts facilitates a plan to conserve and protect dunes sagebrush lizard and its habitat (EIS Section 3.6.4) (TCPA, 2019).

As with the dunes sagebrush lizard, many nonprofit organizations and voluntary landowner agreements are dedicated to the conservation and recovery of Texas horned lizards by funding research and conservation efforts, which has resulted in an increase of the species in Texas (Bond, 2018). The Texas horned lizard is widespread in west and south Texas and has experienced over-collecting, incidental loss, and habitat disturbance (ISP, 2020; Bond, 2018). The species is vulnerable to loss of breeding habitat, which comprises a combination of open spaces separated by shrubs (Bond, 2018). Because of the small amount of potential habitat that may be disturbed from construction of the proposed CISF {approximately 130 ha [320 ac]} compared to the abundant suitable habitat in the vicinity of the project to support displaced individuals, and because of the mitigation measures that ISP commits to implement (described at the end of this section) that would limit impacts to lizards such as stabilizing and revegetating disturbed areas, the NRC staff concludes that there would be only minor impacts on the Texas horned lizard from the construction of the proposed CISF.

The proposed CISF project area is not located within the lesser prairie-chicken designated focal area or connectivity zone, which are areas of the greatest importance to the species. Neither evidence of the lesser prairie-chicken nor active leks have been observed on the WCS-owned property (ISP, 2020; WCS, 2007). For these reasons, the NRC staff determines that it is unlikely that this species would occur at the proposed CISF project area or be disturbed by construction activities there (KBS, 2017; Wolfe et al., 2017; ISP, 2020, 2019d).

The presence of power lines increases the potential for collisions of wildlife with power lines and could displace prey species, which may reduce food availability within the area. Electrical power lines currently traverse the land WCS owns to the west of the proposed CISF in a north-south direction (ISP, 2020). According to ISP, electricity to the CISF would be provided from existing power lines northeast of the proposed CISF site. A small transformer yard would be located on the proposed CISF project area and distribution to onsite facilities would be provided via buried electrical lines (ISP, 2020). Associated support structures would be located along the existing onsite rights-of-way to minimize impacts to vegetation and wildlife and to minimize the impacts of short-term disturbances related to the placement of the tie-in line (ISP, 2020). Therefore, the NRC staff concludes that there would be minor ecological impacts from the construction of utilities at the proposed CISF during the proposed action (Phase 1).

Migratory birds, including waterfowl, could temporarily occur at the proposed CISF and may be vulnerable to proposed CISF construction activities. Water fowl could also use the large drainage depression on the eastern edge of the CISF footprint and other nearby surface features described in EIS Sections 3.4.2 and 3.5.1, such as Baker Spring, surface depressions, and playas located within 10 km [6.2 mi] of the proposed CISF project area that retain small amounts of water for several days following a major precipitation event. The relatively small size of these features {less than 2 ha [5 ac] each} would limit the presence of waterfowl and other avian species, such as the State-listed species discussed in this section, from relying on the playa depressions as long-term water sources. Thus, it is reasonable to determine that proposed CISF construction activities would have a minor effect on migratory birds, including waterfowl. Mitigation measures TPWD and FWS recommend, described later in this section, would lessen impacts to avian species.

Many other species, such as rodents and some reptiles that could be present at the site and described in EIS Section 3.6.3, are small, have limited mobility, occur in habitats that provide concealment, or spend at least a portion of their lives underground. During proposed CISF construction activities (Phase 1), it is likely that some individuals of these species will not survive the construction activities. Rodents and larger mammals and reptiles may be killed along access roads by vehicles moving to and from the site or by construction equipment.

The applicant has committed to implement mitigation measures that would further limit potential construction impacts on ecological resources (ISP, 2020). As previously referenced in this section, ISP would use mitigation measures for soil stabilization and sediment control, comply with a TPDES construction permit, and revegetate disturbed areas with native plant species. ISP indicates in its ER that additional mitigation measures would include monitoring leaks and spills of oil and hazardous material from operating equipment (ER Section 4.1), using animal-friendly fencing around the proposed CISF (ER Section 5.2.5), minimizing fugitive dust (ER Sections 4.5.11 and 5.2.6), down-shielding security lighting for all ground-level facilities and equipment to keep night light exposure to a minimum (ER Section 4.5.9), maintaining noise-suppression systems on construction vehicles (ER Section 5.2.7), installing new water supply lines along the existing roadways (ER Section 4.1), and burying new power lines. These mitigation measures would reduce impacts on ecological resources by limiting exposure of contaminants to wildlife, protecting wildlife so that wildlife cannot be injured or entangled in the proposed CISF security fence, limiting dust that may settle on forage and edible vegetation rendering it undesirable to animals, limiting the potential mortalities of nocturnal animals and crepuscular animals that are active primarily during twilight, and reducing disturbing noise to animals.

There are many square miles of undeveloped land southeast of the proposed project area, which have native vegetation and habitats suitable for native species. The proposed action (Phase 1) construction impacts would be expected to contribute to the change in vegetation species' composition, abundance, and distribution within and adjacent to the proposed CISF project area and, per BLM, it may take decades to establish mature, native plant communities in the region (BLM, 2017). Although the construction of the proposed action (Phase 1) would remove about 34 percent {43.9 ha [108.5 ac]} of the land area within the proposed CISF project area, 43.9 ha [108.5 ac] accounts for about 0.8 percent of the 5,666 ha [14,000 ac] parcel of land WCS owns. The disturbance to vegetation would affect the ecosystem function of the vegetative communities within and around the proposed CISF project area due to the expected shift of plant communities and the potential introduction of weeds. Therefore, the NRC staff concludes that impacts to vegetation from the construction of the proposed action (Phase 1) would be noticeable within the proposed project area but would not destabilize the vegetative communities at the proposed CISF project, resulting in a MODERATE impact. However, the removal of 43.9 ha [108.5 ac] of vegetation within the regional Apacherian-Chihuahuan mesquite upland scrub ecological system would not be noticeable and would have a SMALL impact on vegetation in the regional ecosystem.

As discussed in EIS Section 3.6, the species of wildlife that are present or that could be present at the proposed CISF project area are typical of those found in the habitats in the surrounding area. Because (i) a large portion of the area surrounding the proposed CISF project area is undeveloped (EIS Section 3.2); (ii) there is abundant suitable habitat in the vicinity of the project to support displaced animals; (iii) the proposed action (Phase 1) construction activities would have "No Effect" on Federally listed species; and (iv) there are no rare or unique communities, habitats, or wildlife on the proposed CISF project area, the NRC staff concludes that impacts to wildlife from the proposed action (Phase 1) for construction would be minor and would not noticeably change the population of any species.

In ER Section 5.2.5, ISP stated that it would consider recommendations from appropriate Federal and State agencies. The TPWD provided the NRC staff with recommendations for the proposed project for migratory birds, the lesser prairie-chicken, the Texas horned lizard, the dunes sagebrush lizard, and rare species that may be found at the CISF project area (TPWD, 2017). The NRC staff also independently reviewed FWS recommendations for development projects. The following paragraphs describe TPWD and FWS recommendations to ensure the protection of ecological resources during the construction stage of the proposed CISF.

Many migratory birds are generally present in the region from February through September and nest between March through August (FWS, 2020; TPWD, 2017). All migratory birds, their feathers and body parts, nests, eggs, and nestling birds are protected by the Federal Migratory Bird Treaty Act (MBTA), making it unlawful to hunt, shoot, wound, kill, trap, capture, or sell birds listed under this convention. With a few exceptions, the MBTA protects all bird species that are native to the United States. Eagles are additionally protected by the Bald and Golden Eagle Protection Act (BGEPA) (FWS, 2020). The applicant would be responsible for complying with these laws during all stages and phases of the proposed project, limiting potential effects on birds from the proposed project. ISP would consider recommendations of Federal and State agencies. The FWS and TPWD recommend that ISP avoid conducting activities requiring vegetation removal or disturbance during the peak nesting period of March through August to avoid destruction of individuals, nests, or eggs (FWS, 2020; TPWD, 2017). The FWS and TPWD further recommend that if project activities must be conducted during this time that nest surveys are conducted prior to the vegetation removal or disturbance (FWS, 2020; TPWD, 2017). If the nest of a migratory bird is found during the survey, the FWS recommends establishing a buffer of vegetation that would remain around the nest until the young have fledged or the nest is abandoned (FWS, 2020; TPWD, 2017). The NRC staff supports these FWS and TPWD recommendations for avoiding vegetation removal or disturbance between March through August, conducting bird nest surveys prior to disturbance, and establishing vegetation barriers if nests are found and proposes them as additional mitigation measures (EIS Chapter 6).

While the lesser prairie-chicken is not a Texas State-listed or Federally listed protected species, the TPWD recommends that ISP monitor the listing status of the lesser prairie-chicken because changes could potentially require consultation, permitting, or mitigation with wildlife agencies in the future (TPWD, 2017). Because the proposed CISF project area is located within the modeled habitat range of the lesser prairie-chicken, TPWD recommends (and, as included in EIS Chapter 6, the NRC staff concurs) that new projects in this habitat range should voluntarily enroll in the Range-Wide Conservation Plan for the species intended to conserve suitable habitat (TPWD, 2017).

The NRC staff has consulted with Federal and State agencies and has considered the recommendations of Federal and State agencies in the development of this draft EIS. The NRC staff will consider all additional Federal and State agency recommendations provided on this draft EIS in the final EIS. The FWS provides information on its website regarding measures to reduce potential impacts to birds from electric power infrastructure when constructing new overhead power lines and retrofitting old power lines (FWS, 2016). The FWS website provides links to documents the Avian Power Line Interaction Committee (APLIC) developed with recommendations to prevent or minimize risk of avian collision or electrocution of raptors (APLIC, 2006). The applicant could further reduce effects on avian species from construction activities by following FWS's Nationwide Standard Conservation Measures and APLIC's Suggested Practices for Avian Protection on Power Lines (FWS, 2018; APLIC, 2006). Although the NRC staff anticipates minor impacts to birds from the presence of power lines that support the proposed CISF, should the applicant choose to follow these additional FWS- and APLIC-recommended mitigations, in addition to mitigation measures previously described that ISP commits to implement, effects on all birds would be reduced (EIS Chapter 6).

The TPWD recommends that ISP avoid disturbing Texas horned lizards and colonies of their primary food source, the Harvester ant, during construction stages (TPWD, 2017). The TPWD additionally recommends that a permitted biological monitor be present during construction activities so that Texas horned lizards can be relocated, if found. If a monitor is not present during construction, ISP should allow Texas horned lizards to safely leave the site. Lastly, TPWD recommends that ISP revegetate disturbed areas within suitable habitat with patchy, native vegetation rather than sod-forming grass (TPWD, 2017).

Because TPWD determined that there is a high likelihood of occurrence of the dunes sagebrush lizard in the proposed project area, TPWD further recommends that ISP implement a number of conservation measures within suitable dunes sagebrush lizard habitat during the proposed project (TPWD, 2017). These measures include (i) maximizing the use of the existing developed areas and roadways, (ii) limiting construction activities during the months from

October through March, (iii) minimizing the development footprint, (iv) restricting vehicle travel when possible, (v) avoiding aerially sprayed herbicides for weed control, (vi) avoiding the introduction of nonnative vegetation, (vii) reclaiming suitable dunes sagebrush lizard habitat with locally sourced native seeds and vegetation, and (viii) controlling mesquite and other invasive woody species from impairing suitable dunes sagebrush lizard habitat.

The NRC staff considered TPWD-recommended mitigation measures that has informed the NRC staff's determinations in this EIS. The NRC staff supports the TPWD recommendations for mitigating impacts on the Texas horned lizard and dunes sagebrush lizard (EIS Chapter 6). The NRC staff further recommends that ISP consult with TPWD to develop a survey plan for the Texas horned lizard and dunes sagebrush lizard. Additionally, the NRC staff recommends that ISP follow TPWD-provided fence designs that TPWD deems appropriate to use during the CISF construction activities.

As previously described, the applicant has committed to mitigation measures, including using temporary sediment-control features during construction that would limit direct impacts from land disturbances and spills. TCEQ regulations require that the applicant follow provisions in a SWPPP that would address stormwater drainage impacts from erosion and sedimentation during construction activities.

Lastly, the NRC staff recommends that ISP follow FWS's recommendations to educate all employees, contractors, and/or site visitors of relevant rules and regulations that protect wildlife (FWS, 2018).

As described in EIS Section 2.2.1.3, the applicant plans to submit up to 7 license amendments for additional phases of the proposed project (Phases 2-8). Should the license and these amendments be granted, construction of the proposed CISF would occur in 8 phases over a 20-year period and include construction of additional storage pads, each capable of storing an additional 5,000 MTU. ISP anticipates that the total area of land to be disturbed from the development of Phases 1 through 8, or full build-out, the rail sidetrack, site access road, and construction laydown area of the proposed CISF is approximately 133.4 ha [330 ac] (ISP, 2020). Construction of Phases 2-8 have the potential to directly impact the dunes sagebrush lizard if those phases occur within suitable dunes sagebrush lizard habitat at the proposed CISF project area because this species is confined to small home ranges within the active sand dune-shinnery oak habitat type, between 0.044 to 0.28 ha [0.1 to 0.7 ac] in size (EIS Section 3.6.1.1).

Similar to the proposed action (Phase 1), to mitigate impacts to vegetation disturbance during construction of subsequent phases, the applicant proposes to use mitigation measures for soil stabilization and sediment control described in EIS Section 4.4, including earth berms, dikes, and sediment fences, as necessary, during all phases of construction to limit runoff (ISP, 2020). Disturbed areas would be stabilized as part of construction work with native grass species, pavement, and crushed stone to control erosion, and eroded areas that may develop would be repaired (ISP, 2020). During construction of Phases 2-8, the applicant would continue to monitor for and repair leaks and spills of oil and hazardous material from operating equipment (EIS Section 4.4.1.1), minimize fugitive dust (EIS Section 4.7.1), and conduct most construction activities during daylight hours (EIS Section 4.8.1.1). The applicant would also be required to comply with a TPDES general construction permit. For construction of each individual subsequent phase (Phases 2-8), because (i) a smaller amount of land would be disturbed during each subsequent construction stage compared to Phase 1, (ii) fewer vehicles and workers would access the proposed project area, and (iii) the applicant has committed to mitigation measures, the potential impacts on wildlife and vegetation would be similar during the construction of individual Phases 2-8 compared to the proposed action (Phase 1). The combined area of disturbance from the construction of full build-out (Phases 1-8), the rail sidetrack, site access road, and construction laydown area, would be approximately 133.4 ha [330 ac] of land. Because construction would occur over a number of years and there would be abundant habitat available around the proposed facility to support the gradual movement of wildlife, and because the proposed CISF would have no effect on Federally listed threatened or endangered species, the NRC staff concludes that overall ecological impacts at the proposed CISF during the construction stage for full build-out (Phases 1-8) would be SMALL for wildlife and MODERATE for vegetative communities. The removal of up to 133.4 ha [330 ac] of vegetation within the region of the Apacherian-Chihuahuan mesquite upland scrub ecological system would not be noticeable and would have a SMALL impact on vegetation in the regional ecosystem.

Should ISP choose to follow the NRC staff recommendations during construction of Phases 2-8 that were also made for reducing ecological impacts during the proposed action (Phase 1) construction to (i) avoid vegetation removal or disturbance between March through August, (ii) conduct bird nest surveys prior to disturbance and establish vegetation barriers if nests are found; (iii) enroll in the Range-Wide Conservation Plan for the lesser prairie-chicken, (iv) follow FWS guidance when constructing new overhead power lines and retrofitting old power lines, (v) follow TPWD recommendations to limit disturbances to the Texas horned lizard, (vi) follow TPWD recommendations to limit disturbances to the dunes sagebrush lizard, (vii) consult with TPWD to develop a survey plan for the Texas horned lizard and dunes sagebrush lizard, (viii) follow TPWD-provided fence designs that TPWD deems appropriate to use during the CISF construction activities, and (ix) educate employees and visitors on relevant rules and regulations that protect wildlife, effects on ecological resources would be reduced but would remain SMALL for wildlife and MODERATE for vegetative communities for full build-out (Phases 1-8).

4.6.1.2 Operations Impacts

Fewer effects to vegetative communities would occur during the operations stage as compared to the construction stage (Phase 1) because the only planned land disturbance during the operations stage would be for staggered construction of storage pads. Land available for ecological resources would be committed for up to the 40-year license term of the proposed action (Phase 1). No noxious or invasive weeds have been identified at the proposed CISF; however, ISP states that lower successional stage species (i.e., weeds) are present along the access road along the perimeter of the proposed CISF project area that is maintained and used by vehicles, associated with the operation of the adjacent waste disposal facilities, on a regular basis (EIS Section 3.6.2) (ISP, 2020). Land immediately adjacent to areas previously disturbed during construction activities, and areas along the existing and proposed access roads and rail tracks that remain disturbed during operations of the proposed action (Phase 1), may provide additional opportunities for invasion of undesirable plant species (i.e., weeds). ISP states that herbicides may be used in limited amounts according to government regulations and manufacturer's instructions to control unwanted noxious vegetation (ISP, 2020). In addition, material spills from transportation vehicles and train engines, maintenance equipment, and diesel-powered equipment such as generators could also occur during the operations stage, which could kill vegetation exposed to the spilled material; however, such spills are anticipated to be few, based on permit requirements and mitigation measures that would continue to be implemented.

The potential impacts to mammals, birds, amphibians, and reptiles during the proposed action (Phase 1) operations at the proposed CISF would be similar to or less than the SMALL impacts on wildlife and MODERATE impacts on vegetative communities at the proposed CISF described previously for the proposed action (Phase 1) construction stage with respect to earthmoving activities and traffic. With the exception of avian species, none of the wildlife species at the proposed CISF discussed in EIS Section 3.6 have established migratory travel corridors because they are not migratory in this part of their range. In addition, the potential for wildlife to access the surface impoundments would be minimized by the installation of animal-friendly fencing around the proposed CISF. After construction of Phase 1 is complete, there would be less noise and less traffic during the operations stage of the proposed project (Phase 1) compared to the construction stage; therefore, the potential to disrupt wildlife populations would be reduced along with a decrease in the probability of vehicular collisions. The area to be fenced (i.e., the OCA) would account for 130 ha [320 ac] of the proposed CISF project area, which would prevent large wildlife such as antelope and cattle from accessing the proposed CISF. ISP expects that no liquid effluents other than stormwater runoff would have the chance of reaching surface water conveyance features such as gullies and rills of Monument Draw (ISP, 2020); therefore, the operations stage would have no impacts on downstream habitats (e.g., wetlands and depressions) or water fowl or other avian species that may rely on standing water.

During the operations stage of the proposed action (Phase 1) and all subsequent phases (Phases 2-8), the SNF loaded in storage modules under normal operating conditions would emit gamma and neutron radiations to areas in and around the storage and operation area. Wildlife in and around the storage and operation area could be exposed to these types of radiation. Because radiation attenuates (decreases) with distance, the level of exposure would depend on the proximity of wildlife to the storage modules. Birds and other small animals could find the proposed CISF project attractive during winter months because the proposed CISF project would be a source of heat. There are currently no Federal standards that directly limit radiation doses to wildlife, although related scientific research continues to develop the information base necessary to assess whether such standards are needed.

However, it is well understood that the biological effects of ionizing radiation depend on the intensity of the radiation (both magnitude and energy) and the accumulated dose recipients receive. Considering available scientific information, the DOE has developed a technical standard that applies a graded approach for evaluating radiation doses to terrestrial biota (DOE, 2019). The DOE technical standard includes impact threshold levels for terrestrial wildlife exposed to continuous direct radiation that the NRC staff found applicable to the exposure conditions at the proposed CISF project. The DOE technical standard states that if the greatest dose rate in the field does not exceed 1 mGy/d [0.1 rad/d], the facility has demonstrated protection and no further action or analysis is required. DOE further states that if the greatest dose rate in the field exceeds 1 mGy/d [0.1 rad/d], it does not immediately imply noncompliance and allows for further consideration and refinement of conservatisms in the approach such as the possibility of noncontinuous exposure that would lower the actual expected exposure. DOE sets an upper threshold that the maximum dose rates should not exceed 100 mGy/d [10 rad/d] based on a prior IAEA (1992) report. The IAEA report found that acute dose rates below this level {100 mGy/d [10 rad/d]} were unlikely to produce persistent and measurable deleterious changes in populations or communities of terrestrial plants or animals.

Based on the dose rate estimates documented in ISP's dose calculations (ISP, 2018), the highest average human dose rate on the accessible surface of a loaded storage module was 0.360 mSv/hr [36.0 mrem/hr] or 8.64 mSv/d [0.864 rem/day] at the top of a loaded HSM Model

80 storage cask. The ISP dose rate is a dose equivalent, which is based on the product of absorbed dose and a quality factor that accounts for the effectiveness of different radiations in causing biological damage (ICRP, 2007). Considering this general relationship between dose equivalent and absorbed dose, the NRC staff conservatively estimated the absorbed dose (to compare with the DOE technical standard) by dividing the ISP dose rate by the lowest quality factor of the applicable radiations (gamma radiation, which has a quality factor of 1), resulting in an absorbed dose of 8.64 mGy/d [0.864 rad/d]. The NRC staff similarly estimated additional absorbed dose rates from ISP's estimated human dose equivalent rates near the proposed controlled area boundary of the CISF at approximately 941 m [1029 yd] from the proposed storage pads. During the operations stage of the proposed action (Phase 1), this dose rate was 0.556 μSv/hr [55.6 μrem/hr], which converted to 13.3 μSv/d [1.33 mrem/d], which resulted in an NRC staff estimated absorbed dose rate of 13.3 μGy/d [1.33 mrad/d]. At full build-out, a controlled area boundary dose rate ISP estimated as 7.46 nSv/hr [0.746 μrem/hr] at a distance of 1,006 m [3,300 ft] from the center of the proposed CISF (ISP, 2020), which similarly converted to 0.179 μSv/d [17.9 μrem/d] and resulted in an NRC staff estimated absorbed dose rate of 0.179 μGy/d [17.9 μrad/d].

In comparing the estimated absorbed dose rates at the proposed CISF with the DOE technical standard, the NRC staff concludes that during any phase of the proposed project, the highest estimated absorbed dose rate that ISP reported at the surface of a storage cask (at the top of a loaded HSM Model 80 storage cask) of 8.64 mGy/d [0.864 rad/d] exceeds the DOE initial threshold for demonstrated protection of wildlife but is below the DOE threshold of 100 mGy/d [10 rad/d] for persistent deleterious changes in populations or communities. Therefore, some individual organism impacts are possible if there is sustained exposure to wildlife within close proximity to a storage module, but NRC staff expects this level of sustained close proximity of wildlife to storage modules would be unlikely; therefore, such effects would be minor. Additionally, the comparison to the DOE thresholds indicates that population effects would not be expected. The comparison of dose rates at the facility boundary for Phase 1 and full build-out are below the DOE thresholds; therefore, the NRC staff concludes that estimated radiation levels at the controlled area boundary and beyond during any phase of the proposed CISF project would be generally protective of wildlife.

As stated in EIS Section 4.6.1.1 for impacts from construction (Phase 1) on ecological resources, the applicant has committed to mitigation measures that would limit potential effects on vegetation and wildlife during the operations stage (Phase 1). These mitigations include monitoring for leaks and spills of oil and hazardous material from operating equipment, using animal-friendly fencing around the proposed CISF, minimizing fugitive dust, down-shielding security lighting for all ground-level facilities and equipment to keep night light exposure to a minimum, maintaining noise suppression systems on construction vehicles, installing new water supply lines along the existing road right of ways, and burying new power lines (ISP, 2020). Due to the absence of an aquatic environment and the applicant's commitment to implement stormwater management practices, the impacts to aquatic systems from operations would be limited. During the operations stage for the proposed action (Phase 1), approximately 120 ha [320 ac] of vegetative communities and habitat for wildlife that was disturbed during construction would continue to be noticeably altered, but not destabilized, within the proposed project area, and therefore would continue to result in a MODERATE impact on the vegetative communities within the proposed CISF project area. However, effective wildlife management practices, required monitoring for leaks and spills, and down-shield security lighting would prevent permanent nesting and lengthy stay times of wildlife that may potentially attempt to reside at the proposed CISF. Thus, the impacts to local wildlife during the proposed action (Phase 1) operations stage would be minor and would not noticeably change the population of any species.

The NRC staff anticipates that, when overlapping construction and operations activities of subsequent phases occur, ISP would continue the mitigation measures implemented during construction discussed in EIS Section 4.6.1.1 and the previously described mitigations for the proposed action (Phase 1), and that these would continue to limit potential effects on vegetation and wildlife during overlapping construction and operations activities during Phases 2-8. Although construction impacts of subsequent phases would occur concurrently with operation impacts of prior phases, operation impacts are not anticipated to significantly increase those experienced from construction. Once construction activities for all phases are complete, ecological impacts because of noise, vehicles, structures, and the presence of humans would be significantly reduced because limited or no earthmoving activities would occur. During the operations stage of Phases 2-8, as described in the preceding analysis, some individual organism impacts are possible from exposure to direct radiation if there is sustained exposure to wildlife within close proximity to storage modules, but this would not be expected to affect populations. The radiation levels at the controlled area fence and beyond during Phases 2-8 of the proposed CISF project would be generally protective of wildlife. Similar to the proposed action (Phase 1) operations stage, to mitigate impacts to vegetation and wildlife during operations, ISP proposes to (i) monitor for leaks and spills of oil and hazardous material from operating equipment, (ii) use animal-friendly fencing around the proposed CISF, (iii) minimize fugitive dust, (iv) down-shield security lighting for all ground-level facilities and equipment to keep night light exposure to a minimum, (v) maintain noise suppression systems on construction vehicles, (vi) install new water supply lines along the existing road rights of way, and (vii) bury new power lines (ISP, 2020). Because disturbances from construction of Phases 2-8 would continue, but no additional land would be disturbed during the operations stage of Phases 2-8 at the proposed CISF project, and because of ISP's commitment to mitigation measures, the NRC staff determines that the potential impacts on ecology during the operations stage for the proposed action (Phase 1) and for full build-out (Phases 1-8) would be SMALL on wildlife and MODERATE on vegetation at the proposed CISF project. The removal of up to 133.4 ha [330 ac] of vegetation within the region of the Apacherian-Chihuahuan mesquite upland scrub ecological system would not be noticeable and would have a SMALL impact on vegetation in the regional ecosystem.

In addition to the mitigation measures ISP plans to implement, the NRC staff recommends that ISP develop a wildlife inspection plan to identify animals that may be present at the proposed CISF and take action to remove animals found within the storage pad area if present. To prevent permanent nesting and lengthy stay times of wildlife that may potentially attempt to reside at the proposed CISF, the NRC staff recommends that ISP consult with TPWD to determine appropriate mitigation measures to discourage wildlife from use and habitation of the proposed CISF, particularly near cask vents. To further limit the potential impacts on vegetation communities and wildlife habitat from the presence of the rail sidetrack, the NRC staff recommends that ISP periodically inspect roads and rights-of-way for invasion of noxious weeds, train maintenance staff to recognize weeds and report locations to the local weed specialist, and maintain an inventory of weed infestations and schedule them for treatment on a regular basis.

Defueling

Defueling activities would consist of moving SNF from the CISF storage units and transporting offsite to a final repository. Activities would be similar in scale and nature to those that occur during emplacement of the SNF canisters earlier in the operations stage. Potential ecological impacts would be negligible because no new construction would be occurring; however, disturbances could include habitat fragmentation; the potential for the establishment of invasive weeds along the disturbed edges of the rail sidetrack or access roads; noise, lights, and vibrations of the trains or trucks that could disturb wildlife; and, direct animal mortalities. However, removing the SNF would reduce the potential for wildlife to be exposed to radiation doses. Therefore, the NRC staff concludes that defueling for the proposed action (Phase 1) or for full build-out (Phases 1-8) would have SMALL impacts on wildlife and MODERATE impacts on vegetation at the proposed CISF. The removal of up to 133.4 ha [330 ac] of vegetation within the region of the Apacherian-Chihuahuan mesquite upland scrub ecological system would not be noticeable and would have a SMALL impact on vegetation in the regional ecosystem.

4.6.1.3 Decommissioning Impacts

At the end of the license term of the proposed CISF project, once the SNF inventory is removed, the facility would be decommissioned such that the proposed project area and remaining facilities could be released, and the license terminated. Decommissioning activities, in accordance with 10 CFR Part 72 and Part 20 requirements, would include conducting radiological surveys and decontaminating, if necessary. Decommissioning activities for the proposed action (Phase 1) and for Phases 2-8 would involve the same activities. Differences between decommissioning of the proposed action (Phase 1) and subsequent phases would include the number of radiological surveys conducted and amount of decontaminating (if necessary) needed, as the activities would be scaled to address the overall size of the CISF (i.e., the number of phases completed). During the decommissioning stage of the proposed action (Phase 1) and all subsequent phases, wildlife in and around the storage and operation area could be exposed to radiation at levels less than during the operations stage when SNF is emplaced at the proposed CISF.

Decommissioning at the facility for either the proposed action (Phase 1) or full build-out (Phases 1-8) could potentially remove some vegetation and temporarily displace animals close to the CISF infrastructure. Direct impacts on vegetation during decommissioning of the proposed CISF would also include removal of existing vegetation from the area required for equipment laydown and disassembly. These disturbances would be temporary and limited to areas previously disturbed during the construction and operations stages. The wildlife in the project area would have adapted to the existence of the proposed CISF during the post-construction operations stage of the proposed action (Phase 1). As is the case during operations, due to the absence of an aquatic environment and the applicant’s commitment to implement stormwater management practices, the impacts to aquatic systems during decommissioning would be minimal.

ISP anticipates that decommissioning and closure of the proposed project (Phase 1) would require 2 years to complete (ISP, 2020). Decommissioning activities discussed in EIS Section 2.2.1.3.3 do not include removal of all casks and other infrastructure; therefore, the acreage that may be replanted as a result of dismantling any facilities during decommissioning would vary. If facilities are not removed, impacts to vegetation and wildlife would persist throughout the decommissioning stage. Replanting the disturbed areas that may require dismantling during decommissioning with native species after completion of the decontamination and decommissioning activities could reduce decommissioning impacts on vegetation communities and wildlife habitat. While vegetation becomes established, individual animals such as the dunes sagebrush lizard, which depends on the sandy shinnery shrubland vegetation type present in the northern third of the proposed CISF project area, could experience temporary and limited potential impacts.

The NRC staff would conduct detailed technical and environmental reviews of the decommissioning plan. Prior to final site decommissioning, the applicant would submit a decommissioning plan to the NRC, in accordance with 10 CFR Part 40. During the decommissioning phase, the applicant would have a continued legal obligation to comply with the ESA, the MBTA, and the BGEPA to limit potential effects on wildlife. Because the NRC staff cannot predict the acreage that may be replanted during decommissioning, the NRC staff conservatively assumes that all of the 120 ha [320 ac] disturbed during the construction stage of the proposed action (Phase 1) would continue to alter noticeably but not destabilize the vegetative communities within the proposed project area during the decommissioning phase. At the time of license termination, the site would be released in accordance with 10 CFR Part 20, Subpart E (ISP, 2020). For these reasons, the NRC staff concludes that the impact on ecological resources from decommissioning the proposed action (Phase 1) would be SMALL on wildlife and MODERATE on vegetation within the proposed project area.

Decommissioning the proposed facility for Phases 2-8 would have potential ecological impacts similar in nature to the decommissioning stage for the proposed action (Phase 1) (e.g., vegetation removal, wildlife displacement, and disturbances), but would be larger in scale compared to the amount of disturbed land from the decommissioning stage of Phase 1. Potential impacts could affect surface water runoff receptors and individual animals until vegetation is established in any disturbed areas. The NRC staff anticipates that the same mitigation measures described for decommissioning the proposed action (Phase 1) previously discussed would be used during decommissioning for Phases 2-8 (e.g., use site stabilization practices to reduce the potential for erosion and sedimentation), which would limit overall impacts to wildlife and their habitat. For these reasons, the NRC staff concludes that impacts on local wildlife during the decommissioning stage would be SMALL from decommissioning for the proposed CISF project (Phase 1) and for full build-out (Phases 1-8). The establishment of mature, native plant communities in any disturbed areas may require decades. The NRC staff concludes that the impact on vegetation within the proposed project area from decommissioning the proposed project (Phase 1) and for full build-out (Phases 1-8) would be MODERATE.

4.6.2 No-Action Alternative

Under the No-Action alternative, the NRC would not license the proposed CISF and the land would continue to be available for other uses. Impacts such as habitat loss from land clearing, noise and vibrations from heavy equipment and traffic, fugitive dust, increased soil erosion from surface water runoff, sedimentation, and the presence of personnel would not occur in order to build and operate a CISF, but it is possible that the site would experience those impacts because of other unrelated land use changes. Operational impacts would also be avoided because no SNF canisters would arrive for storage. Impacts to ecological resources from decommissioning activities would not occur, because unbuilt SNF storage pads, buildings, and transportation infrastructure require no decontamination or decommissioning. The ecological conditions on and near the proposed CISF project would remain essentially unchanged under the No-Action alternative until other activities occur, and the proposed CISF project area would continue to support wildlife and habitats that occur there. In the absence of the proposed CISF, the NRC staff assumes that SNF would remain onsite in existing wet and dry storage facilities and be stored in accordance with NRC regulations and be subject to NRC oversight and inspection. Site-specific impacts at each of these storage sites would be expected to continue as detailed in generic (NRC, 2013, 2005a) or site-specific environmental analyses. In accordance with current U.S. policy, the NRC staff also assumes that the SNF would be transported to a permanent geologic repository, when such a facility becomes available.

4.7 Air Quality Impacts

This section considers the potential impacts to air quality, including nongreenhouse gases, greenhouse gases, and climate change for the proposed action (Phase 1), Phases 2-8, full build-out (Phases 1-8), and No-Action alternative.

4.7.1 Nongreenhouse Gas Impacts

Impacts from nongreenhouse gases to air quality from the proposed CISF activities may result primarily from combustion emissions from mobile sources (e.g., construction equipment and ready-mix trucks) as well as fugitive dust.

4.7.1.1 Impacts from the Proposed CISF

As described in EIS Section 3.2.1, the proposed ISP CISF would be situated on a portion of a 5,666-ha [14,000-ac] parcel of land, part of which is located in Andrews County, Texas, and part of which is located in Lea County, New Mexico. As described in EIS Section 3.7.2.1, Andrews County, Texas, is located within the Midland-Odessa-San Angelo Air Quality Control Region and Lea County, New Mexico, is located within the Pecos-Permian Basin Air Quality Control Region. The proposed CISF project area would be situated on 130 ha [320 ac] of land in Andrews County, Texas. The proposed rail sidetrack would be situated on land in Andrews County, Texas, primarily within the proposed CISF project area (EIS Figure 3.7-1)

The following sections assess the potential environmental impacts on air quality from construction, operation, and decommissioning of the proposed CISF. This section also addresses the environmental impacts from the peak year of activity at the proposed CISF, which accounts for the period of time when stages (i.e., construction and operation) occur simultaneously or overlap because of staggered development of the project phases, if approved by NRC. Peak-year emissions represent the highest emission levels associated with the proposed CISF in any single year and therefore also represent the greatest potential impact to air quality.

The NRC staff characterizes the magnitude of air effluents from the proposed CISF project in part by comparing the emission levels to regulatory standards such as National Ambient Air Quality Standards (NAAQS). The NRC's analysis (i) provides context for understanding the magnitude of the proposed CISF project air effluents, which are predominantly from mobile and fugitive sources rather than stationary sources; and (ii) identifies what emissions the analysis in this EIS will focus on for evaluating potential environmental effects. The comparison of pollutant concentrations to thresholds in this EIS is for the NRC's impact evaluation only and does not document or represent a formal determination for air permitting or regulatory compliance.

4.7.1.1.1 Peak-Year Impacts

The peak-year emissions represent the highest emission levels associated with the proposed action (Phase 1) for each individual pollutant in any one year and therefore also represent the greatest potential impact to air quality. Specifically, peak-year emissions account for any overlap in stages (i.e., construction, operation, and decommissioning). For the proposed action, (Phase 1) no stages overlap. This means the peak year for each pollutant occurs during the stage with the highest emission levels in tons per year for that pollutant. Details concerning the emissions associated with each individual stage are provided in subsequent sections of EIS Section 4.7.1.1, which analyze each individual stage. For the proposed action (Phase 1), the construction stage generates peak-year emissions for all pollutants (EIS Table 2.2-2).

Key factors in assessing impacts to air quality include the following: the existing air quality, the proposed action (Phase 1) peak-year emission levels, and the proximity of the emission sources to the receptors. As described in EIS Section 3.7.2.1, the proposed CISF would be located in a region characterized with good air quality. EIS Table 2.2-2 contains the estimated peak-year emission levels for the proposed action (Phase 1). ISP has committed to implement fugitive dust suppression measures (i.e., watering) to reduce impacts of earthmoving activities. This was the only mitigation measure incorporated into the proposed CISF emission estimates in EIS Table 2.2-2. Using these proposed CISF emission estimates, ISP conducted air dispersion modeling and compared the results to NAAQS. EIS Table 4.7-1 contains this comparison. Project emissions alone and when combined with background levels are well below the NAAQS for all pollutants. With respect to proximity of receptors, the nearest resident is located approximately 6 km [3.8 mi] to the west of the proposed CISF (EIS Section 3.7.2.1). The distance between the proposed CISF and the nearest residence reduces the potential impacts because pollutants disperse as distance from the source increases. EIS Figure 3.7-1 shows that other facilities, including the WCS LLRW disposal facility, are located in closer proximity to the proposed CISF project area than the nearest resident. Even with other facilities in close proximity to the proposed CISF project area, the modeling results in EIS Table 4.7-1 show that combining emissions from the proposed project with other facilities would still result in values below the NAAQS. Therefore, the NRC staff concludes that the potential impacts to air quality from the proposed action (Phase 1) peak year emission levels would be minor.

As described in EIS Section 3.7.2.1, the closest Class I area to the proposed CISF project area is Carlsbad Caverns National Park, located about 132.0 km [82 mi] to the southwest. Federally designated Class I areas include national parks, wilderness areas, and monuments, as specified in 40 CFR Part 81. Class I areas have the most stringent requirements for protecting air quality. Federal land managers responsible for managing Class I areas developed guidance that recommends a screening test be applied to proposed sources greater than 50 km [31 mi] from a Class I area to determine whether analysis for air quality related values (e.g., visibility and atmospheric deposition) is warranted (National Park Service, 2010). The screening test considers the project’s distance to the Class I area and the project’s emission levels. If the combined annual mass emission rate (i.e., tons per year) for nitrogen oxides, particulate matter PM_{10}, sulfur dioxide, and sulfuric acid divided by the distance in kilometers from the Class I area is 10 or less, then this source is considered to have negligible impacts with respect to air quality-related values, and further analysis is not warranted. Based on the proposed action (Phase 1) peak-year emission estimates in EIS Table 2.2-2, the screening test results for the proposed CISF is 0.3, which is well below the threshold of 10. Based on the screening test results, the estimated proposed action (Phase 1) peak-year emissions for the proposed CISF would have negligible impacts on air quality related values for Carlsbad Caverns National Park. This is also true for the individual proposed action (Phase 1) stages (i.e., construction, operation, and decommissioning) because their emission levels are the same or lower than the peak-year emission levels (EIS Table 2.2-2).

Table 4.7-1 Proposed Action (Phase 1) Peak Year* Estimated Concentrations (i.e., AERMOD Modeling Results) for the Proposed CISF Compared to the National Ambient Air Quality Standards (NAAQS)					
Pollutant	**Time**	**Background Concentration† (μg/m³)‡**	**Peak Year (μg/m³)**	**Total (μg/m³)**	**NAAQS (μg/m³)**
Carbon Monoxide	1 hour	343.6	78.13	421.73	40,000
	8 hours	343.6	30.63	374.23	10,000
Nitrogen Dioxide	1 hour	26.2	33.17	59.37	188
	Annual	26.2	1.65	27.85	100
Particulate Matter $PM_{2.5}$	24 hours	7.6	0.47	8.07	35
	Annual	7.6	0.39	7.99	15
Particulate Matter PM_{10}	24 hours	20	1.28	21.28	150
Sulfur Dioxide	1 hour	22.8	23.98	46.78	196
	3 hours	22.8	15.05	37.85	1,300

*Peak Year estimates represent the highest emissions levels attributed to the proposed action (Phase 1) of the proposed CISF.
†Background concentrations the applicant provided with longer time-frame estimates conservatively based on shorter time frame values.
‡To convert μg/m³ to oz/yd³, multiply by 2.7×10^{-8}
Source: Modified from ISP, 2020

EIS Table 2.2-3 contains the Phases 2-8 estimated emission levels for the various project stages and the peak year. The peak-year emissions for Phases 2-8 account for when any stages (regardless of phase) overlap. None of the subsequent expansion phase construction stages overlap with the construction stage from other phases. Operations overlap with the construction stages of individual phases; however, the operations stage emissions are independent of the number of operating phases (ISP, 2020). For Phases 2-8, the overlapping construction and operations stages generate the peak-year emission levels for all of the pollutants identified in EIS Table 2.2-3. As described in EIS Section 2.2.1.4, the peak-year emission levels for Phases 2-8 (EIS Table 2.2-3) are less than peak-year emission levels for Phase 1 (EIS Table 2.2-2). The key assessment factors (i.e., existing air quality, project emission levels, and proximity of emission sources to receptors) for the Phases 2-8 peak-year impact assessment are either the same as or bounded by the key factors for the proposed action (Phase 1) peak year impact assessment (minor). Similarly, the impact assessments for full build-out (Phases 1-8) are bounded by the proposed action (Phase 1) peak-year impacts; therefore, the NRC staff concludes that the potential impacts to air quality from peak year emission levels for full build-out (Phases 1-8) would be minor.

In summary, the proposed action (Phase 1) and full build-out (Phases 1-8) generate low levels of air emission criteria pollutants within and adjacent to attainment areas (40 CFR 81.344 and 40 CFR 81.332). Therefore, the NRC staff concludes that the air quality impacts during the peak-year emission levels for the proposed action (Phase 1) would be SMALL, and potential impacts for full build-out (Phases 1-8) would also be SMALL.

4.7.1.1.2 Construction Impacts

The proposed action (Phase 1) construction consists of building the storage modules and pad for 5,000 MTU [5,500 short tons] of SNF. In addition, the proposed action (Phase 1) construction includes building all of the infrastructure needed to support the proposed CISF, including a security and administration building, cask-handling building, and rail sidetrack. Combustion emissions from mobile sources and construction equipment as well as fugitive dust are the main contributors to air quality impacts. The key factors for the proposed action (Phase 1) construction stage are the same as the key factors for the proposed action (Phase 1) peak-year-impact assessment and result in the same overall impact assessment (minor).

Construction of Phases 2-8 consists of building the storage modules and concrete pad for each subsequent phase. Construction stage emission levels for Phases 2-8 are lower than the proposed action (Phase 1) construction stage emission levels because emissions for Phases 2-8 do not include the emissions associated with building all of the infrastructure (e.g., roads and buildings) needed to support the proposed CISF project. The key factors for Phases 2-8 construction stages are either the same as or bounded by the key factors for the Phases 2-8 peak-year impact assessment. For full build-out (Phases 1-8) construction, key factors are the same as for the proposed action (Phase 1) peak-year impact assessment and result in the same overall impact assessment (minor).

In summary, the construction phase impacts for both the proposed action (Phase 1) and full build-out (Phases 1-8) are the same as the peak-year impacts. Therefore, the NRC staff concludes that the air quality impacts during the construction stage for the proposed action (Phase 1) would be SMALL, and potential impacts for full build-out (Phases 1-8) would also be SMALL.

4.7.1.1.3 Operations Impacts

For the proposed action (Phase 1) operations stage, the primary activity is receiving and loading SNF into modules. The main contributors to air quality impacts are combustion emissions from the trains transporting the SNF on the rail sidetrack and from the equipment loading the SNF into the modules. The key factors for the proposed action (Phase 1) operations stage are either the same as or bounded by the key factors for the proposed action (Phase 1) peak-year impact assessment. Similar to the proposed action (Phase 1), the Phases 2-8 operations stages primarily consists of receiving SNF at the proposed CISF project and loading it into modules for storage. The main contributors to air quality impacts continue to be from combustion emissions from trains and equipment used to conduct this activity. The key factors for Phases 2-8 operations stages are either the same as or bounded by the key factors for the Phases 2-8 peak-year impact assessment. For the full build-out (Phases 1-8) operations, the key factors are the same as for proposed action (Phase 1)

In summary, the key factors for the proposed action (Phase 1) and full-build-out (Phases 1-8) operations are the same as or bounded by the key factors for the peak-year operations. This means that the peak-year impact assessment (i.e., SMALL) is bounding. Therefore, the NRC staff concludes that air quality impacts during the operations stage for the proposed action (Phase 1) would be SMALL, and potential impacts for full build-out (Phases 1-8) would also be SMALL.

Defueling the Proposed CISF

Defueling the proposed CISF would involve removal of SNF from the proposed CISF. Defueling activities would generate levels of combustion emissions on a scale similar to emplacement of the SNF earlier in the operations stage. In addition, the description of existing air quality and proximity of the emission sources to the receptors earlier in the operations stage also applies to defueling. Therefore, the NRC staff concludes that the air quality impacts during defueling for the proposed action (Phase 1) would be SMALL, and potential impacts for full build-out (Phases 1-8) would also be SMALL.

4.7.1.1.4 Decommissioning

At the end of the license term of the proposed CISF project, once the SNF inventory is removed, the facility would be decommissioned such that the proposed project area and remaining facilities could be released, and the license terminated. Decommissioning activities in accordance with 10 CFR Part 72 and Part 20 requirements would include conducting radiological surveys and decontaminating, if necessary. Decommissioning activities for the proposed action (Phase 1) and for Phases 2-8 would involve the same activities, but the activities would be scaled to address the overall size of the proposed CISF (i.e., the number of phases completed).

The NRC staff assumes that if decommissioning activities generate any air emissions (e.g., combustion emissions from mobile sources associated with transporting people for conducting surveying), the levels would be bounded by those the operations stage generate [the operations stage emissions are the same for the proposed action (Phase 1), Phases 2-8, and full build-out (Phases 1-8)]. The other key factors (air quality and proximity of emission sources to receptors) for decommissioning the proposed action (Phase 1), Phases 2-8, and full build-out (Phases 1-8) are the same as for the operations stage impact assessments. Therefore, the NRC staff concludes that the air quality impacts during the decommissioning stage for the proposed action (Phase 1) would be SMALL, and potential impacts for full build-out (Phases 1-8) would also be SMALL.

4.7.1.2 No-Action Alternative

Under the No-Action alternative, the NRC would not license the proposed CISF. Therefore, impacts on existing air quality would not occur, because the generation of emissions from activities and sources associated with the proposed CISF would not occur. Construction impacts would be avoided, because SNF storage pads, buildings, and transportation infrastructure would not be built. Operational impacts would also be avoided because no SNF canisters would arrive for storage. Decommissioning impacts would be avoided, because there are no facilities to decommission. Under the No-Action alternative, impacts to air quality at the proposed CISF site would be attributed to existing sources but would not include the proposed CISF. In the absence of the proposed CISF, the NRC staff assumes that SNF would remain onsite in existing wet and dry storage facilities and be stored in accordance with NRC regulations and be subject to NRC oversight and inspection. Site-specific impacts at each of these storage sites would be expected to continue, as detailed in generic (NRC, 2013, 2005a) or site-specific environmental analyses. In accordance with current U.S. policy, the NRC staff also assumes that the SNF would be transported to a permanent geologic repository, when such a facility becomes available.

4.7.2 Greenhouse Gas Impacts

4.7.2.1 Impacts from the Proposed CISF

Climate change effects are considered the result of overall greenhouse gas emissions from numerous sources rather than an individual source. In addition, there is not a strong cause and effect relationship between where the greenhouse gases are emitted and where the impacts occur. Because of these two factors, the NRC staff addresses the contribution of greenhouse gases from the proposed CISF to the overall atmospheric greenhouse gas levels and the relevant climate change effects in EIS Section 5.7.2 on air quality cumulative effects rather than in this section, which addresses the air quality effects specifically attributed to the proposed CISF.

4.7.2.2 No-Action Alternative

Under the No-Action alternative, the NRC would not license the proposed CISF, and the proposed CISF would not be constructed, operated, or decommissioned. Therefore, there would be no contribution from the proposed CISF to the overall greenhouse gas levels and no need to assess the impacts of climate change to or in conjunction with the proposed CISF. In the absence of the proposed CISF, the NRC staff assumes that SNF would remain onsite in existing wet and dry storage facilities and be stored in accordance with NRC regulations and be subject to NRC oversight and inspection. Site-specific impacts at each of these storage sites would be expected to continue, as detailed in generic (NRC, 2013, 2005a) or site-specific environmental analyses. In accordance with current U.S. policy, the NRC staff also assumes that the SNF would be transported to a permanent geologic repository, when such a facility becomes available.

4.8 Noise Impacts

This section considers the potential noise impacts from the construction, operation, and decommissioning of the proposed action (Phase 1), full build-out (Phases 1-8), and No-Action alternative.

4.8.1 Impacts from the Proposed CISF

The nearest residential noise receptor is located at a distance of approximately 6 km [3.8 mi] west of the proposed CISF project area (ISP, 2020). Ambient background noise sources in the area include (i) vehicle traffic on State Highway 176; (ii) operations at nearby industrial facilities (WCS's existing hazardous and LLRW disposal facilities, the NEF operated by URENCO USA, Permian Basin Materials, Sundance Services, and the Lea County Landfill); and (iii) train traffic on tracks located along the southern border of the proposed CISF project area (EIS Figure 3.1-1). As discussed in EIS Section 3.8, average background noise levels measured at the boundaries of the existing WCS facility and at the proposed CISF site ranged from 36.3 dBA to 43.8 dBA and were predominantly because of roadway traffic from State Highway 176 (Nelson Acoustics, 2019; ISP, 2020).

4.8.1.1 Construction Impacts

During construction for the proposed action (Phase 1), noise would result from traffic entering and leaving the project area and from earthmoving and construction activities. Earthmoving and construction activities would require the use of heavy equipment such as excavators, front-end loaders, bulldozers, dump trucks, and materials handling equipment (e.g., cement mixers and cranes). The use of heavy equipment can generate noise levels up to 120 decibels (dBA), and construction sites typically have noise levels of 100 dBA (see text box). Earthmoving and excavation activities and large trucks typically have noise levels ranging from 80-95 dBA at approximately 15 m [50 ft]. Noise levels decrease by about 6 dBA for each doubling of distance from the source, although further reduction occurs when the sound energy has traveled far enough to have been appreciably reduced by absorption into the atmosphere (NRC, 2001). Most construction activities would occur during weekday daylight hours; however, construction could occur during night and weekends, if necessary.

Noise Levels Associated with Common Activities*

Common Sounds	Typical Sound Level (dBA)	Effect
Threshold of Pain	140	Painfully Loud
Jet Taking Off (200 ft)	130	
Heavy Equipment Use	120	
Night Club (w/music)	110	Very Annoying
Construction Site	100	
Boiler Room	90	Annoying
Freight Train (100 ft)	80	
Classroom Chatter	70	Intrusive
Converstation (3 ft)	60	
Urban Residence	50	Quiet
Soft Whisper (5 ft)	40	
Rim of Grand Canyon	30	Very Quiet
Silent Study Room	20	

*Source: OSHA, 2013; EPA, 1974

For the proposed action (Phase 1), expected noise levels generated during construction activities would be most noticeable in proximity to operating equipment such as excavators, heavy trucks, and bulldozers. ISP estimated noise levels during Phase 1 construction based on noise levels from construction equipment and additional noise sources related to mechanical equipment associated with the security and administration building and the cask handling building and noise from vehicle backup alarms (Nelson Acoustics, 2019). Day-night average sound level (L_{dn}) was estimated for five locations in and around the proposed CISF where background noise level measurements were collected in July 2019 (EIS Section 3.8; EIS Figure 3.8-1). Estimated ambient and total L_{dn} values during Phase 1 construction for these locations are provided in EIS Table 4.8-1. During Phase 1 construction, potential noise increases would be most noticeable within and directly adjacent to the proposed CISF (30.8 and 20.3 dBA, respectively) (EIS Table 4.8-1). Potential noise increases would be less noticeable (1.3 to 7.8 dBA) at nearby industrial facilities (NEF operated by URENCO USA, Sundance Services, and Permian Basin Materials) (EIS Table 4.8-1). As described in EIS Section 3.8, the EPA's recommended L_{dn} for industrial sites is 70 dBA (EPA, 1974). The estimated total L_{dn} for Phase 1 construction within and around the proposed CISF is below the EPA guideline of 70 dBA for industrial use (EIS Table 4.8-1).

For the proposed action (Phase 1), noise impacts to nearby residences, schools, churches, and hospitals during construction are not expected. Because of the distance from the proposed CISF project area to the nearest residential noise receptor {approximately 6 km [3.8 mi] west of the proposed CISF project area}, the residential receptor is not expected to perceive an increase in noise levels because of construction activities. The nearest school, hospital, church, and other residences are located even further to the west in and near Eunice, New Mexico, allowing sound levels from construction to decrease even further.

Table 4.8-1 Estimated Noise Level During Phase 1 Construction				
Location	Estimated Ambient L_{dn} (dBA)	Estimated CISF Phase 1 Construction L_{dn} (dBA)	Estimated Total L_{dn} During Phase 1 Construction (dBA)	Potential Noise Increase (dBA)
CISF (SW Corner)	39.1	69.9	69.9	30.8
CISF (Outside Southern Boundary)	39.8	60.0	60.1	20.3
Sundance Services (NE Boundary)	42.6	48.4	49.4	6.8
Permian Basin Materials (East Boundary)	41.6	48.6	49.4	7.8
NEF/URENCO USA (NE Boundary)	47.9	43.2	49.1	1.3
Source: ISP, 2020				

For the proposed action (Phase 1), truck transport of construction materials along State Highway 176 will be the primary noise source that may potentially affect the public. The incremental increase in construction-related noise because of truck traffic on this road is not expected to be noticeable. The proposed CISF project area is in an area of active oil and gas exploration and development, and State Highway 176 is heavily traveled by truck traffic associated with these activities. Therefore, noise from truck traffic already using this roadway is substantially louder than would result from the incremental increase in traffic related to construction of the proposed CISF.

In summary, the estimated total L_{dn} for Phase 1 construction within and around the proposed CISF is below the EPA guideline of 70 dBA for industrial use. The nearest residence is located approximately 6 km [3.8 mi] from the proposed CISF project area and, due to dissipation of sound with distance from the source, residents are not expected to perceive an increase in noise levels because of construction activities. Proposed and recommended mitigation measures, such as keeping sound-abatement controls on operating equipment in proper working condition and using hearing protection in work areas, would ensure that noise levels remain within OSHA guidelines for workers. Because of existing heavy truck traffic on State Highway 176, the incremental increase in construction-related noise from truck traffic on this road is not expected to be noticeable. Therefore, the NRC staff concludes that the overall site-specific impacts from noise during construction of the proposed action (Phase 1) would be SMALL.

For Phases 2-8, there would be concurrent construction and operations stages. Estimated ambient and total L_{dn} values during concurrent construction and operations stages for the five locations in and around the proposed CISF (EIS Figure 3.8-1) are provided in EIS Table 4.8-2. The estimated shift-average sound levels for work areas during concurrent construction and operation are provided in EIS Table 4.8-3. Construction noise for subsequent phases would be less noticeable and would have a smaller impact on offsite receptors and workers. Any construction associated with Phases 2-8 would be similar to that of Phase 1 construction but would not include the construction of buildings and general earthwork for infrastructure, including the cask-handling building, security and administration building, the rail sidetrack, and access roads. Therefore, the NRC staff concludes that noise impacts from constructing Phases 2-8 would be less than the initial construction stage noise and would be SMALL, and thus, the impacts from constructing full build-out of the proposed CISF (Phases 1-8) would be SMALL.

Table 4.8-2 Estimated Noise Level During Concurrent Construction and Operations

Location	Estimated Ambient L_{dn} (dBA)	Estimated CISF Phase 2-8 Construction L_{dn} (dBA)	Estimated Sound L_{dn} During Operation (dBA)	Estimated Total L_{dn} During Concurrent Construction and Operation (dBA)	Potential Noise Increase (dBA)
CISF (SW Corner)	39.1	57.8	58.4	61.2	22.1
CISF (Outside Southern Boundary)	39.8	52.2	55.1	57.0	17.2
Sundance Services (NE Boundary)	42.6	43.0	39.9	46.8	4.2
Permian Basin Materials (East Boundary)	41.6	43.7	39.1	46.6	5.0
NEF/URENCO USA (NE Boundary)	47.9	37.7	41.4	49.1	1.2

Source: ISP, 2020

Table 4.8-3 Estimated Shift-Average Sound Level During Concurrent Construction and Operations

Work Area	Estimated Shift-Average Sound Level (dBA)
Storage Pad	87
Protected Area	78

Source: ISP, 2020

4.8.1.2 Operations Impacts

Estimated ambient and total L_{dn} values during operations for the five locations in and around the proposed CISF (EIS Figure 3.8-1) are provided in EIS Table 4.8-4. The potential impact from noise (i.e., the potential noise increase) during operation for the proposed action (Phase 1) and Phases 2-8 would be less than during the construction stage (EIS Tables 4.8-1 and 4.8-2) because fewer pieces of heavy machinery would be used. Noise from operation would be primarily train traffic noise from the delivery and shipment of casks and noise from site vehicles used to transport SNF canisters from the cask-handling building to the SNF storage systems (EIS Section 2.2.1.3.2). Equipment such as cranes used to transfer SNF canisters to site transport vehicles would be contained within the cask-handling building, thus limiting the propagation of noise to onsite and offsite receptors. A variety of mechanical equipment (e.g., heating, ventilation, and air conditioning systems, rooftop fans, and transformers) at the cask-handling building and security and administration building would also generate noise. Mitigation measures, such as keeping sound-abatement controls on operating equipment and transport vehicles in proper working condition, would further reduce the propagation of noise to onsite and offsite receptors (ISP, 2020).

For the proposed action (Phase 1) and Phases 2-8, train traffic associated with transporting SNF canisters to and from the proposed CISF would result in temporary noise. ISP has stated that the nominal average sound levels during operation of the proposed CISF would increase primarily because of the potential for one additional train passage per day (ISP, 2020). Freight trains generate noise levels of 80 dBA at approximately 30 m [100 ft] (see text box in EIS Section 4.8.1.1). For brief periods of train acceleration, sound levels at distances of up to about 1.6 km [1 mi] might occasionally exceed the 55-dBA level the EPA recommended for day-night sound level in outdoor spaces (EPA, 1974). Therefore, it is not expected that train noise would be noticeable at the nearest residence to the proposed CISF project area (i.e., 6 km [3.8 mi]). In addition, shipments of SNF would be infrequent (EIS Table 2.2-4), with noise occurring during only a few hours per week. Traffic noise from commuting workers on State Highway 176 would not noticeably increase noise levels to sensitive receptors.

ISP estimated the noise levels to workers that would occur during operations of the proposed CISF (ISP, 2020). As described previously, OSHA regulations require that workers do not receive an unprotected noise dose in excess of 90 dBA for an 8-hour shift and 88.4 dBA for a 10-hour shift (29 CFR 1910.95). The estimated shift-average sound level for activities during operations are provided in EIS Table 4.8-5. Estimated shift-average sound levels for storage module construction (92 dBA) exceed OSHA regulations. Estimated shift-average sound levels for cask transport (89 dBA) exceed OSHA regulations for a 10-hr shift. ISP has recommended hearing protection for activities where shift-average sound levels exceed 80 dBA (ISP, 2020). To further minimize noise to workers during construction, ISP has proposed to keep all noise suppression equipment on construction vehicles in proper operating condition (ISP, 2020).

Table 4.8-4 Estimated Noise Level During Operations

Location	Estimated Ambient L_{dn} (dBA)	Estimated CISF Operations L_{dn} (dBA)	Estimated Total L_{dn} During Operations (dBA)	Potential Noise Increase (dBA)
CISF (SW Corner)	39.1	58.4	58.5	19.4
CISF (Outside Southern Boundary)	39.8	55.1	55.3	15.5
Sundance Services (NE Boundary)	42.6	39.9	44.5	1.9
Permian Basin Materials (East Boundary)	41.6	39.1	43.5	1.9
NEF/URENCO USA (NE Boundary)	47.9	41.4	48.7	0.9

Source: ISP, 2020

Table 4.8-5 Estimated Shift-Average Sound Level During Operations	
Activity	**Estimated Shift-Average Sound Level (dBA)**
Storage Module Construction	92
Cask Transport	89
Source: ISP, 2020	

In summary, much of the noise generated during the operations phase would be contained within the cask handling building. Noise levels to onsite (outside the cask handling building) and offsite receptors would be less than during the construction stage and would be mitigated by keeping sound-abatement controls on operating equipment in proper working condition, recommended hearing protection for activites where shift-average sound levels exceed 80 dBA, and adherence to OSHA regulatory limits for noise to workers. Train traffic associated with SNF shipments would be infrequent and result in only short-term noise. Traffic noise from commuting workers would not noticeably increase noise levels to sensitive receptors along local highways. Therefore, the NRC staff concludes that the impacts from noise during operations for the proposed action (Phase 1) would be SMALL, and potential impacts for full build-out (Phases 1-8) would also be SMALL.

Defueling

Defueling the CISF would involve removal of SNF from the proposed CISF. With regard to noise levels, defueling would be similar to the loading of SNF canisters onsite under operations and would be similar for all phases {i.e., for the proposed action (Phase 1) or for full build-out (Phases 1-8)}. Activities would include noise from machinery and transport trucks or rail cars. Because noise sources and levels would be similar to those of emplacement of the SNF earlier in the operations stage, the NRC staff concludes that noise impacts from defueling the proposed CISF project for the proposed action (Phase 1) would be SMALL, and potential impacts for full build-out (Phases 1-8) would also be SMALL.

4.8.1.3 Decommissioning Impacts

At the end of the license term, once the SNF inventory is removed, the proposed CISF project would be decommissioned such that the proposed project area and remaining facilities could be released for unrestricted use. As described in EIS Section 2.2.1.3.3, the principal activities involved in decommissioning would include initial characterization surveys to identify any areas of contamination; decontamination and/or disassembly of contaminated components; waste disposal; and final radiological status surveys. The sources of noise would include the use of equipment for decontamination and/or disassembly of contaminated components and heavy-haul truck transport for waste disposal. Because these activities are similar to those occurring under the construction stage, the NRC staff concludes that the noise impacts from decommissioning for the proposed action (Phase 1) would be SMALL, and potential impacts for full build-out (Phases 1-8) would also be SMALL.

4.8.2 No-Action Alternative

Under the No-Action alternative, the NRC would not license the proposed CISF, and the CISF would not be constructed, operated, or decommissioned. Therefore, there would be no additional contribution from the CISF to the existing noise levels of the area. In the absence of a CISF, the NRC staff assumes that SNF would remain onsite in existing wet and dry storage facilities and be stored in accordance with NRC regulations and be subject to NRC oversight and inspection. Site-specific impacts at each of these storage sites would be expected to continue, as detailed in generic (NRC, 2013, 2005a) or site-specific environmental analyses. In accordance with current U.S. policy, the NRC staff also assumes that the SNF would be transported to a permanent geologic repository, when such a facility becomes available.

4.9 Historical and Cultural Impacts

This section describes potential environmental impacts to historic and cultural resources at the proposed project during each stage of the facility lifecycle, for both the proposed action (Phase 1) and full build-out (Phases 1-8). The impacts to historic and cultural resources associated with the No-Action alternative are also evaluated in this section. Consultation requirements under NHPA Section 106 are further described in EIS Section 1.7.2.

4.9.1 Impacts from the Proposed CISF

Impacts to cultural and historic resources could result from the various stages of the proposed CISF. These impacts could result from the loss of or damage to historical and cultural resources, as discussed throughout this section.

4.9.1.1 Construction Impacts

The proposed action (Phase 1) and Phases 2-8 would encompass approximately 130 ha [320 ac] of land north of the existing WCS LLRW facility in Andrews County, Texas. However, as described in EIS Section 3.9.2, the area that the proposed activity may directly or indirectly impact represents the area of potential effects (APE). The direct APE would coincide with the footprint of ground disturbance for the construction stage (e.g., cask-transfer building, storage pads, access roads, and rail sidetrack). The NRC staff anticipates that because of construction activities, the largest area would be disturbed during the construction stages of full build-out (Phases 1-8). In addition, construction of the rail sidetrack, site access road, and construction laydown area would contribute an additional area of disturbed soil such that the total disturbed area for construction of the proposed CISF would be approximately 133.4 ha [330 ac] (ISP, 2020). Therefore, the direct APE is a 133.4-ha [330-ac] parcel of privately owned land corresponding to the area of land disturbance from full build-out of the proposed CISF project. For site preparation, earthmoving and grading equipment would be used to excavate and remove soil for foundation preparation for these proposed structures. As discussed in EIS Section 1.7.2, the Texas State Historic Preservation Officer (SHPO) explained that the proposed APE is different from the area where intensive archaeological survey had been previously conducted and, thus, the Texas SHPO found that an archeological survey was necessary for those portions of the current APE that do not overlap the previously surveyed areas. Also, as discussed in EIS Section 1.7.2, an additional survey was conducted in 2019, with results reported to the NRC in 2020. The NRC staff continues to consult with the Texas SHPO.

The indirect APE for the proposed CISF project would consist of visual effects and noise sources arising from the project. Because of the low profile of the proposed project and the existence of other buildings, roads, railroad spur, and structures (i.e., WCS waste management facilities), the extent of the visual APE (i.e., indirect APE) includes areas within a 1.6-km [1-mi] radius extending from the proposed project boundary. Temporary construction impacts would result from increased dust, noise, and traffic in the direct and indirect APEs, if historic and cultural resources are present.

No archaeological materials were observed in the portion of the direct APE surveyed during the Class III Cultural Resource Survey the applicant conducted in May 2015 and November 2019. The direct APE is also devoid of any historic standing structures, so the proposed CISF project would not result in a direct impact to any nonarchaeological historic resources. There do not appear to be any historic resources 45 years or older (dating to 1974 or earlier) within the 1.6-km [1-mi] indirect APE. The closest known archaeological resources to the proposed CISF project are located immediately outside the 1.6-km [1-mi] buffer (i.e., the indirect APE) in New Mexico and consist of five prehistoric sites excavated in 2003 prior to the construction of a nearby uranium enrichment facility (URENCO NEF). These archaeological resources, however, are at a distance where construction and operation activities for the proposed action (Phase 1) and full build-out (Phases 1-8) will cause impacts.

While the probability for encountering human remains in this area is low, ISP has also committed to an inadvertent discovery plan for human remains or other items of archeological significance during construction of the proposed CISF (ISP, 2020). Work would cease immediately upon discovery within an area of 30 m [100 ft], and the area would be protected from further disturbance. The appropriate agency would be notified within 24 hours. The agency would then determine how to treat the remains, and any necessary identification, consulting, and excavation would be completed to the agency requirements before construction could resume. Therefore, because no known historic and cultural resources are present within the area, the NRC staff concludes that the construction stage of the proposed action (Phase 1) and full build-out (Phases 1-8) (and the entirety of the direct APE), would not affect cultural and historic resources, and impacts would be SMALL. Accordingly, consistent with 36 CFR 800.4(d)(1), the NRC staff determined that no historic properties are present and consulted with the Texas SHPO on this determination to ensure compliance with its obligations under the NHPA Section 106 process.

4.9.1.2 Operations Impacts

During operations, SNF in shipping casks would arrive at the proposed CISF via rail car, be transported into the cask-transfer building for inspection, and then transferred to the proposed CISF storage pad for storage. During defueling, activities similar to those during SNF emplacement would occur to remove the SNF from storage. No new ground disturbance is anticipated during operations beyond that associated with maintenance and traffic around the facility. Because no ground-disturbing activities would occur and no historic or cultural resources are present within the direct APE of proposed action (Phase 1) or full build-out (Phases 1-8) and no historic or cultural resources are present within the indirect APE to be affected by visual, noise, or vibration impacts, the NRC staff concludes that operation of the proposed CISF for either the proposed action (Phase 1) or full build-out would not affect cultural and historic resources, and, therefore, impacts would be SMALL.

4.9.1.3 Decommissioning Impacts

At the end of the license term of the proposed CISF project, once the SNF inventory is removed, the facility would be decommissioned such that the proposed project area and remaining facilities could be released, and the license terminated. Decommissioning activities, in accordance with 10 CFR Part 72 requirements, would include conducting radiological surveys and decontaminating (if necessary). Decommissioning activities for the proposed action (Phase 1) and for Phases 2-8 would involve the same activities, but the activities would be scaled to address the overall size of the CISF (i.e., the number of phases completed).

As noted, no historic or cultural resources that constitute historic properties are present within the direct APE for the proposed CISF, and therefore no historic and cultural impacts would result from decommissioning of those areas. The NRC staff concludes that decommissioning of the NRC-licensed proposed action (Phase 1) and full build-out (Phases 1-8) of the proposed CISF would not affect cultural and historic resources, and therefore, impacts would be SMALL.

4.9.2 No-Action Alternative

Under the No-Action alternative, the NRC would not license the proposed CISF project. Therefore, impacts such as damage to or destruction of cultural and historic resources would not occur. Construction impacts would be avoided, because SNF storage pads, buildings, and transportation infrastructure would not be built. Operational impacts would also be avoided, because no SNF canisters would arrive for storage. Impacts to cultural resources from decommissioning activities would not occur, because unbuilt SNF storage pads, buildings, and transportation infrastructure would require no decontamination. The current cultural and historic resources on and near the project, including archaeological sites, remain essentially unchanged under the No-Action alternative. In the absence of a CISF, the NRC staff assumes that SNF would remain onsite in existing wet and dry storage facilities and be stored in accordance with NRC regulations and be subject to NRC oversight and inspection. Site-specific impacts at each of these storage sites would be expected to continue as detailed in generic (NRC, 2013, 2005a) or site-specific environmental analyses. In accordance with current U.S. policy, the NRC staff also assumes that the SNF would be transported to a permanent geologic repository, when such a facility becomes available.

4.10 Visual and Scenic Impacts

This section describes the potential impacts to visual and scenic resources associated with construction, operation, and decommissioning of the proposed action (Phase 1), full build-out (Phases 1-8), and the No-Action alternative.

4.10.1 Impacts from the Proposed CISF

The NRC staff considered the BLM Visual Resource Management (VRM) classification of landscapes (BLM, 1986, 1984) in assessing the significance and management objectives of visual impacts. As described in Section 3.10, ISP classified the proposed CISF project area as VRM Class IV (ISP, 2020). The objective of this class is to provide management for activities that might require major modifications of the existing character of the landscape (BLM, 1986). The level of change permitted for this class is the least restrictive and can be high.

4.10.1.1 Construction Impacts

Visual impacts related to facilities construction for the proposed action (Phase 1) would include the initial SNF storage pads and systems, cask-handling building, security and administration building, and rail sidetrack. The most visible structure would be the cask-handling building, which would be approximately 22.9 m [75 ft] high. Due to the relatively flat topography of the proposed CISF project area and surrounding land, the proposed CISF structures may be observable from Texas State Highway 176 and New Mexico Highway 234 and from nearby properties, creating a visual intrusion and partially obstructing views of the existing landscape. However, considering that there are no regional or local high-quality viewing areas and considering existing man-made structures near the project area (e.g., pump jacks, above-ground tanks, high power lines, and industrial buildings), the obstruction of existing views because of the proposed CISF structures would be similar to current conditions. Furthermore, considering existing structures associated with nearby industrial properties and activities (e.g., the Permian Basin Materials quarry, the WCS LLRW disposal facilities, the Lea County Landfill, NEF, and Sundance Services), the proposed CISF structures would be no more intrusive than those already existing in the area.

As described in EIS Section 4.7, standard dust-control measures (e.g., water application) would be implemented to reduce visual impacts from fugitive dust. ISP has also proposed the following mitigation measures to minimize the impact to visual and scenic resources:

- Using accepted natural, low-water-consumption landscaping techniques with indigenous vegetation to limit any potential visual impacts.
- Promptly revegetating or covering bare areas to mitigate visual impacts because of construction activities.

In summary, although construction of the proposed action (Phase 1) would alter the natural state of the landscape, the absence of regional or local high quality scenic views in the area, lack of a unique or sensitive viewshed, and the presence of nearby industrial properties and structures would result in minimal visual and scenic impact. Therefore, the NRC staff concludes that the impact to visual and scenic resources resulting from construction of the proposed action (Phase 1) would be SMALL.

For Phases 2-8, the additional impact to visual and scenic resources would be from the addition of SNF storage systems and pads, which would increase the overall footprint of the facility overall. However, as described previously, considering that there are no regional or local high-quality viewing areas and considering existing man-made structures near the project area (e.g., pump jacks, above-ground tanks, high power lines, and industrial buildings), the obstruction of existing views because of the proposed CISF structures would be similar to current conditions. Furthermore, considering existing structures associated with nearby industrial properties and activities (e.g., the Permian Basin Materials quarry, the WCS LLRW disposal facilities, the Lea County Landfill, NEF, and Sundance Services), the proposed CISF structures would be no more intrusive than those already existing in the area. Therefore, the NRC staff concludes that the impact to visual and scenic resources as part of Phases 2-8 (and at full build-out, Phases 1-8) would be SMALL.

4.10.1.2 Operations Impacts

ISP would sequentially construct and operate SNF storage pads and systems. At full build-out of the proposed CISF (e.g., all eight phases operating) the proposed CISF project area would include 130 ha [320 ac] of land within the larger WCS site. However, because the cask-handling building, security and administration building, and rail sidetrack would already be in place, the SNF storage pads and systems are relatively low structures, and SNF shipments are relatively infrequent, the overall visual impact of operating the proposed CISF will be the same or less than from construction. As described in EIS Section 4.7, standard dust-control measures (e.g., water application) would be implemented to reduce visual impacts from fugitive dust during operation activities. Therefore, the NRC staff concludes that the impacts to visual and scenic resources from the operations stage of the proposed action (Phase 1) would be SMALL, and potential impacts for full build-out (Phases 1-8) would also be SMALL.

Defueling

Defueling for the proposed action (Phase 1) and Phases 2-8 would involve removal of SNF from the proposed CISF. The impacts to visual and scenic resources would be similar to those of loading SNF during the fuel emplacement operations at the proposed CISF project. As described in EIS Section 4.7, standard dust-control measures (e.g., water application) would be implemented to reduce visual impacts from fugitive dust during defueling activities. Therefore, the NRC staff concludes that the impact to visual and scenic resources during defueling for Phase 1 would be SMALL, and potential impacts for full build-out (Phases 1-8) would also be SMALL.

4.10.1.3 Decommissioning Impacts

At the end of the license term, once the SNF inventory is removed, the proposed CISF would be decommissioned such that the proposed project area and any remaining facilities could be released for unrestricted use or transferred to the current landowner. Prior to final site decommissioning, ISP would submit a decommissioning plan to NRC, in accordance with 10 CFR Parts 72 and 20. As described in EIS Section 2.2.1.3.3, the principal activities involved in decommissioning would include initial characterization surveys to identify any areas of contamination; decontamination and/or disassembly of contaminated components; waste disposal; and final radiological status surveys.

During decommissioning activities, temporary impacts to the visual environment would be similar to the impacts in the construction stage. Equipment used to decontaminate and/or dismantle contaminated components or conduct waste-disposal activities and final radiological status surveys would result in temporary visual contrasts. Visual and scenic resources may be affected by fugitive dust emissions from decommissioning activities. As described in EIS Section 4.7, ISP would implement dust-suppression measures (e.g., water application) to reduce dust emissions. Therefore, the NRC staff concludes that the visual and scenic impacts from decommissioning for the proposed action (Phase 1) would be SMALL, and potential impacts for full build-out (Phases 1-8) would also be SMALL.

4.10.2 No-Action Alternative

Under the No-Action alternative, the NRC would not license the proposed CISF, and the CISF would not be constructed, operated, or decommissioned. Therefore, there would be no additional impacts from the proposed CISF project to the visual and scenic resources of the area. In the absence of a CISF, the NRC staff assumes that SNF would remain onsite in existing wet and dry storage facilities and be stored in accordance with NRC regulations and be subject to NRC oversight and inspection. Site-specific impacts at each of these storage sites would be expected to continue as detailed in generic (NRC, 2013, 2005a) or site-specific environmental analyses. In accordance with current U.S. policy, the NRC staff also assumes that the SNF would be transported to a permanent geologic repository, when such a facility becomes available.

4.11 <u>Socioeconomic Impacts</u>

This section presents the potential socioeconomic impacts from the construction, operation, and decommissioning of the proposed action (Phase 1), full build-out (Phases 1-8), and the No-Action alternative on employment and economic activity, population and housing, and public services and finances within the three-county socioeconomic region of influence (ROI) (Andrews and Gaines Counties in Texas, and Lea County in New Mexico). The effects of the proposed action on land use (including use of public lands and rights-of-way, recreational and tourism sites, and wilderness areas) and visual resources in the area are assessed in EIS Sections 4.2 and 4.10, respectively. The basis for the NRC staff's selection of the socioeconomic ROI and the existing socioeconomic and community resources in the ROI is explained in EIS Sections 3.11 through 3.11.5 and in Appendix B.

4.11.1 Impacts from the Proposed CISF

4.11.1.1 Construction Impacts

Impacts to socioeconomic and community resources from the proposed action (Phase 1) are primarily associated with workers who might move into the area and tax revenues that the proposed project would generate, which would influence resource availability for the community. The socioeconomic issues that fall within the scope of this socioeconomic analysis include the direct and indirect economic effects on employment, taxes, residential and commercial development, and public services in the ROI. EIS Table 4.11-1 describes the significance level of potential socioeconomic impacts for this EIS that could be experienced from the construction and operation of the proposed CISF. These levels are based on the NRC staff's previous experience in evaluating the potential impacts to socioeconomic and community resources (NRC, 2005b, 1996).

To evaluate the potential socioeconomic impacts, the NRC staff conducted a bounding analysis, which includes the NRC staff assumption that, for Phase 1, construction and operations stages are concurrent, such that peak employment is represented. This scenario is consistent with ISP's planned expansion of the proposed action to include subsequent Phases 2-8, each of which would be constructed when the prior phase becomes operational. ISP estimates that the proposed action (Phase 1) construction activities would require up to 50 construction workers, which is the NRC staff's bounding assumption. ISP provided more than one estimate for the number of nonconstruction workers (e.g., radiation-protection technicians, maintenance workers, and technical support) associated with the proposed CISF project. For this EIS, the NRC staff considered that the peak number of operations workforce for the proposed action (Phase 1) would include 45 to 60 regular employees (ISP, 2020; EIS Section 4.3.1.2) and that an operations workforce of up to 60 workers would overlap with the 50 construction workers from the construction stage of the proposed action (Phase 1) (ISP, 2020). Adding together the estimated maximum of construction workers (50) and operations workers (60) previously described, the NRC staff conservatively assumes that the peak number of annual workers for the proposed action (Phase 1) who would be directly employed at the CISF is 110 workers (Phase 1). This peak number of annual workers would also apply if overlapping construction and operation activities from full build-out (Phases 1-8) were to occur. From this bounding assumption of 110 annual workers, EIS Table 4.11-2 depicts a range of the resulting workforce that the NRC staff anticipates would move into the ROI, as well as family and workforce retention characteristic assumptions. EIS Appendix B provides additional details. These projections are used throughout this EIS socioeconomic-impact analysis.

Table 4.11-1 Impact Definitions to Socioeconomic and Community Resources	
Category and Significance Level of Potential Impact	**Description of Affected Resources**
Employment and Economic Activity Impacts	
Small	Less than 0.1-percent increase in employment
Moderate	Between 0.1- and 1.0-percent increase in employment
Large	Greater than 1-percent increase in employment
Population and Housing Impacts	
Small	Less than 0.1-percent increase in population growth and/or less than 20 percent of vacant housing units required to house workers moving into the ROI
Moderate	Between 0.1- and 1.0-percent increase in population growth and/or between 20 and 50 percent of vacant housing units required to house workers moving into the ROI
Large	Greater than 1-percent increase in population growth and/or greater than 50 percent of vacant housing units required to house workers moving into the ROI
Impacts on Public Services and Finances	
Small	Less than 1-percent increase in local revenues
Moderate	Between 1- and 5-percent increase in local revenues
Large	Greater than 5-percent increase in local revenues
Source: NRC, 2005b, 1996	

Table 4.11-2 Assumptions for Workforce Characterization During Peak Employment (Concurrent Construction and Operations Stages)	
Peak number of onsite workers (50 construction workers, 60 operations personnel)*	110
Percentage of construction workers moving into the ROI †‡§	10-30%
Percentage of nonconstruction workers who may move into the ROI†‡§	40-60%
Range of construction workers that may move into the ROI during construction peak	5-15
Range of nonconstruction workers moving into the ROI	24-36
Range of all workers that may move into the ROI. This is also the range of new households.	29-51
Percentage of workers who are likely to bring families† ‡§	50-70%
Range of number of families moving into the ROI	15-36
Average family size in the ROI	3.25
Range of total number of workers and family members moving into the ROI	64-133
Number of school-aged children per family (all workers) †‡§	0.8
Range of school-aged children of workers moving into ROI	12-29
Percentage of moved-in workers that may leave the ROI after the construction phase†§	50-60%
Range of moved-in workers that may leave the ROI post-construction	15-31
Range of moved-in workers and family members that may leave the ROI post-construction	37-66
Range of school-age children of moved-in workers that may leave the ROI, post-construction phase	7-15
Employment multiplier for construction workers moving into the ROI (BEA, 2019)	1.5333
Range of indirect jobs resulting from construction workers moving into the ROI	3-8
Employment multiplier for nonconstruction workers moving into the ROI (BEA, 2019)	1.4793
Range of indirect jobs resulting from nonconstruction workers moving into the ROI	12-18

*=Assumptions from ISP's ER
†=Malhotra, 1981
‡=NRC, 2001
§=NRC, 2012
‖=NRC, 2016
Note: There are slight variations in the calculations due to rounding. All calculated numbers greater than 1 related to people are automatically rounded up (e.g., 4.1 people = 5)

EIS Table 4.11-2 provides the NRC staff's estimates that, as a result of concurrent construction and operation activities of the proposed action (Phase 1), up to 133 new residents would move into the 3-county ROI, including 18 to 21 new school-age children. The precise distribution of workers moving into the ROI would be determined by many factors, including proximity to the site and the availability of housing and public services. The NRC staff estimates that the addition of up to 133 new residents would represent an increase of 0.12 percent of population in the ROI (USCB, 2018). As provided in EIS Table 4.11-1, the NRC staff determined that an increase of 0.1 to 1.0-percent in population growth would result in a moderate impact.

In 2017, construction and mining (oil and gas and nonfuel minerals) employment provided approximately 81 percent of all nonservice-related employment in the ROI and accounted for 32 percent of all industries that brought employment into the ROI (EIS Table 3.11-4 Employment by Industry). They are two of the largest employment sectors in the ROI.

New workers (i.e., workers moving into the ROI and those previously unemployed) would have an additional indirect effect on the local economy because these new workers would stimulate the regional economy by their spending on goods and services in other industries. The U.S. Department of Commerce Bureau of Economic Analysis (BEA), Economic and Statistics Division offers an economic model called RIMS II that incorporates buying and selling linkages among regional industries and uses a multiplier specific to an industry to estimate the economic impact within the ROI. The multiplier is the number of times the final increase in consumption exceeds the initial dollar spent. In this analysis, the NRC staff uses BEA's Type II multiplier for the construction industry in the ROI to estimate the number of indirect jobs that would result from the new direct workers associated with the peak employment that would occur with concurrent construction and operations stages. According to the BEA, Type II multipliers not only account for the effects realized between all industries in the ROI, but they also account for the induced effects within the region (BEA, 2013). Induced effects refer to the jobs that are created because of a project (e.g., a worker that moves into the ROI to work at a local restaurant that serves those the proposed project employs), and the money that is recirculated through household spending that further affects the economy in the ROI (e.g., the money that the restaurant worker spends in the ROI).

Based on the BEA RIMS II multiplier, for each new job created in the construction industry in the ROI, an estimated 0.5333 indirect jobs would be created (BEA, 2019). Applying this multiplier to the worker characteristic assumptions provided in EIS Table 4.11-2, the NRC staff estimates that the new direct workers associated with the peak employment that would occur concurrently during the assumed overlapping construction and operations stages of the proposed CISF (Phase 1) would generate between 15 and 26 new indirect and induced jobs in the ROI (EIS Table 4.11-2) (BEA, 2019). The NRC staff determined that this range is comparable to ISP's estimated indirect and induced jobs and that NRC's and ISP's estimates fall within the range of another proposed above-ground storage facility (NRC, 2001; ISP, 2020). Appendix B of this EIS further explains the NRC staff's analysis and conclusions the NRC staff reached to assess ISP's employment estimates. Indirect jobs are often nontechnical and nonprofessional positions in the retail and service sectors. The NRC staff considered that ROI residents would likely fill the indirect jobs that would be created. If unemployed individuals in the ROI filled up to 26 new indirect jobs, this would represent 0.6 percent of the unemployed labor force in the ROI using the data from the period between 2013 and 2017 (USCB, 2017). The NRC staff estimates that between 29 and 51 direct workers, which is also the range of new households, may move into the ROI as a result of the peak employment that would occur concurrently during the assumed overlapping construction and operations stages of the proposed CISF (Phase 1) (EIS Table 4.11-2). The combined maximum of up to 26 indirect workers and 51 direct workers

(77 total) would represent 0.09 percent of the labor force within the ROI. As provided in EIS Table 4.11-1, the NRC staff determined that an increase of less than 0.1-percent in employment would result in a small impact on employment.

As described in EIS Section 2.2.1, the license term for the proposed CISF project is 40 years. ISP stated in RAI responses (ISP, 2019a) that the assumptions associated with the schedule (e.g., the timing for transporting SNF to the proposed CISF) used for estimating project costs may differ from the assumptions used for assessing the impacts of the proposed action (Phase 1) and full build-out (Phases 1-8) evaluated in this EIS. ISP estimates that the initial construction costs for the proposed action (Phase 1) in the first 2.5 years would be $148.3 million, and that the cost to construct Phase 1 over a 40-year period would be $350.8 million (EIS Appendix C Table C-3) (ISP, 2020). The initial cost estimate of $148.3 million includes all licensing, engineering, design, excavation and grading, fencing, security system costs, administrative and support buildings, handling equipment, and constructing pads for the storage systems that will hold the first 5,000 MTU of SNF. The $350.8 million estimate includes the additional cost of concrete overpacks. Based on ISP's estimates, the total impact on the economy from the initial construction costs for the proposed action (Phase 1) within Andrews County, Texas, would be approximately $112 million (ISP, 2020). The NRC staff used the BEA multiplier for the construction industry and determined that if ISP spent the estimated $148.3 million of initial construction expenditures, there would be approximately $63.6 million of economic benefit generated in the 3-county ROI, and that spending $350.8 million of construction expenditures over a 40-year license term would generate $149.1 million (BEA, 2019). The NRC staff concludes that the differences in jobs and economic impact estimates derived by the IMPLAN model ISP used and the BEA RIMS II multipliers the NRC staff used represent a reasonable range of potential outcomes for the proposed project. Appendix B of this EIS further explains the NRC staff's analysis of ISP's cost estimates and conclusions.

ISP anticipates that the State and local tax revenues that would be generated in Andrews County, Texas, from the first 2.5 years of the construction stage of the proposed project (Phase 1) would be $3,273,628 (ISP, 2020). The estimated Federal taxes generated from construction would be $10,332,086. According to Andrews County, Texas, total revenues before expenditures generated in the county for the 2017 fiscal year totaled $27,212,549 (Andrews County, 2017). Total revenues before expenditures for the same reporting period were $22,993,482 for Gaines County, Texas, and $44,939,440 for Lea County, New Mexico (Davis, Ray & Co., 2017; Lea County, 2017). Based on the NRC staff's comparison of county financial reports against the revenues of the three counties within the ROI of $95,145,472 [2017 dollars], the estimated State and local tax revenues from the construction stage of proposed project (Phase 1) would represent an increase of State and local revenues by approximately 3.44 percent. Tax revenues may fluctuate year to year and may be distributed on the local level among municipalities in ways that cannot be easily quantified. NRC's and ISP's estimates fall within the range of another proposed above-ground storage facility (NRC, 2001; ISP, 2020). Appendix B of this EIS further explains the NRC staff's determinations and examples of the steps that the NRC staff took to assess ISP's tax revenue estimates. As provided in EIS Table 4.11-1, the NRC staff determined that a 1 to 5-percent increase in local revenues would result in a moderate impact.

Expenditures for goods and services to support construction activities would occur both inside and outside the ROI. The NRC staff's experience is that applicants purchase approximately 10 percent of their construction materials locally (NRC, 2016); however, the applicant did not provide a detailed estimate of the types and quantities of materials or where materials would be purchased or sourced, and the NRC staff did not independently estimate the costs of construction materials needed for the construction of the proposed project (Phase 1). The NRC staff contacted the Lea County Economic Development Corporation (LCED) for information on local source materials (Gobat, 2019). The LCED provided the NRC staff with a list of development service providers and suggested that many of the materials needed for the proposed action (Phase 1) should be able to be purchased in Lea County, including concrete, steel, gravel/sand, electrical components, and fencing (Gobat, 2019). The NRC staff assumes that similar material sources would be available for the construction of Phases 2-8, should they be developed. If goods and services are purchased locally to support construction activities, a portion of the purchases would provide additional economic revenue in the ROI. If goods and services are not purchased or sourced within the ROI, then that economic benefit would not materialize within the ROI.

Direct and indirect workers would spend a portion of their earnings on housing, goods, and services within the ROI. Affordable housing and housing capacity in the ROI are discussed in EIS Section 3.11.3. The estimated 2017 median worker income within the ROI ranges from $43,206 to $52,158 (EIS Section 3.11.2). The median monthly gross rent in the ROI in the period from 2013 to 2017 ranged between $697 and $997 (EPS, 2019). Based on the median gross rent and median worker income in the ROI, workers that earn $28,000 could spend less than 30 percent of their income on rental housing in the ROI. Compared to the vacancy of housing units for sale and for rent in the ROI in the period from 2013 to 2017, the estimated 29 to 51 new households that would be added to the ROI during peak employment of the proposed CISF would fill less than 1 percent of the housing vacancies in the ROI (EIS Table 4.11-2) (EPS, 2019). The NRC staff expects that the housing market in the county would be able to absorb the influx of workers, and rental rates and housing prices would not suffer a perceptible increase because of this influx. As provided in EIS Table 4.11-1, because less than 20 percent of vacant housing units would be needed to house workers moving into the ROI, the impact on housing during peak employment with concurrent construction and operations stages of the proposed action (Phase 1) would be small.

In addition to the impacts from direct and indirect revenue and job generation, socioeconomic impacts may include impacts to existing resources. Comparing the estimated number of school-aged children that may move into the ROI (12 to 29 children as shown in EIS Table 4.11-1) to the total number of students enrolled in kindergarten through 12th grade in the ROI (23,725 students; EIS Section 3.11.5), the addition of between 12 to 29 school-aged children would represent an increase of 0.1 percent. The proposed CISF project would be located within the Andrews Independent School District area. Given that the ROI includes 3 counties and that workers have the option to live in several communities in those counties, the NRC staff determines that it would be unlikely that all school-aged children that move into the ROI would attend schools of the same school district, or that the increase of school-aged children would exceed 0.1 percent in any school district within the 3-county ROI. As provided in EIS Table 4.11-1, the NRC staff determined that an increase of less than 0.1-percent in population growth would result in a small impact. The NRC staff applied this concept to the school districts to estimate that the potential impact from the addition of new students moving into the ROI during peak employment with concurrent construction and operations for the proposed action (Phase 1, along with subsequent Phases 2-8), would be small.

Utilities required for the proposed action (Phase 1) would include the installation of water, natural gas, and electrical utility lines that would be collocated with already disturbed land areas where possible. During peak employment, the City of Eunice's Water and Sewer Department would provide potable water for construction and operation of the proposed CISF, with water drawn from the Ogallala Aquifer (ISP, 2018). A new potable water supply line would extend from the existing potable water system at the WCS LLRW site (ISP, 2020). The new water supply lines would be buried along existing road rights-of-way to minimize environmental impacts and land disturbances (ISP, 2020; EIS Section 4.2.1). Nonpotable water pumped from WCS wells perforated in the Santa Rosa Formation of the Dockum-Aquifer may be used during the construction stage for purposes that do not require potable water (i.e., dust suppression) (ISP, 2020; EIS Section 4.5.2.1). More information on water use at the proposed CISF can be found in EIS Section 4.5.2.1.1. Additionally, electric service to the proposed CISF for the cask-handling building and the security and administration buildings would be supplied by overhead power lines from existing power lines northeast of the proposed CISF project area. A small transformer yard would be constructed and located within the proposed project area site, and distribution to onsite facilities would be buried electrical lines along existing onsite rights-of-way (EIS Section 4.2.1). As provided in EIS Table 4.11-1, the NRC staff determined that a less than 1-percent increase in local revenue would result in a small impact on public services.

The NRC staff concluded in EIS Section 4.3.1 that the increase in traffic from the proposed CISF project construction would have a SMALL impact on daily traffic on Texas State Route 176 near the proposed CISF project and other roads in the area, and that the impacts from the proposed action (Phase 1) on traffic would be SMALL. Moreover, the NRC staff determined that the increase in traffic during the construction stages of Phase 2-8 would result in a SMALL impact to existing traffic conditions. EIS Section 4.3.1 states that when added to traffic necessary for peak construction [i.e., 20 to 50 workers for 3 to 6 months at a time for 18 out of 30 months (ISP, 2020)], and traffic during the operations stages of Phase 2-8 (45 to 60 workers) when construction and operations stages overlap, the total traffic during the peak employment would not adversely affect the speed, safety, and travel times in the region.

EIS Section 3.11.5 describes the police and fire services within the ROI. As stated in this section, up to 133 new residents may move into the ROI during the peak employment period when construction and operations stages from the proposed action (Phase 1) overlap, which would increase the population of the ROI by 0.1 percent and result in filling less than 1 percent of the housing vacancies. Therefore, the NRC staff expects that there would not be a detectable increase in the demand for fire protection or law enforcement services, and that existing fire protection and law enforcement personnel, facilities, and equipment would be sufficient to support the population increase. Mutual-aid agreements are in place between Lea County and the City of Eunice to ensure that fire and emergency support services for the Eunice area are met. Eunice is located approximately 8 km [5 mi] from the proposed CISF and may be the first off-site responders to an incident at WCS or the proposed CISF. According to ISP, a telephone system will be installed at the proposed CISF project that will have access to other WCS facilities outside of the CISF project area and outside lines (ISP, 2018). The telephone service will be used to provide normal communication to and from the proposed CISF and emergency communications with local authorities. In instances where radioactive or hazardous materials are involved, WCS employees trained in emergency response will provide information and assistance to the responding off-site personnel and agencies (ISP, 2020). As provided in EIS Table 4.11-1, the NRC staff determined that a less than 1-percent increase in local revenue would result in a small impact on public services, and an increase of less than 0.1 percent of the overall population in the ROI would also result in a small economic impact.

In summary, the NRC staff concludes that economic impacts could be experienced throughout the 3-county ROI for the construction of the proposed action (Phase 1) and during concurrent construction and operations stages at the proposed CISF project. While the NRC staff anticipates that impacts on employment, local finance, housing, and public services would be SMALL, and impacts on population growth would be MODERATE, the NRC staff also recognizes that not all individuals in the ROI are likely to be affected equally. For instance, not all residents utilize community services such as schools, fire, police, and health benefits at the same rate. However, most community members would share to some degree in the economic growth the proposed CISF project is expected to generate. Therefore, the NRC staff has not conducted additional analysis to determine how the benefits are likely to be distributed among persons or potential beneficiaries in the ROI.

As described at the beginning of this section, peak employment with concurrent construction and operations of the proposed action (Phase 1 with subsequent Phases 2-8) is 110 workers per year. ISP anticipates that no additional construction or operations workers would be expected to be hired during Phases 2-8 (ISP, 2020). Therefore, 110 workers per year represents the bounding potential economic impact from the proposed action (Phase 1) and Phases 2-8. Based on the NRC staff's conclusions from the results of the bounding analysis, the NRC staff anticipates that socioeconomic impacts resulting from construction of proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL for employment, housing, and public services, MODERATE for population growth, and MODERATE and beneficial for local finance.

4.11.1.2 Operations Impacts

Economic effects, such as job and income growth, were evaluated in the 3-county socioeconomic ROI. After peak employment, the construction workforce during operations would decline, thereby producing a decline in related payrolls, leading to a corresponding decline in economic impacts. Once all concurrent construction and operations activities are complete, the fully constructed operating CISF would require the fewest number of workers. The loss of construction-related jobs would also lead to a decrease in indirect jobs through the "multiplier effect." ISP estimates that the proposed action (Phase 1) operations stage of the proposed CISF project would require an estimated annual workforce of up to 60 people (ISP, 2020; EIS Section 4.3.1.2). The NRC staff's socioeconomic analysis in EIS Section 4.11.1 accounts for these 60 workers per year during the operations stage (EIS Appendix B). Using the same assumptions for the workforce characteristics in EIS Table 4.11-2, the NRC staff assumes that up to 66 people would move out of the ROI during the operations stage for the proposed action (Phase 1) when construction is complete (i.e., during operation only), leaving 67 workers that moved into the ROI. Up to 15 of those 66 people would be school-aged children. Even with the decrease of jobs during the construction stage, there would also continue to be the presence of up to 26 people that moved into the ROI during the previous construction stage but did not move out after construction was complete. The NRC staff estimates that residents that would remain in the ROI would be approximately 93 people and would represent an increase of 0.08 percent of population in the ROI (USCB, 2018). As provided in EIS Table 4.11-1, the NRC staff determines that an increase of less than 0.1 percent in population growth would result in a small impact on employment and population growth in the ROI.

ISP estimates that annual operating costs would average between approximately $5 and 12.2 million per year over the 40-year license term of proposed project (Phase 1) (ISP, 2020; EIS Appendix C, Tables C-3 and C-4). ISP estimates that the State and county taxes generated in Andrews County, Texas, from operations of the proposed project (Phase 1) Andrews County, Texas, would be $1,135,748 per year over 40 years (ISP, 2020). ISP estimates that Federal taxes generated from operations of the proposed project (Phase 1) in Andrews County, Texas, would be $72,881,153 over 40 years (ISP, 2020). Based on the information that NRC staff provided in EIS Section 4.11.1 from review of county financial reports, Andrews County, Texas, revenues for the 2017 fiscal year totaled $27,212,549 (Andrews County, 2017), and revenues in the three counties in the ROI in fiscal year 2017 were $95,145,472. Therefore, the proposed action (Phase 1) operations stage would generate a 4.2 percent increase in revenues in Andrews County, Texas, and about a 1.2 percent increase in revenues within the ROI. ISP's estimate indicates that the CISF would generate less taxes each year because of fewer material purchases and corporate taxes. The NRC staff cannot predict the total amount of revenues that would be generated in the ROI each year during the operations stage; however, the NRC staff determines that it is reasonable that annual county revenues would increase over time based on new businesses and residents moving into the ROI, and that the percentage of revenues that the proposed CISF would contribute to the ROI could potentially decrease to an amount below 1 percent. As provided in EIS Table 4.11.1, the NRC staff determines that a less than 1-percent increase in local revenues would result in a small impact, and a 1-5 percent increase would result in a moderate impact.

Although the NRC staff determines that the anticipated increase in population would result in a small impact on public services, as discussed in EIS Section 4.11.1.2, the NRC staff also recognize that the presence of a facility that stores nuclear materials may require additional preparedness of first responders in the event of an incident requiring fire, law enforcement, and health service support. ISP did not provide a detailed estimate of the additional training and equipment that would be necessary to respond to an incident at the proposed CISF project that are not currently available to first responders, and local agencies nor officials have not conducted studies with this type of information. Therefore, a detailed analysis of the costs associated with these potential additional resources are not evaluated in detail in this EIS, but NRC has considered first responder training further in the following paragraphs.

Carriers and shippers are required to prepare emergency response plans and provide assistance and information to emergency responders under ANSI N14.27-1986(R1993). The DOT, together with its counterparts in Canada and Mexico, published the "2016 Emergency Response Guidebook," (USDOT, 2016) for carriers and State and local first responders to use during the initial phase of an accident involving hazardous materials. The guidebook sections that apply to SNF include instructions on potential hazards, public safety measures, and emergency response actions. Additionally, DOT requires driver training, including crew training for emergency situations and contacting and assisting first responders. States are recognized as responsible for protecting public health and safety during transportation accidents involving radioactive materials. Federal agencies are prepared to monitor transportation accidents and provide assistance if States request to do so. Eight Federal Regional Coordinating Offices, the DOE funds, are maintained throughout the U.S. Personnel in these offices are on 24-hour call and are capable of responding to such emergencies with equipment and experts that could advise on recovery and removal of the cask and site remediation (USDOT, 2016). Additionally, any event involving NRC-licensed material that could threaten public health and safety or the environment would trigger special NRC procedures.

Affected communities may be able to obtain emergency response financial assistance necessary for training and equipment from Federal programs or other sources. Nationwide, there are numerous shipments of Federally controlled or licensed radioactive material each year, for which the States and some municipalities already provide capable emergency response. Significant additional costs to States would likely not be incurred related to unique or different training to respond to potential transportation accidents involving SNF as compared to existing radioactive materials commerce. However, the NRC staff recognizes that if SNF is shipped to a CISF, some States, Tribes, or municipalities along transportation routes may incur costs for emergency-response training and equipment that might otherwise be eligible for funding under NWPA Section 180(c) provisions if DOE shipped the SNF from existing sites to a repository. Because needs of individual municipalities along transportation routes and the costs of this training and equipment vary widely, quantification of such would be speculative. Furthermore, how the States may distribute funding for first responder training and equipment to local municipalities is not within NRC's authority and is beyond the scope of this EIS.

Based on the NRC staff's conclusions from the results of the previous analysis, the NRC staff anticipates that socioeconomic impacts resulting from operations of the proposed action (Phase 1) would be SMALL for population, employment, housing, and public services and SMALL to MODERATE and beneficial for local finance dependent on the number of new businesses and residents moving into the ROI, and the percentage of revenues that the proposed CISF would contribute to local finances over the 40-year license term. The operations stage of Phases 2-8 would require workers to carry out operation and maintenance activities commensurate to those as part of Phase 1 (the proposed action) and would generate similar revenues for local and State governments. Therefore, population, employment, housing, utilities, and community services previously evaluated for the proposed action (Phase 1) operations stage would not change. Therefore, the NRC staff concludes that the impacts associated with operations of full build-out of the proposed CISF (Phases 1-8) would be SMALL for population, employment, housing, and public services and SMALL to MODERATE and beneficial for local finance dependent on the number of new businesses and residents moving into the ROI, and the percentage of revenues that the proposed CISF would contribute to local finances over the 40-year license term.

Defueling

Defueling would involve removal of the SNF from the proposed CISF and would involve a similar workforce as that used to load and emplace the SNF during the operations stages previously evaluated for Phase 1 and Phases 2-8. Thus, defueling would be expected to have similar impacts for both direct (e.g., traffic, public services) and indirect (e.g., consumer goods) effects within the socioeconomic ROI compared to the earlier portion of the operations stage. Therefore, the NRC staff concludes that the potential impacts to socioeconomics during defueling would be SMALL for population, employment, housing, and public services, and SMALL to MODERATE and beneficial dependent on the number of new businesses and residents moving into the ROI, and the percentage of revenues that the proposed CISF would contribute to local finances over the 40-year license term for Phase 1 (the proposed action) and for Phases 2-8.

4.11.1.3 Decommissioning Impacts

At the end of its license term, the proposed CISF project would be decommissioned such that the proposed project area and remaining facilities could be released for unrestricted use. Decommissioning activities for the proposed action (Phase 1) and for Phases 2-8 would involve the same activities. As described in EIS Section 2.2.1.6, the principal activities involved in decommissioning would include: initial characterization surveys to identify any areas of contamination; decontamination and/or disassembly of contaminated components; waste disposal; and final radiological status surveys. Differences between decommissioning of the proposed action (Phase 1) and subsequent phases would include the number of radiological surveys conducted and amount of decontaminating (if necessary) needed. The number of workers required for dismantling the proposed CISF would also depend on the number of radiological surveys conducted and amount of decontaminating (if necessary) needed. However, the NRC staff assumes that the workforce needed for dismantling the CISF for the proposed project (Phase 1) and for Phases 2-8 would not be greater than the NRC staff assumption for peak employment (EIS Section 4.11.1.1), thus, there would be no increased demand for housing and public services during the decommissioning stage. However, there is uncertainty regarding socioeconomic conditions in the ROI at the end of the license term for the proposed action (Phase 1) and for full build-out (Phases 1-8) of the proposed CISF project. Technological progress and improvements in our understanding of best practices will play an important role at the end of the license term of the proposed CISF project by changing both the type of services available in the region and the manner in which they are delivered. Facilities licensed under 10 CFR Part 72 are required to submit a decommissioning plan to the NRC for review and approval. The NRC's review and approval of the decommissioning plan would require a NEPA environmental review. NRC staff would take into consideration the likely socioeconomic environment in which the closure will take place and draw upon other closure experiences in the region, including strategies used and lessons learned.

The NRC staff anticipates that the potential socioeconomic impacts from decommissioning the proposed CISF project both for the proposed action (Phase 1) and full build-out (Phases 1-8) would not exceed the estimated socioeconomic impacts determined in EIS Section 4.11.1.1.1 for construction of the proposed action (Phase 1) during peak employment, and that additional workers hired during the decommissioning phase would be less than 0.1 percent of the population within the ROI. Thus, the NRC staff concludes that the socioeconomic impacts from decommissioning of the proposed CISF project would be SMALL for population growth, employment, housing, and public services. Because of the uncertainty regarding socioeconomic conditions in the ROI at the end of the license term for the proposed action (Phase 1) and for full build-out (Phases 1-8) of the proposed CISF project, impacts on local finances would be SMALL to MODERATE and beneficial, dependent on the number of new businesses and residents moving into the ROI, and the percentage of revenues that the proposed CISF would contribute to local finances over the 40-year license term.

4.11.2 No-Action Alternative

Under the No-Action alternative, the NRC would not license the proposed CISF project. Within the 3-county ROI for the proposed CISF project, socioeconomic impacts from the proposed project would be avoided, because no workers or materials would be needed to build the proposed CISF, and no tax revenues from the proposed CISF would be generated. Operational impacts would also be avoided, because no workers would be needed to operate the proposed CISF project, and no tax revenues would be generated. Socioeconomic impacts from decommissioning activities would not occur, because there would be no CISF to decommission. The proposed CISF project property would continue to be privately owned and existing land uses would continue. The current socioeconomic conditions on and near the project would remain essentially unchanged under the No-Action alternative. In the absence of a CISF, the NRC staff assumes that SNF would remain onsite in existing wet and dry storage facilities and be stored in accordance with NRC regulations and be subject to NRC oversight and inspection. Site-specific impacts at each of these storage sites would be expected to continue as detailed in generic (NRC, 2013, 2005a) or site-specific environmental analyses. In accordance with current U.S. policy, the NRC staff also assumes that the SNF would be transported to a permanent geologic repository, when such a facility becomes available.

4.12 Environmental Justice

4.12.1 Impacts from the Proposed CISF

Environmental justice refers to the Federal policy established in 1994 by Executive Order 12898 (59 FR 7629) that directs Federal agencies to identify and address disproportionately high and adverse human health and environmental effects of its programs, policies, and activities on minority or low-income populations. Because NRC is an independent agency, the Executive Order (EO) does not automatically apply to the NRC. But as reflected in its subsequent Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions (69 FR 52040), the NRC strives to meet the goals of EO 12898 through its well-established NEPA review process.

Appendix B to this document provides additional information on the NRC staff's methodology for addressing environmental justice in environmental analyses. This environmental justice review includes an analysis of the human health and environmental impacts on low-income and minority populations resulting from the proposed action (Phase 1), full build-out (Phases 1-8), and the No-Action alternative. EIS Section 3.11.1.3 summarizes the NRC's methodology for identifying minority and low-income populations, explains why the NRC staff uses block groups for evaluating census data, and identifies the minority and low-income populations within the 80-km [50-mi] radius of the proposed CISF. EIS Section 3.11.1.3 also explains the NRC staff's 50 percent or greater than 20 percent criteria in NUREG–1748 Appendix C (NRC, 2003) used for identifying minority and low-income populations, and the more inclusive criteria applied to this analysis (i.e., including census block groups with a percentage of Hispanics or Latinos at least as great as the statewide average) for identifying potentially affected environmental justice populations.

There are 109 block groups that fall completely or partly within 80 km [50 mi] of the proposed project area. Of the 109 block groups, there are 72 block groups with Hispanic or Latino populations that meet one of the two NRC guidance criteria. The majority of the block groups with minority populations are located in Lea County in and around the City of Hobbs. Of the 109 block groups within 80 km [50 mi] of the proposed CISF project, 6 block groups have potentially affected low-income families and low-income individuals. The locations of these block groups that represent environmental justice populations are shown on EIS Figures 3.11-3 and 3.11-4. Appendix B provides additional detail about the minority populations in the 109 block groups.

4.12.1.1 Construction Impacts

The NRC staff considered the CEQ's Environmental Justice Guidance under NEPA and NRC's general guidelines on the evaluation of environmental analyses in "Environmental Review Guidance for Licensing Actions Associated with NMSS (Nuclear Material Safety and Safeguards) Programs" (NUREG–1748), and follows NRC's final policy statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions (69 FR 52040) in determining potential environmental justice impacts for the construction phase of the proposed CISF project both for the proposed action (Phase 1) and full build-out (Phases 2-8) (CEQ, 1997; NRC, 2003). A more detailed list of the impacts from the proposed project, as evaluated in other sections of this EIS, is provided in EIS Appendix B.

For each of the areas of technical analysis presented in this EIS, a review of impacts to the human and natural environment was conducted to determine if any minority or low-income populations could be subject to disproportionately high and adverse impacts from the proposed action (Phase 1) and expansion Phases 2-8. Throughout this EIS, the NRC staff concluded that the impacts from the construction of the proposed action (Phase 1) and full build-out (Phases 2-8) would be SMALL, with the exception of MODERATE impacts on vegetation and SMALL to MODERATE impacts on population growth and local finances, dependent on the number of new businesses and residents moving into the ROI, and the percentage of revenues that the proposed CISF would contribute to local finances over the 40-year license term (EIS Table 2.4-1). The primary resource areas that the NRC staff considered for this environmental justice analysis that could affect potential environmental justice populations from the construction phase of the proposed action (Phase 1) and Phases 2-8 are land use, transportation, soil, groundwater, air quality, ecology, socioeconomics, and public health. The following discussion summarizes proposed project impacts on the general population and addresses whether minority and low-income populations would experience disproportionately high and adverse impacts during the construction stage for the proposed action (Phase 1) and for Phases 2-8.

The NRC staff considered the potential physical environmental impacts and the potential radiological health effects from constructing the proposed CISF project {both for the proposed action (Phase 1) and Phases 2-8} to identify means or pathways for minority or low-income populations to be disproportionately affected. No means or pathways have been identified for minority or low-income populations to be disproportionately affected by the proposed action. No commercial crop production takes place within the proposed project area. Also, as stated in EIS Section 4.6.1, there is no adequate habitat within the proposed project area to support aquatic life (e.g., fish); therefore, no analysis was performed for subsistence consumption of fish. Because land access restrictions would limit hunting, and no fish or crops on the land are available for consumption, the NRC staff concludes that there is minimal, if any, risk of radiological exposure through subsistence consumption pathways. Moreover, adverse health effects to all populations, including minority and low-income populations, are not expected under the proposed action, because ISP is expected to maintain current access restrictions (EIS Section 2.2); comply with license requirements, including sufficient monitoring to detect radiological releases (EIS Chapter 7); and maintain safety practices following a radiation protection program that addresses the NRC safety requirements in 10 CFR Parts 72 and 20 (EIS Section 4.13.1.2).

After reviewing the information presented in the license application and associated documentation, considering the information presented throughout this EIS, and considering any special pathways through which environmental justice populations could be more affected than other population groups, the NRC staff did not identify any high and adverse human health or environmental impacts from constructing the proposed CISF project (both for the proposed action (Phase 1) and for Phases 2-8, and concluded that no disproportionately high and adverse impacts on any environmental justice populations would exist.

In conclusion, because all phases are located within the proposed CISF project area, the construction of the proposed action (Phase 1) would affect the same minority and low-income populations as the construction of Phases 2-8. The NRC staff did not identify any special pathways during construction of the proposed CISF project, both for the proposed action (Phase 1) and for Phases 2-8 through which environmental justice populations could be more affected than other population groups. Therefore, the NRC staff determines that no disproportionately high and adverse impacts from the proposed action (Phase 1) or from full build-out (Phases 1-8) on any environmental justice populations would exist.

4.12.1.2 Operations Impacts

The primary environmental resources the operation of the proposed CISF (Phase 1) and for Phases 2-8 could affect are the same as those discussed in EIS Section 4.12.1.1.1 (Construction Impacts). The NRC staff evaluated the proposed action (Phase 1) operations stage impacts in this EIS for land use (EIS Section 4.2.1.2), transportation (EIS Section 4.3.1.2), soils (EIS Section 4.4.1.2), groundwater quality (EIS Section 4.5.2.1.2), groundwater quantity (EIS Section 4.5.2.1.2), air quality (EIS Section 4.7.1.1.3), ecology (EIS Section 4.6.1.2), and socioeconomics (EIS Section 4.11.1.2), and public and occupational health (EIS Section 4.13.1.2). In each of these sections, the NRC concluded that the impacts from the proposed action (Phase 1) and from Phases 2-8 operations would be SMALL, with the exception of SMALL to MODERATE impacts on ecological resources and SMALL to MODERATE impacts on population growth and local finances, dependent on the number of new businesses and residents moving into the ROI, and the percentage of revenues that the proposed CISF would contribute to local finances over the 40-year license term (EIS Table 2.4-1).

For public and occupational health, the proposed action (Phase 1) and Phases 2-8 operations stage would consist of shipments of SNF to and from the proposed CISF. Shipments of LLRW to disposal facilities are also expected. Potential accident scenarios associated with SNF transportation using rail could result in members of the general public being exposed to additional levels of radiation beyond those associated with normal operations (EIS Section 4.15); however, minority and low-income populations would not be more at risk than the general population, because during normal incident-free operations and accident conditions, the requirements of 10 CFR Part 20 must be met. The NRC staff concludes in EIS Section 4.13 that impacts from the operations stage of the proposed action (Phase 1) and Phases 2-8 on public and occupational health would be SMALL. The NRC staff further concluded that because the annual occupational radiation doses would be limited by regulation and administratively controlled in accordance with applicable radiation protection plans, the radiological impact to workers from incident-free transportation of SNF to and from the proposed CISF project would be SMALL.

In summary, in this EIS, the NRC staff concluded that the impacts of the proposed action (Phase 1) and Phases 2-8 operations stage on the resources evaluated would be SMALL for most resources except for a SMALL to MODERATE impact on ecological resources and local finances. The NRC staff found no activities, resource dependencies, pre-existing health conditions, or health service availability issues resulting from normal operations at the proposed CISF that would cause a health impact for the members of minority or low-income communities within the 80-km [50-mi] study area. Therefore, it is unlikely that any minority or low-income population would be disproportionately and adversely affected by normal operations during the proposed action (Phase 1) and Phases 2-8.

In summary, the potential impacts for Phases 2-8 would affect the same minority and low-income populations within an 80-km [50-mi] radius around the proposed CISF project as the operations stage of the proposed action (Phase 1). The NRC staff determined that adverse health effects to all populations, including minority and low-income populations, are not expected during the operations stage of the proposed action (Phase 1) or for Phases 2-8. Similarly, the NRC staff concludes that there would be no disproportionately high and adverse impacts on low-income and minority populations from the operations stage for the proposed action (Phase 1) or for full build-out (Phases 1-8).

Defueling

Defueling any phase of the proposed CISF to remove the stored SNF involves similar activities (e.g., cask handling and preparation for transportation offsite) as those conducted during emplacement earlier in the operations stage. Because the activities are similar, radiological exposure to workers and the public during defueling of the proposed action (Phase 1) and Phases 2-8 would not exceed exposures experienced when SNF is emplaced at the proposed CISF project. Because the NRC staff determined that adverse health effects to all populations, including minority and low-income populations, are not expected during the construction and operations stages for the proposed action (Phase 1) or full build-out (Phases 1-8) of the proposed CISF project, the NRC staff concludes that there would be no disproportionately high and adverse impacts on low-income and minority populations from defueling.

4.12.1.3 Decommissioning Impacts

At the end of the license term, once the SNF inventory is removed, the proposed CISF project would be decommissioned such that the proposed project area and remaining facilities could be released, and the license terminated. Decommissioning activities, in accordance with 10 CFR Part 72 and Part 20 requirements, would include conducting radiological surveys and decontaminating, if necessary. Decommissioning activities for the proposed action (Phase 1) and for Phases 2-8 would involve the same activities, but the activities would be scaled to address the overall size of the CISF (i.e., the number of phases completed).

The NRC staff examination of the various environmental pathways reveals that there would be no disproportionately high and adverse impacts on low-income and minority populations from decommissioning the proposed CISF project for both the proposed action (Phase 1) and for Phases 2-8.

Decommissioning activities (e.g., radiological and site surveys), would be smaller in scale to the construction activities for the proposed CISF project for both the proposed action (Phase 1) and for Phases 2-8. The additional impacts on low-income and minority populations from decommissioning the proposed CISF project Phases 2-8 are not expected to significantly change the estimated impacts experienced by low-income and minority populations from decommissioning of the proposed action (Phase 1). Therefore, the NRC staff examination of the various environmental pathways reveals that there would be no disproportionately high and adverse impacts on low-income and minority populations from decommissioning the proposed action (Phase 1) or full build-out (Phases 1-8).

4.12.2 No-Action Alternative

Under the No-Action alternative, the NRC would not license the proposed CISF project. Therefore, impacts from the proposed CISF on land use, transportation, soils, water resources, air quality, ecological resources, socioeconomics, and human health would not occur. Construction impacts would be avoided, because CISF storage pads, buildings, and transportation infrastructure would not be built. Operational impacts would also be avoided, because no SNF canisters would arrive for storage. The current physical environmental conditions on and near the project would remain essentially unchanged under the No-Action alternative and, thus, there would be no high or adverse impact on minority or low-income populations. In the absence of a CISF, the NRC staff assumes that SNF would remain onsite in existing wet and dry storage facilities and be stored in accordance with NRC regulations and be subject to NRC oversight and inspection. Site-specific impacts at each of these storage sites would be expected to continue as detailed in generic (NRC, 2013, 2005a) or site-specific environmental analyses. In accordance with current U.S. policy, the NRC staff also assumes that the SNF would be transported to a permanent geologic repository, when such a facility becomes available.

4.13 Public and Occupational Health

The potential radiological and nonradiological effects from the proposed CISF may occur during all stages of the project life cycle. Additionally, the potential hazards and associated effects can be either radiological or nonradiological. Therefore, the analysis in this section evaluates the potential radiological and nonradiological public and occupational health and safety effects for normal conditions in each stage of the proposed CISF project life cycle. “Normal conditions” refers to proposed activities that are executed as planned. The impacts of potential accident conditions when unplanned events can generate additional hazards are evaluated in EIS Section 4.15.

4.13.1 Impacts from the Proposed CISF

The environmental impacts on public and occupational health and safety for the proposed action (Phase 1), full build-out (Phases 1-8), and the No-Action alternative are described in the following sections.

4.13.1.1 Construction Impacts

Construction activities at the proposed CISF would include clearing and grading for roads; excavating soil, building foundations, and assembling buildings; constructing the rail sidetrack, and laying fencing. Workers and the public could be exposed to background radiation or nonradiological emissions during the construction stage. Background radiation exposures could result by direct exposure, inhalation, or ingestion of naturally occurring radionuclides during construction activities. Nonradiological exposures may result from inhalation of combustion emissions and fugitive dust from vehicular traffic and construction equipment.

Site-specific measurements indicate that the natural background radiation at the proposed CISF applicable to construction worker and public construction exposures is encompassed by the national average natural background radiation (EIS Section 3.12). Because terrestrial radiation (e.g., from natural radioactivity in soil) is a small fraction of the natural background radiation, the fugitive dust generated from facility construction activities would not be expected to result in an increased radiological hazard to workers and the public. In addition, ISP has proposed implementing water application as a mitigation measure to reduce and control fugitive dust emissions (ISP, 2020). Therefore, the NRC staff estimates that the direct exposure, inhalation, or ingestion of fugitive dust would not result in an increased radiological hazard to workers and the general public during the construction stage of the proposed action (Phase 1) and at full build-out (Phases 1-8) of the proposed CISF project.

The construction stage of the proposed action (Phase 1) would be conducted without the presence of radioactive materials; therefore, there would be no worker radiation exposure from stored SNF. As construction proceeds to Phases 2 and beyond, loaded storage casks would be present at the Phase 1 pad, and ongoing adjacent construction activities would result in the installation of additional storage casks near the existing loaded storage casks. Therefore, the Phase 2 excavation would increase occupational exposure to radiation (e.g., emitted from the Phase 1 modules). ISP estimated dose rates in areas where construction workers would be involved in the construction of CISF Phases 2 through 8 and found that these workers would not be exposed to direct radiation from SNF in storage at Phase 1 above the 0.02 mSv/hr [2 mrem/hr] and 0.5 mSv/y [50 mrem/y] limit in 10 CFR 20.1302(b)(2)(ii) for members of the public (ISP, 2020).

Nonradiological impacts to construction workers during the construction stage of the proposed action (Phase 1) and for full build-out (Phases 1-8) of the proposed CISF project would be limited to typical hazards associated with construction (i.e., no unusual situations would be anticipated that would make the proposed construction activities more hazardous than for a typical industrial construction project). The proposed CISF project would be subject to Occupational Safety and Health Administration (OSHA) General Industry Standards (29 CFR Part 1910) and Construction Industry Standards (29 CFR Part 1926). These standards establish practices, procedures, exposure limits, and equipment specifications to preserve worker health and safety.

Occupational hazards within the construction industry, typically including overexertion, falls, or being struck by equipment (NSC, 2018), can result in fatal and nonfatal occupational injuries. To estimate the number of potential injuries for construction (as well as for operations and decommissioning stages) of the proposed CISF project, the NRC staff considered annual data on fatal and nonfatal occupational injuries the National Safety Council reported (NSC, 2018). This includes data the Bureau of Labor Statistics (BLS) and OSHA compiled. BLS and OSHA data applicable to construction were used to estimate the occupational injuries for construction. The data applicable to the trucking and warehousing industry were used to estimate the occupational injuries for the operations stage. EIS Table 4.13-1 presents the expected number of potentially fatal and nonfatal occupational injuries for applicable phases of the proposed CISF project. Over the proposed 2.5-year duration of the construction stage of the proposed action (Phase 1), the estimated fatalities is less than one, and the total number of estimated construction injuries is 4. Over the proposed 20-year duration of construction of full build-out (Phases 1-8), the fatality estimate continues to be less than one, and the total number of estimated construction injuries is 32. Because the construction activities at the proposed CISF would be typical of a construction project and subject to applicable occupational health and safety regulations, there would be only minor impacts to worker health and safety from construction-related activities. Therefore, the NRC staff concludes that the nonradiological occupational health effects of the construction stage of the proposed action (Phase 1) and the construction stages of full build-out (Phases 1-8) would be minor.

Further reduction in the estimated occupational safety hazards from construction may be possible by following established safety practices, such as those OSHA recommended (OSHA, 2016).

Table 4.13-1 Estimated Fatal and Nonfatal Occupational Injuries for the Proposed CISF Project by Work Activity and Project Phase						
Activity	**Number of Full-time Workers***	**Duration (years)**	**Fatal Injury Rate***	**Estimated Fatalities**	**Nonfatal Injury Rate†**	**Estimated Nonfatal Injuries**
Construction–proposed action (Phase 1)	50	2.5	9.8×10^{-5}	0.012	3.2×10^{-2}	4
Construction–Phases 1-8	50	20	9.8×10^{-5}	0.098	3.2×10^{-2}	32
Operation–proposed action (Phase 1)	60	2.5	1.3×10^{-4}	0.020	4.5×10^{-2}	7
Operation–Phases 1-8	60	20	1.3×10^{-4}	0.16	4.5×10^{-2}	54
Decommissioning–(Any or All Phases)	The NRC staff expects a small workforce involved primarily in conducting radiological surveys would have negligible injuries and no fatalities					
Total				0.29		97

*The number of operational workers does not include security staff who would not be directly involved in the proposed project activities evaluated for injuries and fatalities.
†Source: NSC, 2018. The fatal and nonfatal injury rates are the number of reported occupational deaths and nonfatal medically consulted occupational injuries per annual worker full-time equivalent for construction and transportation and warehousing industries.

The potential nonradiological air quality impacts from fugitive dust and diesel emissions, including comparisons with health-based standards, are evaluated in EIS Section 4.7.1.1. Fugitive dust emissions would occur primarily from travel on unpaved roads and wind erosion. Construction equipment would be diesel powered and would emit diesel exhaust, which includes small particles (PM_{10}) and a variety of gases. In EIS Section 4.7.1.1, the NRC staff concluded that construction stage air emissions would have a SMALL impact on air quality because the pollutant concentrations would be low compared to the NAAQS and PSD thresholds. Additionally, ISP's compliance with Federal and State occupational safety regulations would limit the potential nonradiological effects of fugitive dust and diesel emissions to levels acceptable for workers. Based on the foregoing analysis, the NRC staff concludes that overall nonradiological impacts on workers and the general public from the construction stage of the proposed action (Phase 1) and the construction stages of full build-out (Phases 1-8) would be SMALL.

4.13.1.2 Operations Impacts

Operational activities at the proposed CISF would include the receipt, transfer, handling, and storage of canistered SNF. During these activities, the radiological impacts would include expected occupational and public exposures to low levels of radiation. The nonradiological impacts would include the potential for typical occupational injuries and fatalities during the proposed CISF operations.

The radiological impacts from normal operations involve radiation doses to workers and members of the public. Operational worker doses would occur as a result of the proximity of workers to SNF casks and canisters during receipt, transfer, handling, and storage operations. Public radiation doses from normal operations occur from exposure to low levels of direct radiation at locations beyond the boundary of the CISF controlled area from the stored SNF casks. ISP would monitor and control both occupational and public radiation exposures by following a radiation protection program that addresses the NRC safety requirements in

10 CFR Parts 72 and 20. The following detailed evaluations of the radiological effects to workers and the public from normal operations at the proposed CISF is based on the NRC staff's site-specific review.

ISP estimated occupational radiation exposures during proposed operations involving the proposed SNF receipt and transfer operations. For canisters that would be vertically stored, this would include the receipt and inspection of the shipping cask, transfer of the canister from the shipping cask to a temporary transfer cask, transfer of the canister to a vertical storage module, and movement of the vertical storage module to the storage pad (ISP, 2018). For horizontal storage, following receipt and inspection, the shipping cask would be placed on a horizontal transport trailer and moved to the NUHOMS horizontal storage module where the canister would be transferred from the shipping cask (ISP, 2018). Detailed dose estimates for each step of the receipt and transfer process were documented for different shipping cask and canister configurations in ISP SAR Appendices A.9, B.9, C.9, D.9, E.9, F.9, and G.9 (ISP, 2018). ISP's estimated occupational doses included both neutron and gamma contributions for fuel compositions considered to be representative of typical fuels. Calculated worker doses were based on flux and dose rate for cask surfaces obtained from design basis source terms from applicable cask certifications for each cask system evaluated, the number and location of workers for each operation, and the duration of each operation (ISP, 2018). The use of design-basis source terms from cask certifications is a conservative basis for cask dose rates because they incorporate bounding characteristics. Among the configurations evaluated, most of the calculated collective worker receipt and transfer dose estimates were above 0.01 person-Sv [1.0 person-rem] (ISP, 2018). The highest receipt and transfer dose estimate was associated with the transfer of a NUHOMS 24PT1 Dry Shielded Canister from a MP187 Cask and into a horizontal storage module (ISP, 2018). Per individual canister, the collective dose estimate for the entire crew was 0.01097 person-Sv [1.097 person-rem]. Person-Sv (person-rem) is an expression of the collective summation of the individual dose equivalents a population exposed to radiation received. For comparison, if the proposed operational workforce of 60 employees (ISP, 2020) received the annual occupational dose limit of 0.05 Sv [5 rem], their collective dose would be 3.0 person-Sv [300 person-rem]. The maximum individual occupational dose estimate for a transfer operation was 4.5 mSv [450 mrem)] (ISP, 2020). The NRC staff reviewed the ISP's occupational dose calculations and found them to be based on acceptable methods, assumptions, and input parameters that would not be expected to underestimate calculated doses. Because the occupational doses can be maintained within the NRC 0.05 Sv/yr [5 rem/yr] occupational dose limit specified in 10 CFR 20.1201(a), the NRC staff concludes that the radiological impacts to workers during the operations stage of the proposed action (Phase 1) and the operations stages of full build-out (Phases 1-8) would be minor.

To assess the radiological impacts to the general public from normal operation of the proposed CISF project, the NRC staff evaluated ISP's estimates of the potential dose to a hypothetical maximally exposed individual located at the boundary of the proposed CISF-controlled area, as well as to nearby residents. Because the direct radiation emitted from the storage modules under normal operations decreases with distance, the nearest publicly accessible location is the location where the radiation dose rate is the highest for a member of the public. Similarly, workers constructing subsequent phases may also be exposed to radiation at locations beyond the boundary of the CISF-controlled area.

The potential exposure pathways at the proposed CISF include direct exposure to radiation (neutrons and gamma rays), including skyshine, emitted from the storage casks. Exposure pathways that would require a release of radioactive material from the casks (e.g., environmental transport to air, water, soil, and subsequent inhalation or ingestion) are not applicable to normal operations of the proposed CISF. The potential for release of radioactive material is addressed separately in the EIS accident analysis (EIS Section 4.15). Factors that contribute to the containment of SNF during normal operations include the use of sealed (welded closure) canisters that would remain closed for the duration of storage, the engineered features of the cask system, and plans to inspect casks upon arrival at the CISF and take corrective actions when canisters do not meet acceptance criteria, including unacceptable external contamination (ISP, 2018).

ISP calculated dose rates for locations at the boundary of the CISF-controlled area considering both vertical and horizontal storage modules and conservative design basis source terms that do not account for radioactive decay necessary to allow for transportation (ISP, 2020). ISP notes that the source terms were taken directly from the reactor storage licensing and cask certification basis documents for each system under which the canisters were originally loaded. The highest dose rates calculated were associated with the vertical storage modules. The location of the maximum dose to an individual at the proposed controlled area boundary of the CISF was 1,006 m [3,300 ft] from the center of the proposed storage pads. For the purpose of this analysis, ISP assumed that the CISF was fully loaded and consisted of an array of 2,592 vertical storage casks. For context, if these assumed 2,594 vertical storage casks were divided equally among the proposed 8 phases, each phase would have approximately 324 vertical casks. An additional 100 horizontally stored casks (not included in the ISP boundary dose calculation, because the higher vertical cask dose rates bound the dose rates from the horizontal storage modules) would be needed to address storage of the approximate total number of canisters proposed to be stored (3,400).

For the operations stage of the proposed action (Phase 1), ISP estimated a bounding annual dose of 0.07 mSv [7 mrem] to a hypothetical individual that spends 8,760 hours at the controlled area boundary 1,006 m [3,300 ft] from the CISF at full build-out (ISP, 2020). Doses to actual individuals further from the CISF or who spend less time at the boundary would be smaller. The estimated 0.07 mSv [7 mrem] dose is less than the 0.25 mSv [25 mrem] regulatory limit specified in 10 CFR 72.104 for the maximum permissible annual whole-body dose to any real individual. Additionally, the 0.07 mSv [7 mrem] annual dose is less than half of the average annual preoperational radiation dose ISP reported in the ER from past monitoring near the proposed CISF project area of 0.168 mSv [16.8 mrem] and one percent of the annual natural background radiation dose in the United States of 3.1 mSv/yr [310 mrem/yr] (EIS Section 3.12.1).

The nearest resident to the proposed CISF project is located approximately 6 km [3.8 mi] to the west at a location east of Eunice, New Mexico (ISP, 2020). At large distances, absorption and attenuation of radiation in the air significantly reduces the dose. For the operations stage of the proposed action (Phase 1), ISP calculated the dose to residents assuming 8,760 hours (an entire year) were spent by the nearest resident to the CISF at full build-out without shielding by a residence or other structures. The calculated 4.83×10^{-16} mSv [4.83×10^{-14} mrem] annual dose (ISP, 2018) is smaller than the 0.25 mSv [25 mrem)]regulatory limit specified in 10 CFR 72.104 for the maximum permissible annual whole-body dose to any real individual. The 4.83×10^{-16} mSv [4.83×10^{-14} mrem] annual dose is a small fraction of the annual preoperational radiation dose ISP reported in the ER from past monitoring near the proposed CISF project area of 0.168 mSv [16.8 mrem] and the annual natural background radiation dose in the United States of 3.1 mSv/yr [310 mrem/yr] (EIS Section 3.12.1). The NRC staff reviewed ISP's public dose calculation methods, assumptions, and parameters and found them to be acceptable. The NRC staff also found that the calculated dose estimates were within expectations, based on prior ISFSI public dose estimates (NRC, 2009, 2005a, 2005b, 2001).

Because ISP's public dose estimates are a small fraction of the NRC public dose limit as well as natural background radiation, the NRC staff concludes that the radiological impacts to the public for the operations stage of the proposed action (Phase 1) and full build-out (Phases 1-8) would be minor.

Nonradiological impacts to operations workers would be limited to the hazards associated with CISF normal operations. The proposed CISF would be subject to OSHA General Industry Standards (29 CFR Part 1910). These standards establish practices, procedures, exposure limits, and equipment specifications to preserve worker health and safety.

To estimate the number of potential injuries for operation of the proposed CISF project for the operations stage of the proposed action (Phase 1) and full build-out, the NRC staff considered annual data on fatal and nonfatal occupational injuries the National Safety Council reported (NSC, 2018). This includes data the BLS and OSHA compiled. BLS and OSHA data applicable to the trucking and warehousing industry were used to estimate the occupational injuries for the operations stage based on similarities to proposed activities (e.g., transfer of heavy objects and crane operations). EIS Table 4.13-1 presents the expected number of potentially fatal and nonfatal occupational injuries for each stage and by phase of the proposed CISF project. For the operations stage of the proposed action (Phase 1) and the operations stages of full build-out (Phases 1-8), the estimate of fatalities is less than one, and the number of estimated injuries would be 7 and 54, respectively. Because the nonradiological operations activities at the proposed CISF would be typical of other industrial operations (e.g., crane operation, movement of large objects) and subject to applicable occupational health and safety regulations, there would be only minor impacts to nonradiological worker health and safety from operations-related activities. Therefore, the NRC staff concludes that the nonradiological occupational health impacts of the operations stage of the proposed action (Phase 1) and full build-out (Phases 1-8) would be minor.

Overall, based on the preceding analysis that considers (i) occupational dose estimates for operations that are below applicable NRC standards, (ii) public dose estimates from CISF storage operations that are well below NRC standards and a small fraction of background radiation exposure, and (iii) low occupational injury estimates, the NRC staff concludes that the radiological and nonradiological public and occupational health impacts from the operations stage of the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

Defueling

Removal of the SNF from the proposed CISF project, or defueling, would involve reversing the activities conducted at the start of operations to receive, handle, and transfer SNF that arrived at the CISF from generator sites. Therefore, the public and occupational health impacts would be bounded by the impacts evaluated for receiving, handling, and transferring the SNF at the proposed CISF and would be SMALL both for the proposed action (Phase 1) and full build-out (Phases 1-8).

4.13.1.3 Decommissioning Impacts

At the end of the license term of the proposed CISF project, once the SNF inventory is removed, the facility would be decommissioned such that the proposed project area and remaining facilities could be released, and the license terminated. Decommissioning activities, in accordance with 10 CFR Part 72 requirements, would include conducting radiological surveys and decontaminating, if necessary. Decommissioning activities for the proposed action

(Phase 1) and for full build-out (Phases 1-8) would involve the same activities, but the activities would be scaled to address the overall size of the CISF (i.e., the number of phases completed). EIS Sections 2.2.1.5 and 2.2.1.3.3 describe the decommissioning activities.

During the decommissioning stage of the proposed CISF project, the primary public and occupational health impacts would be limited to worker safety and a limited potential for radiation exposure.

Radiological safety during decommissioning activities would be maintained as the existing NRC-approved 10 CFR Part 20 compliant radiological protection plan and an NRC-approved decommissioning plan require. The decommissioning plan would identify any areas of the facilities or grounds or materials where surveys may be needed to evaluate the radiological status prior to unrestricted release or disposal, in accordance with NRC regulations or guidelines. As discussed in EIS Section 4.13.1.2, no radiological contamination of the facility, the storage casks, or storage pads is expected under normal operations. The NRC staff assumes a small number of workers would be needed to complete the limited decommissioning activities. Therefore, nonradiological worker and public impacts during decommissioning would be negligible.

Based on the effective containment of SNF during operations under normal conditions, the existing radiological and nonradiological controls and decommissioning planning, the NRC staff concludes that the public and occupational health impacts during the decommissioning stage of the proposed action (Phase 1) and at full build-out (Phases 1-8) would be SMALL.

4.13.2 No-Action Alternative

Under the No-Action alternative, the NRC would not license the proposed CISF project. Therefore, public and occupational impacts such as typical construction hazards and the occupational and public radiation exposures from the proposed storage of SNF would not occur. Construction impacts would be avoided, because SNF storage pads, buildings, and transportation infrastructure would not be built. Operational impacts would also be avoided, because SNF receipt, transfer, or storage at the proposed CISF would not occur. Public and occupational impacts from the proposed decommissioning activities would not occur, because unbuilt SNF storage pads, buildings, and transportation infrastructure would require no decommissioning. The current public and occupational health conditions on and near the project would remain unchanged by the proposed CISF under the No-Action alternative. In the absence of a CISF, the NRC staff assumes that SNF would remain onsite in existing wet and dry storage facilities and be stored in accordance with NRC regulations and be subject to NRC oversight and inspection. Site-specific impacts at each of these storage sites would be expected to continue, as detailed in generic (NRC, 2013, 2005a) or site-specific environmental analyses. In accordance with current U.S. policy, the NRC staff also assumes that the SNF would be transported to a permanent geologic repository, when such a facility becomes available.

4.14 Waste Management

This section describes the potential impact to waste management for the proposed action (Phase 1), full build-out (Phases 1-8), and the No-Action alternative.

4.14.1 Impacts from the Proposed CISF

EIS Section 2.2.1.4 provides a detailed description of various waste streams the proposed CISF would generate, including a description of the quantities of waste the various proposed CISF stages would generate (i.e., construction, operation, and decommissioning) for the waste streams that will be analyzed in this EIS Section. The proposed CISF generates two waste streams for which the impacts are analyzed elsewhere in this EIS. Stormwater runoff impacts are analyzed in EIS Section 4.5.1, and excavated soil impacts are analyzed in EIS Section 4.4.

As described in EIS Section 2.2.1.4, the proposed CISF would be constructed in eight phases (Phases 1–8) over a 20-year period (ISP, 2020). The following sections analyze the potential impacts on waste management resources (i.e., disposal sites) from the construction, operation, and decommissioning of the proposed CISF. This assessment considers whether the quantity of waste the proposed CISF would generate would affect the waste management resources.

4.14.1.1 Construction Impacts

As illustrated in EIS Table 2.2-4, the construction stage generates nonhazardous solid waste, hazardous solid waste, and sanitary liquid waste. EIS Section 3.13 provides a description of the relevant disposal sites.

Construction of Phases 1-8 would generate nonhazardous waste. Phase 1 construction consists of building the storage modules and pad for Phase 1, as well as all of the infrastructure needed to support the proposed CISF, including a security and administration building, the cask-handling building, and rail sidetrack. Construction for Phases 2-8 consists of building the storage modules and pad for the individual phases, which would be similar in scope and scale as building storage modules and pads for Phase 1. Therefore, construction of Phase 1 provides an upper bound to the potential impacts for nonhazardous waste because this phase generates the most amount of waste as a result of additional construction of the support infrastructure.

As described in EIS Section 3.13.2, the applicant has proposed disposal of nonhazardous solid waste offsite in a municipal landfill. The nearest municipal solid waste facility to the proposed CISF project area is the Lea County Solid Waste Authority landfill. Construction of Phase 1 would generate approximately 2,378 metric tons [2,621 short tons] of nonhazardous solid waste annually, over the 2.5-year schedule for construction of Phase 1 (ISP, 2020), which is approximately 2.7 percent of the annual volume of nonhazardous solid waste disposed at the Lea County Solid Waste Authority Landfill (EIS Section 3.13). Construction of Phases 2-8 would generate approximately 2,330 metric tons [2,568 short tons] of nonhazardous solid waste annually, over the 17.5-year schedule for construction of Phases 2-8, which is approximately 2.6 percent of the annual volume of nonhazardous waste disposed of at the Lea County Solid Waste Authority Landfill. The total nonhazardous solid waste the proposed CISF would generate for the construction stage of the full build-out (construction of Phases 1-8 over 20 years) would be 46,714 metric tons [51,495 short tons] (ISP, 2020). This would be about 0.6 percent of the capacity of the Lea County Solid Waste Authority Landfill based on multiplying the annual volume of waste disposed at this landfill by the projected lifespan of this landfill (ISP, 2020). The NRC staff considers the amount of nonhazardous solid waste the proposed CISF construction stage would generate to be minor in comparison to the capacity of the landfill to dispose of such waste and that there would be adequate capacity to dispose of the nonhazardous waste produced from the construction stage of the proposed action (Phase 1) and full build-out (Phases 1-8).

The construction stage would involve limited activities that generate hazardous waste. The construction stage of Phase 1 is estimated to generate 0.5 metric tons [.53 short tons] of hazardous waste annually (ISP, 2020). The construction stages of Phases 2-8 are estimated to generate 0.5 metric tons [.53 short tons] of hazardous waste annually (ISP, 2020). The total hazardous solid waste the proposed CISF would generate for the construction stage of the full build-out (Phases 1-8 over the project schedule in EIS Section 2.2.1) would be 9.6 metric tons [10.6 short tons] (ISP, 2020). Based on this volume of waste, the applicant expects to be classified as a Conditionally Exempt Small Quantity Generator (CESQG), and the proposed CISF would store and dispose of the hazardous waste in accordance with applicable State and Federal requirements (ISP, 2020). The NRC staff considers the amount of hazardous waste the construction stage would generate relatively minor and that there would be ample capacity at the adjacent WCS hazardous waste management facility to dispose of the limited quantities of hazardous waste produced from the construction stage of the proposed action (Phase 1) and full build-out (Phases 1-8).

The construction stage would generate limited amounts of sanitary liquid waste. As described in EIS Section 3.13.1, the applicant would dispose of sanitary liquid waste using either portable toilets or follow the same disposal procedure that would be used during operations. For operations, the applicant would dispose of sanitary wastewater using underground sewage tank systems that discharge into above-ground holding tanks with no onsite discharge. The resulting sewage would be removed from the tanks and disposed at an offsite permitted treatment facility (ISP, 2020). The construction stage of Phase 1 is estimated to generate approximately 57,000 liters [15,000 gallons] of sanitary liquid waste monthly (ISP, 2020). The construction stages of Phases 2-8 are estimated to generate approximately 57,000 liters [15,000 gallons] of sanitary liquid waste monthly (ISP, 2020). The total sanitary liquid solid waste the proposed CISF would generate for the construction stage of the full build-out (Phases 1-8 over the project schedule in EIS Section 2.2.1) would be approximately 13.6 million liters [3.6 million gallons] (ISP, 2020). The City of Andrews Wastewater Treatment Plant receives up to 4,166,666 liters [1,100,000 gallons] per day of wastewater generated from residential and commercial facilities (City of Andrews, 2020). The NRC staff considers that the amount of liquid sanitary waste the proposed CISF construction stage would generate relatively minor in comparison to the capacity of publicly owned treatment works to process such waste and that there would be adequate capacity to dispose of the sanitary waste produced from the construction stage of the proposed action (Phase 1) and full build-out (Phases 1-8).

The applicant would implement the following mitigation measures to reduce the amount of waste generated or reduce the potential impacts from the waste that is generated: (i) recycle construction debris to the extent practical; (ii) prohibit disposal of nonhazardous solid waste, hazardous solid waste, and sanitary liquid waste at the proposed CISF project area; and (iii) implement administrative procedures and practices that provide for collection, temporary storage, and processing of categorized solid waste in accordance with regulatory requirements such that waste would be temporarily stored in designated locations of the facility until administrative limits are reached, at which time waste would be shipped offsite to the appropriate, licensed treatment, storage, and/or disposal facility (ISP, 2020). The NRC staff determination of the impact magnitude in this EIS accounts for these mitigations that the applicant has committed to implement.

Based on the amounts of nonhazardous solid waste, hazardous solid waste, and sanitary liquid waste the proposed CISF would generate relative to the available capacity for disposal of these wastes and the proposed mitigation measures that ISP has proposed to implement, the NRC staff concludes that the potential impacts to waste management during construction for both the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

4.14.1.2 Operations Impacts

The operations stage generates nonhazardous solid waste, solid LLRW, hazardous solid waste, and sanitary liquid wastes. The operations stage activities for the proposed CISF primarily consist of receiving and positioning SNF at the proposed facility for storage. EIS Section 3.13 provides a detailed description of the relevant disposal sites for each type of waste these activities would generate.

The amount of nonhazardous solid waste generated during the operations stage is much less than the amount generated during the construction stage (EIS Table 2.2-4). The amount of this nonhazardous waste the operations stage would generate would be commensurate with typical office and personnel waste the small work force at the proposed CISF produces. Operation of Phase 1 would generate approximately 48 metric tons [53 short tons] of nonhazardous solid waste annually (ISP, 2020), which is about 0.05 percent of the annual volume of waste disposed at the Lea County Solid Waste Authority Landfill (EIS Section 3.13). Operation of Phases 2-8 would generate a total annual volume of 48 metric tons [53 short tons] of nonhazardous solid waste annually over the project schedule outlined in EIS Section 2.2.1, which is approximately 0.05 percent of the annual volume of waste disposed at the Lea County Solid Waste Authority Landfill. The total nonhazardous solid waste the proposed CISF would generate for the operations stage of full build-out (Phases 1-8 over the project schedule in EIS Section 2.2.1) would be approximately 962 metric tons [1,060 short tons] (ISP, 2020). This would be about 0.01 percent of the capacity of the Lea County Solid Waste Authority Landfill based on multiplying the annual volume of waste disposed at this landfill by the projected lifespan of this landfill (ISP, 2020). The NRC staff considers the amount of nonhazardous solid waste the proposed CISF operations stage would generate to be minor in comparison to the capacity of the landfill to dispose of such waste, and that there would be adequate capacity to dispose of the nonhazardous waste produced from the operations stage of the proposed action (Phase 1) and full build-out (Phases 1-8).

The operations stage would generate limited amounts of LLRW. As described in EIS Section 3.13.2, the applicant proposes to dispose of the LLRW at the adjacent WCS facility or other licensed facility (i.e., the *Energy*Solutions facility in Clive, Utah). The operations stage for Phase 1 would annually generate a volume of 11.7 m^3 [15.2 yd^3] of LLRW (ISP, 2020), which is about 1.6 percent of the annual volume of waste disposed at the WCS facility in Andrews, Texas (EIS Section 3.13). The operations stage for Phases 2-8 would generate a volume of 11.7 m^3 [15.2 yd^3] of LLRW (ISP, 2020) annually, which is about 1.6 percent of the annual volume of waste disposed at the WCS facility in Andrews, Texas (EIS Section 3.13). The total solid LLRW volume that the proposed CISF would generate for the entire operations stage of the full build-out would be 234 m^3 [304 yd^3] (ISP, 2020). This would be about 1.7 percent of the capacity of the WCS facility based on the current disposal capacity of the first phase of operation for this facility (ISP, 2020). The NRC staff considers the amount of LLRW the operations stage would generate to be minor in comparison to the capacity of the facilities to dispose of such waste, and that there would be adequate capacity to dispose of the limited amounts of LLRW produced from the operations stage of the proposed action (Phase 1) and full build-out (Phases 1-8).

The operations stage would involve limited activities that generate hazardous waste. The operations stage for the proposed action (Phase 1) is estimated to generate 1.2 metric tons

[1.33 short tons] of hazardous waste annually (ISP, 2020). The operations stages of Phases 2-8 are estimated to generate 1.2 metric tons [1.33 short tons] of hazardous waste annually (ISP, 2020). The total hazardous solid waste the proposed CISF would generate for the operations stages of the full build-out (Phases 1-8 over the project schedule in EIS Section 2.2.1) would be 24.1 metric tons [26.6 short tons] (ISP, 2020). Based on this volume of waste, the applicant expects to be classified as a CESQG, and the proposed CISF would store and dispose the hazardous waste in accordance with applicable State and Federal requirements (ISP, 2020). The NRC staff considers the amount of hazardous waste the operations stage would generate relatively minor and that there would be adequate capacity at the adjacent WCS hazardous waste disposal facility to dispose of the limited quantities of hazardous waste produced from the operations stage of the proposed action (Phase 1) and full build-out (Phases 1-8). The operations stage would generate limited amounts of sanitary liquid waste. As described in EIS Section 3.13.1, the applicant would dispose of sanitary liquid waste using underground sewage tank systems that discharge into above-ground holding tanks with no onsite discharge. The resulting sewage would be removed from the tanks and disposed at an offsite permitted treatment facility (ISP, 2020). The operations stage of Phase 1 is estimated to generate 700,758 liters [185,000 gallons] of sanitary liquid waste annually (ISP, 2020). The construction stages of Phases 2-8 are estimated to generate 700,758 liters [185,000 gallons] of sanitary liquid waste annually (ISP, 2020). The total sanitary liquid solid waste the proposed CISF would generate for the operations stage of the full build-out (Phases 1 to 8 over the project schedule in EIS Section 2.2.1) would be approximately 14 million liters [3.7 million gallons] (ISP, 2020). The NRC staff considers the amount of liquid sanitary waste the proposed CISF operations stage would generate relatively small in comparison to the current capacity of publicly owned treatment works to process sanitary wastewater, and that there would be adequate capacity to dispose of the sanitary waste produced from the operations stage of the proposed action (Phase 1) and full build-out (Phases 1-8).

Mitigation measures identified for the construction stage (EIS Section 4.14.1.1) would also apply to the operations stage. In addition, the applicant would implement the following mitigation measures associated with the operations stage to reduce the amount of waste generated or reduce the potential impacts from the waste that is generated: (i) design the proposed CISF to minimize the volumes of radiological waste generated, (ii) implement handling and treatment processes designed to limit the volumes of waste generated, (iii) prohibit disposal of LLRW at the proposed CISF project area, and (iv) conduct sampling and monitoring of wastes prior to offsite treatment and disposal to assure facility administrative and regulatory limits are not exceeded (ISP, 2018). The NRC staff determination of the impact magnitude in this EIS accounts for these mitigations that the applicant has committed to implement.

Based on the amounts of nonhazardous solid waste, solid LLRW, hazardous solid waste, and sanitary liquid waste the proposed CISF would generate relative to the available capacity for disposal of these wastes, and the proposed mitigation measures that ISP has proposed to implement, the NRC staff concludes that the potential impacts to waste management during operations for both the proposed action (Phase 1) and full build-out (Phases 1-8) would be SMALL.

Defueling

Defueling the proposed CISF would involve removal of SNF from the proposed CISF and would generate nonhazardous solid waste, solid LLRW, hazardous solid waste, and sanitary liquid wastes. For both the proposed action (Phase 1) and the full build-out (Phases 1-8), the activities and amounts of the various wastes (EIS Table 2.2-4) associated with defueling are similar to those associated with emplacing the SNF. Additionally, for both the proposed action (Phase 1) and full build-out (Phases 1-8), mitigation measures identified for emplacing the SNF (EIS Section 4.14.1.2) would also apply to defueling, and the impacts for defueling are expected to be similar to those for emplacing the SNF. Therefore, the NRC staff concludes that for the proposed action (Phase 1) and full build-out (Phases 1-8) the potential impacts to waste management during defueling would be SMALL.

4.14.1.3 Decommissioning Impacts

The decommissioning stage generates nonhazardous solid waste, solid LLRW, hazardous solid waste, and sanitary liquid wastes. EIS Section 3.13 provides a detailed description of the relevant disposal sites for each type of waste.

At the end of its license term, once the SNF inventory is removed, the proposed CISF would be decommissioned such that the proposed project area and remaining facilities (e.g., buildings and other improvements) could be released for unrestricted use. The activities involved in decommissioning the proposed CISF would be based on an NRC-approved decommissioning plan, and all decommissioning activities would be carried out in accordance with 10 CFR Part 72 and Part 20 requirements. The applicant would submit a final decommissioning plan detailing activities and procedures for decommissioning the proposed CISF after the SNF is removed from the proposed CISF.

As described in EIS Section 3.13.2, the applicant has proposed disposal of nonhazardous solid waste offsite in a municipal landfill. The nearest municipal solid waste facility to the proposed CISF project area is the Lea County Solid Waste Authority landfill. Decommissioning for both the proposed action (Phase 1) and full build-out (Phases 1-8) is not expected to include demolition of the storage pads, buildings, or other improvements and would produce limited nonhazardous waste. The decommissioning stage of the proposed action (Phase 1) would generate approximately 9 metric tons [10 short tons] of nonhazardous solid waste (ISP, 2020), which is about 0.01 percent of the annual volume of waste disposed at the Lea County Solid Waste Authority Landfill (EIS Section 3.13). The decommissioning stages of Phases 2-8 would generate a volume of approximately 64 metric tons [70 short tons] of nonhazardous solid waste (ISP, 2020), which is about 0.07 percent of the annual volume of waste disposed at the Lea County Solid Waste Authority Landfill (EIS Section 3.13). The total nonhazardous solid waste the proposed CISF would generate for the decommissioning stage of the full build-out (Phases 1-8) would be 73 metric tons [80 short tons] (ISP, 2020). This would represent a very minor portion of the remaining nonhazardous waste disposal capacity of the Lea County Solid Waste Authority Landfill (ISP, 2020). Although the duration of the proposed CISF project is anticipated to exceed the currently projected operational life of the Lea County Solid Waste Authority Landfill (ISP, 2020), the NRC staff anticipates that the States of New Mexico and Texas would site new landfills as part of normal urban development. Further, because the quantity of nonhazardous waste produced as a result of decommissioning the proposed CISF is limited and would represent a minor fraction of a typical future landfill's capacity, the NRC staff expects that disposal capacity for nonhazardous solid waste would be available to meet future demands at the time when decommissioning would occur. Therefore, the NRC staff considers the amount of nonhazardous solid waste the proposed CISF decommissioning stage would generate to be minor in comparison to the capacity of the landfill to dispose of such waste.

The decommissioning stage would generate limited amounts of LLRW. As described in EIS Section 3.13.2, the applicant proposes to dispose of the LLRW at the adjacent WCS facility or other licensed facility (i.e., the *Energy*Solutions facility in Clive, Utah). The decommissioning stage for Phase 1 would only generate approximately 11.2 tons [12.3 short tons] of LLRW (ISP, 2020), which represents 1 percent of the capacity of the WCS facility based on the current disposal capacity of the first phase of operation for this facility (ISP, 2020). The decommissioning stages for Phases 2-8 of the proposed CISF would annually generate approximately 78.05 metric tons [86.03 short tons] of LLRW (ISP, 2020), which is about 10 percent of the capacity of the WCS facility, based on the current disposal capacity of the first phase of operation for this facility (ISP, 2020). The total solid LLRW the proposed CISF would generate for the decommissioning stage of full build-out (Phases 1 to 8 over the project schedule in EIS Section 2.2.1) would be approximately 89.25 metric tons [98.3 short tons] (ISP, 2020). This would be about 11 percent of the capacity of the WCS facility based on the current disposal capacity of the first phase of operation for this facility (ISP, 2020). The NRC staff considers the amount of LLRW the decommissioning stage would generate to be low in comparison to the capacity of the facilities to dispose of such waste.

The decommissioning stage would involve limited activities that generate hazardous waste. The decommissioning stage for the proposed action (Phase 1) is estimated to generate 0.162 tons [0.166 short tons] of hazardous waste (ISP, 2020). The decommissioning stages of Phases 2-8 are estimated to generate 1.06 metric tons [1.16 short tons] of hazardous waste (ISP, 2020). The total hazardous solid waste the proposed CISF would generate for the decommissioning stage of the full build-out (Phases 1-8) would be 1.2 metric tons [1.33 short tons] (ISP, 2020). Based on this volume of waste, the applicant expects to be classified as a CESQG, and the proposed CISF would store and dispose the hazardous waste in accordance with applicable State and Federal requirements (ISP, 2020). The NRC staff considers the amount of hazardous waste the decommissioning stage would generate as minor and that there would be adequate capacity to dispose of the limited quantities of hazardous waste produced from the decommissioning stage of the proposed action (Phase 1) and full build-out (Phases 1-8).

The description of the operations stage impacts for sanitary liquid wastes also applies to the decommissioning stage. Thus, the NRC staff considers the amount of sanitary liquid waste the proposed CISF decommissioning stage would generate relatively small in comparison to the capacity of publicly owned treatment works to process such waste.

Mitigation measures identified for the operations stage (EIS Section 4.14.1.2) would also apply to the decommissioning stage. The NRC staff determination of the impact magnitude in this EIS accounts for the mitigation measures the applicant has committed to implement.

Based on the amounts of nonhazardous solid waste, solid LLRW, hazardous solid waste, and sanitary liquid waste the proposed CISF would generate relative to the available capacity for disposal of these wastes, the NRC staff concludes that the potential impacts to waste management during decommissioning would be SMALL.

4.14.2 No-Action Alternative

Under the No-Action alternative, NRC would not license the proposed CISF. Therefore, impacts on waste management would not occur, because the generation of wastes from activities associated with the proposed CISF would not occur. Construction wastes would be avoided, because SNF storage pads, buildings, and transportation infrastructure would not be built. Operational wastes would also be avoided, because no SNF canisters would arrive for storage. Decommissioning wastes would be avoided, because there are no facilities to decommission. Under the No-Action alternative, impacts to waste management would be attributed to existing sources. In the absence of a proposed CISF, the NRC staff assumes that SNF would remain onsite in existing wet and dry storage facilities and be stored in accordance with NRC regulations and be subject to NRC oversight and inspection. Site-specific impacts at each of these storage sites would be expected to continue as detailed in general (NRC, 2013, 2005a) or site-specific environmental analyses. In accordance with current U.S. policy, the NRC staff also assumes that the SNF would be transported to a permanent geologic repository, when such a facility becomes available.

4.15 Accidents

This section addresses the environmental impacts of postulated accidents involving the storage of SNF at the proposed CISF project. The SNF will be stored in dry storage casks licensed by the NRC. The types and consequences of accidents ISP and the NRC safety staff evaluated for the proposed CISF are summarized in this section, along with associated environmental impact conclusions.

NRC regulations at 10 CFR Part 72 "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste," require that structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena (such as earthquakes, tornadoes, and hurricanes) and human-induced events without loss of capability to perform their safety functions. NRC siting regulations at 10 CFR Part 72, Subpart E, "Siting Evaluation Factors," also require applicants to consider, among other things, physical characteristics of sites that are necessary for safety analysis or that may have an impact on plant design (e.g., the design earthquake). These characteristics are identified, characterized, and considered in determining the acceptability of the site and design criteria of the facility in the NRC's safety evaluation, which is documented in the SAR.

Numerous features combine to reduce the risk associated with accidents involving SNF storage at the proposed CISF. The NRC staff's safety review verifies that the applicant has incorporated safety features into the design, construction, and operation of the proposed CISF as a first line of defense to prevent the release of radioactive materials. The NRC staff also confirms that additional measures are designed to mitigate the consequences of failures in the first line of defense.

Consistent with the NRC's defense-in-depth philosophy, this section describes design basis events that are evaluated to prevent or mitigate the consequences of accidents that could result in potential offsite doses. For some design basis events, such as tornadoes, this section describes how the proposed CISF would be designed and built to withstand the event without loss of systems, structures, and components necessary to ensure public health and safety. In these cases, the environmental impacts are small because no release of radioactive material would occur. Other design basis events, such as SNF-handling accidents, are design basis accidents that ISP must assume could occur. In these cases, the applicant must show how engineered safety features in the facility mitigate a postulated release of radioactive material. The environmental impacts of design basis accidents are small because ISP must maintain engineered safety features that ensure that the NRC dose limits for these accidents are met. The basis for impact determinations for design basis events (i.e., whether the accident is prevented or mitigated) is described for each type of design basis event presented in this section. The consequences of a severe (or beyond-design-basis) accident, if one occurs, could be significant and destabilizing. The impact determinations for these accidents, however, consider the low probability of these events. The environmental impact determination with respect to severe accidents, therefore, is based on the risk, which the NRC defines as the product of the probability and the consequences of an accident. This means that a high-consequence, low-probability event, like a severe accident, could result in a small impact determination, if the risk is sufficiently low.

> ***Design Basis Events, Design Basis Accidents, and Severe Accidents***
>
> **Design basis events** are conditions of normal operation, design basis accidents, external events, and natural phenomena, for which the facility must be designed to ensure the capability to prevent or mitigate the consequences of accidents that could results in potential offsite exposures (NRC, 2007).
>
> **Design basis accidents** are postulated accidents that are used to set design criteria and limits for the design and sizing of safety-related systems and components (NRC, 2007).
>
> **Severe accidents**, or beyond-design basis accidents, are accidents that may challenge safety systems at a level much higher than expected.

In the safety analysis report for the proposed CISF (ISP, 2018), ISP evaluates four categories of design basis events based on the NRC's standard review plan for spent fuel dry storage facilities (NRC, 2000). The four categories encompass a range of events including normal, off-normal, and accidental events. Specifically, Design Events I represent those associated with normal operations. These events are expected to occur regularly or frequently. Examples of normal operations where Design Events I could occur include receipt, inspection, unloading, maintenance, and loading of a transportation package; transfer of loaded storage casks to the storage pads; and handling of radioactive waste generated as part of the operation. The impacts from these events are similar to those of normal operations at the proposed CISF (EIS Section 4.13.1.2) and are therefore anticipated to be SMALL for the operations stage of the proposed action (Phase 1), and Phases 2-8.

Design Events II represent those associated with off-normal operations that can be expected to occur with moderate frequency, or approximately once per year. These events could result in members of the general public being exposed to additional levels of radiation beyond those associated with normal operations. During normal operations and off-normal conditions, the requirements of 10 CFR Part 20 must be met. In addition, the annual dose equivalent to any individual located beyond the controlled area must not exceed 0.25 mSv [25 mrem] to the whole body, 0.75 mSv [75 mrem] to the thyroid, and 0.25 mSv [25 mrem] to any other organ.

Off-normal events the applicant evaluated for the proposed CISF (ISP, 2018) for an operating NUHOMS® system included cask handling, transfer vehicle moving, and canister transfer. Off-normal events evaluated for the NAC International (NAC) system components included blockage of half the storage cask air inlets, canister off-normal handling load, failure of instrumentation, small release of radioactive particulate from the canister exterior, and severe environmental conditions (e.g., hypothetical wind). Off-normal events evaluated for the MAGNASTOR system included crane failure during loaded transfer cask movements and crane/hoist failure during the transportable storage canister (TSC) transfer to the vertical concrete cask (VCC). The ISP safety evaluation of these off-normal events for each potential storage system concluded that the proposed storage system would not exceed applicable 10 CFR 72.106(b) dose limits to individuals at or beyond the controlled area boundary and would satisfy applicable acceptance criteria for maintaining safe operations regarding criticality, confinement, retrievability, and instruments and control systems (ISP, 2018). The NRC staff's review and acceptance of the ISP off-normal design basis events analysis is contingent upon the completion of the NRC safety evaluation report (SER) for the proposed CISF. The NRC safety review staff evaluates the applicant's off-normal events analysis, determines if the required safety criteria have been met, and documents the results of that review in the Final SER (FSER). The NRC cannot grant a license for construction and operation of the proposed CISF until satisfactory completion of the safety review. If the NRC safety review of ISP's off-normal events analysis is satisfactory, the environmental impacts associated with off-normal events during the operations stage of the proposed action (Phase 1), and Phases 2-8 would be SMALL.

Design Events III represent infrequent events that could be reasonably expected to occur over the lifetime of the dry cask storage facility, while Design Events IV represent extremely unlikely events or design basis accidents that are postulated to occur because they establish the conservative design basis for systems, structures, and components important to safety. The dose from any credible design basis accident to any individual located at or beyond the nearest boundary of the controlled area may not exceed that specified in 10 CFR 72.106; specifically, the more limiting total effective dose equivalent of 0.05 Sv [5 rem] or the sum of the deep dose equivalent to and the committed dose equivalent to any individual organ or tissue (other than eye lens) of 0.05 Sv [50 rem]; a lens dose equivalent of 0.15 Sv [15 rem]; and a shallow dose equivalent to skin or any extremity of 0.5 Sv [50 rem].

Accident events the applicant evaluated for the proposed CISF (ISP, 2018) included fire; partial blockage of SNF storage canister basket vent holes; tornado missiles; flood; earthquake; explosion; lightning; complete blockage of air inlet and outlet ducts; cask tipover; cask drop; adiabatic heatup; burial under debris; and accidents at nearby sites. ISP's safety evaluation of these accident events concluded that the proposed storage systems would not exceed applicable 10 CFR 72.106(b) dose limits to individuals at or beyond the controlled area boundary and would satisfy applicable acceptance criteria for maintaining safe operations regarding criticality, confinement, retrievability, and instruments and control systems (ISP, 2018). The NRC staff's review and acceptance of the ISP accident analysis is contingent upon the completion of the NRC FSER for the proposed CISF. The NRC safety review staff evaluates the applicant's accident analysis, determines if the required safety criteria have been met with any necessary acceptable safety margin, and documents the results of that review in the FSER. The NRC cannot grant a license for construction and operation of the proposed CISF until satisfactory completion of the safety review. If the NRC safety review of ISP's accident analysis is satisfactory, the environmental impacts associated with accident events would be SMALL for the operations stage of the proposed action (Phase 1), and Phases 2-8.

The natural hazards that climate change affect that are important to proposed CISF siting and design include flood and high-wind hazards. The timeframe for considering these changes in this EIS is the proposed 40-year license term. The amount and rate of future climate change depends on current and future human-caused emissions (GCRP, 2017). Quantitative expressions, such as the amount of projected changes in rainfall or ambient temperature extend to the end of the century. To whatever extent climate change alters the magnitude and frequency of natural phenomena during the proposed CISF license term, the NRC's oversight authority over the CISF is the mechanism that addresses the impact of natural hazards. Under current NRC regulations applicable to dry cask storage facilities, the NRC requires that ISP include design parameters on the ability of the storage casks and facilities to withstand severe weather conditions such as hurricanes, tornadoes, and floods. To this end, the NRC safety staff have evaluated the proposed CISF to ensure that performance of the safety systems, structures, and components will be maintained in response to natural phenomena hazards. In the event of climate change induced impacts, such as increases in ambient temperature, rainfall patterns, and the severity of weather events, which occur gradually over long periods of time, the NRC regulations (e.g., 10 CFR 72.172, "Corrective Action") require licensees to implement corrective actions to identify and correct conditions adverse to safety. In summary, the proposed CISF is designed to withstand the design basis accidents without losing safety functions. If climate change influences on natural phenomena create conditions adverse to safety, the NRC has sufficient time to require corrective actions to ensure that SNF storage at the proposed CISF proceeds with minimal impacts for the license term. In addition, for the 40-year license to be extended with a 40-year renewal, the NRC staff would conduct another safety and environmental review to determine whether to grant the license extension. Those reviews would consider current and projected conditions at the time of renewal.

Overall, the NRC-licensed dry cask storage systems included in the ISP CISF proposal are designed to withstand all normal and off-normal events (Design Events I and II) and postulated design basis accidents (Design Events III and IV) with no loss of the safety functions. In addition, the potential effects of climate changes over time can be addressed as needed by NRC oversight and required corrective actions. Based on the NRC staff's analysis, the overall environmental impact of the accidents at the proposed CISF during the operations stage of the proposed action (Phase 1), and Phases 2-8 is SMALL because safety-related structures, systems, and components are designed to function during and after these accidents.

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5 CUMULATIVE IMPACTS

5.1 Introduction

The Council on Environmental Quality's (CEQ's) regulations regarding the National Environmental Policy Act of 1969 (NEPA) defines cumulative effects as "the 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 (Federal or non-Federal) or person undertakes such other actions" [Title 40 of the *Code of Federal Regulations* (CFR) 1508.7]. Cumulative effects, synonymous with cumulative impacts, can result from individually minor but collectively significant actions taking place over a period of time. A proposed project could contribute to cumulative effects when its environmental impacts overlap with those of other past, present, or reasonably foreseeable future actions. For this environmental impact statement (EIS), other past, present, and future actions considered in the analysis for the proposed consolidated interim storage facility (CISF) project include (but are not limited to) other nuclear facilities, oil and gas production, and wind and solar farms.

The analysis in this EIS of the cumulative impacts of the proposed CISF project was based on publicly available information on past, present, and reasonably foreseeable future projects; information in Interim Storage Partners LLC (ISP) Environmental Report (ER) and Safety Analysis Report (SAR) for the proposed CISF (ISP, 2020); responses to requests for additional information (RAI) (ISP, 2019); and general knowledge of the conditions in west Texas, southeast New Mexico, and in the nearby communities. For this cumulative impact analysis, the geographic scope of the analysis was determined to be the area around the site that reflects the likelihood of workers commuting from established communities that are nearby but somewhat distant from the proposed project area. Only past, present, and reasonably foreseeable future actions within the broadest geographic scope of analysis for an individual resource area {for example, the 80-kilometers (km) [50-mile (mi)] radius for Geology and Soils} are described in the next sections; however, each resource area may further delineate a narrower geographic scope of the analysis as necessary {e.g., the analysis for land use is evaluated within a 8-km [5-mi] radius}.

EIS Section 5.1.1 describes other past, present, and reasonably foreseeable future actions considered in the cumulative impacts analysis. The methodology used to conduct the cumulative impacts analysis in this EIS is provided in EIS Section 5.1.2.

5.1.1 Other Past, Present, and Reasonably Foreseeable Future Actions

The proposed CISF project would be situated about 0.6 km [0.37 mi] east of the Texas and New Mexico State boundary at a location in Andrews County, Texas, that is approximately 52 km [32 mi] west of Andrews, Texas, and 8 km [5 mi] east of Eunice, New Mexico (EIS Figure 5.1-1). The vicinity of the proposed CISF project area is predominantly rural, with limited development outside the cities of Eunice and Hobbs in New Mexico and Andrews, Texas. The land in the vicinity of the proposed CISF project area is predominantly used for livestock grazing; agriculture; oil and gas exploration and development and other mining; and solid, hazardous, and radioactive waste disposal. There are currently three facilities within 80 km [50 mi] of the proposed CISF project area that are licensed to handle radioactive material (one of which is co-located with the proposed CISF) and another facility currently undergoing license review (EIS Section 5.1.1.2). The U.S. Nuclear Regulatory Commission (NRC) staff used the EISs (and supporting documents) for these facilities, the management plan for the U. S. Bureau of Land Management (BLM)-owned land in the vicinity, the comprehensive plans for both the

City of Andrews, Texas, and the City of Hobbs, New Mexico, and other publicly available information to determine past, present, and reasonably foreseeable future actions in the vicinity of the proposed CISF project area.

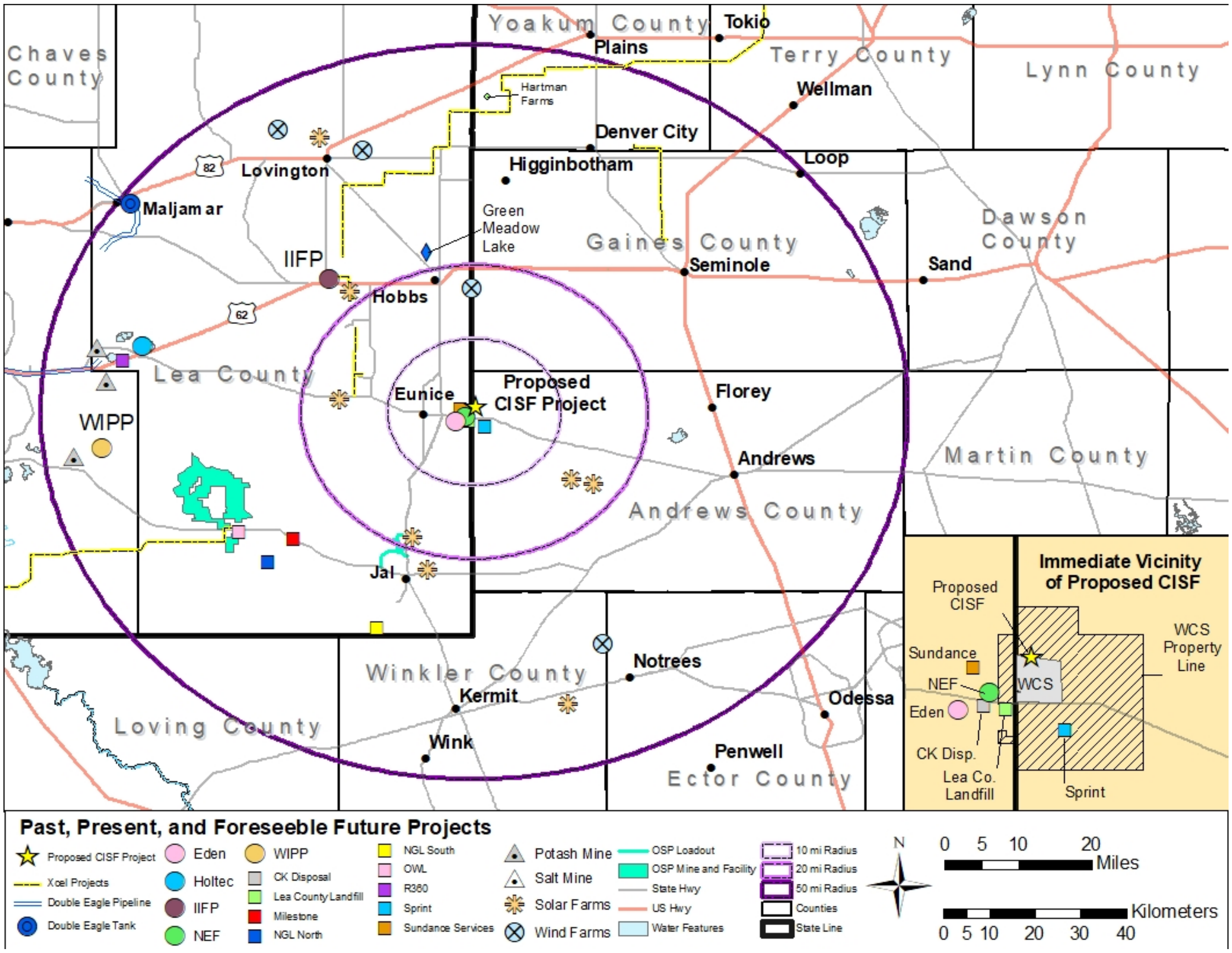

Figure 5.1-1 Location of Facilities within 80 km [50 mi] of the Proposed CISF Project

5.1.1.1 Mining and Oil and Gas Development

The Permian Basin is one of the largest and most active oil basins in the United States and has recently risen to be the world's top oil producer (Rapier, 2019). It covers more than 220,000 km^2 [86,000 mi^2], stretching approximately from Lubbock, Texas, to the Rio Grande and into southeast New Mexico and includes the Delaware Basin, Central Basin Platform, and the Midland Basin (EIA, 2018). The area continues to be the focus of extensive exploration, leasing, development, and production of oil and gas (BLM, 2018; PBRPC, 2014). The proposed CISF project area is located in the midst of the Permian Basin oil hub, near the Texas-New Mexico State line. The oil and gas industry in the region is anticipated to continue to have stable production output with some expansion over the foreseeable future (EIA, 2018; BLM, 2018). The counties of Eddy and Lea in New Mexico and the counties of Andrews, Yoakum, Gaines, and Ector in Texas have economies driven by the oil and gas industries. The oil and gas industry tends to cycle through periods of booms and busts resulting in an intentional effort in these counties to diversify their local economies, while still supporting continued development of oil and gas industry infrastructure and support services, such as additional housing and improved water systems (Lea County, 2005; Consensus Planning, 2017; PBRPC, 2014; Freese and Nichols, 2013).

In New Mexico, potash mining is also a major part of the Lea and Eddy County economies. Mosaic and Intrepid, the two largest producers of potash in New Mexico, have multiple operations in both counties (Sites Southwest, 2012). The NRC staff does not anticipate potash mining operations would cease or slowdown in these two counties for the foreseeable future. However, potash and other evaporate mining is not active in Texas near the proposed CISF project site, nor in the eastern portion of Lea County, New Mexico (USGS, 2019a). Based on historic market trends, the demand for potash will likely gradually increase over time, causing an increase in new mining operations over the next 20 to 30 years (BLM, 2018).

Nonfuel minerals are also mined in the region around the proposed CISF project site. In Texas, cement, clay, lime, salt, sand and gravel, stone, gypsum, helium, iodine, talc, and zeolites are mined (USGS, 2015). The primary nonfuel minerals mined in New Mexico in the vicinity of the proposed CISF project include sand and gravel, stone, potash, and salt (USGS, 2015). The most prominent nonfuel minerals mined in the region around the proposed CISF project site are sand and gravel, as well as caliche. Sand and gravel from the area are primarily used for construction. Caliche is mined from rock near the surface and is crushed for use in surface roads and pads for the oil and gas industry as well as other road construction activities. There are several gravel pits in Yoakum, Gaines, and Andrews Counties and throughout Lea County, becoming especially dense near the New Mexico-Texas State line (USGS, 2019a).

There is one caliche mine in Eddy County, and although caliche forms the basis of the Llano Estacado throughout northern and central Lea County, desirable caliche only occurs sporadically in the southern portion of Lea County (Consensus Planning, 2017; BLM, 2018). In Texas, there are also several caliche pits in Gaines, Andrews, and Ector counties (USGS, 2019a). Lea, Eddy, Gaines, Andrews, and Ector counties have high potential for the development of caliche mines and sand and gravel pits, and as the oil and gas industry continues to grow over the next 20 to 30 years, the demand for these commodities will increase (BLM, 2018).

Salt has been mined in Eddy County and Lea County since 1931 with variable production (BLM, 2018). There are currently three salt mines in Eddy County (Consensus Planning, 2017) and an unknown number in Lea County. According to BLM, the potential for development of salt mines is high in both counties but due to the unpredictable demand, it is not possible to anticipate land development for salt mining (BLM, 2018).

Ochoa Sulphate of Potash (SOP) Mine is a fertilizer production operation that will mine polyhalite/sulphate of potash from the Rustler Formation using the room-and-pillar mining method, approximately 53.8 km [33.4 mi] southwest of the proposed CISF (BLM, 2014). Once mined, the polyhalite would be crushed, calcined, leached, crystalized, and granulated; this final product would then be transported via truck to a loadout facility near Jal, New Mexico, onto trains and shipped (BLM, 2014). The SOP footprint consists of the mine area, the processing plant site, the water-well field and pipeline, and the railway loadout facility, encompassing over 12,599 ha [31,134 ac] in southwest Lea County (BLM, 2014). In 2014, BLM published a Final EIS on the Ochoa Mine, which evaluated the environmental impacts of the SOP and estimated that at full production, approximately 4.99 million tonnes per year [5.5 million tons per year] of polyhalite ore would be processed. PolyNutra, the owners of the SOP project, expect the mine to have a life of 38 years and plan to complete construction in early 2021 with production starting in late 2021 (PolyNutra, 2017).

5.1.1.2 Nuclear Facilities

Less than 2.4 km [1.5 mi] west of the proposed CISF project, on the New Mexico side of the State line, there is a uranium enrichment facility {URENCO USA National Enrichment Facility (NEF)}, which has been in operation since 2010 (URENCO, 2019). It is currently the only operating commercial enrichment facility in the United States, producing approximately one-third of the nation's annual enriched uranium for commercial nuclear power reactors (URENCO, 2019). The uranium is enriched by vaporizing solid uranium hexafluoride and then feeding it into a centrifuge, after which it is compressed, cooled, and stored (URENCO, 2019). The NRC licensed NEF in 2006 for 30 years (NRC, 2012a) and it began operation in 2010 (URENCO, 2019). Since being licensed, NEF's license expiration date has been extended to June 9, 2040 (NRC, 2019b). The environmental impacts, as assessed during the licensing process, were primarily deemed to be small except for the positive impact of increased tax revenue (NRC, 2005).

In October 2012, the NRC issued a license to International Isotopes Fluorine Products Inc. (IIFP) for construction and operation of a depleted uranium deconversion facility known as the Fluorine Extraction and Depleted Uranium Deconversion Plant (FEP/DUP), approximately 39 km [24.5 mi] northwest of the proposed CISF site (NRC, 2019b). The facility would convert depleted uranium hexafluoride into fluoride products for commercial resale and uranium oxides for disposal (NRC, 2019b). The environmental impacts, as assessed during the licensing process, were determined to be small with the exception of air quality during construction potentially being moderate (NRC, 2012b). Since the issuance of the license, no construction activities have occurred.

The Waste Isolation Pilot Plant (WIPP) is located approximately 58 km [36 mi] west of the proposed CISF site. WIPP is a permanent disposal facility for transuranic (TRU) waste that the U.S. Department of Energy (DOE) operates and the U.S. Environmental Protection Agency (EPA) and New Mexico Environmental Department (NMED) regulate, and has been operational since 1999 (WIPP, 2019a). The disposal area is located 655 meters (m) [2,150 feet (ft)] underground in large panels mined out of the salt rock beds (WIPP, 2019b). The facility is the nation's only deep geologic repository (WIPP, 2019c) and currently consists of eight panels, with two more panels planned (WIPP, 2019b). Operational since March 1999, WIPP has disposed of defense-generated TRU waste from over 22 generator sites across the nation (WIPP, 2019a) and is a major employer in Eddy County (Consensus Planning, 2017). DOE assessed the WIPP facility environmental impacts (DOE, 2018a; DOE, 1997).

On January 31, 2018, the DOE and Nuclear Waste Partnership, LLC (NWP) submitted a permit modification to NMED entitled, "Clarification of TRU Mixed Waste Disposal Volume Reporting." The permit modification would effectively create more disposal space at WIPP by changing the way the amount of radioactive waste placed in the repository is measured and would allow DOE to dispose diluted plutonium at WIPP instead of transferring the plutonium to the Savannah River Site for disposal. On December 21, 2018, the NMED Secretary approved the permit modification (NMED, 2018), which completes the regulatory process needed for this modification.

On June 11, 2019, Eden Radioisotopes, LLC (Eden) informed the NRC of its intent to submit a license application to construct and operate a Medical Isotopes Production Facility (Eden, 2019a). Licensing of this facility would be subject to NRC regulations at 10 CFR Part 50 (Domestic Licensing of Production and Utilization Facilities), 10 CFR Part 70 (Domestic Licensing of Special Nuclear Materials) to receive, possess, use, and transfer special nuclear materials, and 10 CFR Part 30 (Rules of General Applicability to Domestic Licensing of Byproduct Material) to possess and transport molybdenum-99 for medical applications. Eden has stated its intent to build its facility east of Eunice, New Mexico, directly west of the existing Lea County Landfill, pending an easement from NEF (Eden, 2019b). If built, Eden would be approximately 5 km [3.1 mi] southwest of the proposed CISF and 3 km [1.9 mi] west of the New Mexico-Texas State line (Eden, 2019b). Eden anticipates beginning construction in early 2022 and production in late 2024 (Eden, 2019c).

5.1.1.3 Co-Located Disposal Facility

Waste Control Specialists (WCS) is a company that was established in 1997 and provides treatment, storage, and disposal of Class A, B, and C low-level radioactive waste (LLRW), (as defined in 10 CFR 61.55), hazardous waste, and byproduct materials. WCS's facility is co-located with the proposed CISF project area, with the CISF project area to be contained within the larger WCS site (EIS Figure 2-1). Because Texas is an Agreement State, WCS is regulated by the Texas Commission on Environmental Quality (TCEQ) and is licensed by the TCEQ to dispose LLRW and byproduct material in Andrews County, Texas (TCEQ, 2019). Class A, B, and C LLRW is disposed by burying waste near-surface in concrete-lined cells on top of a 183-m [600-ft]-thick red-bed clay, which serves as a natural barrier to infiltration (WCS, 2019). The TCEQ's safety and environmental analysis regarding WCS concluded that WCS's actions would protect health and minimize danger to life and the environment (TCEQ, 2008). In addition, WCS can currently store, but not dispose, Greater-Than-Class C (GTCC) and transuranic waste. These WCS disposal and storage capabilities are ongoing at the site.

In January 2015, TCEQ sent a letter to the NRC with questions concerning the State's authority to license a disposal cell for GTCC, GTCC-like, and transuranic waste. The Commission began considering the issue and undertook actions such as development of a regulatory basis, evaluation of technical issues, and conducting stakeholder engagement activities. In February 2016, the U.S. Department of Energy (DOE) issued a final EIS titled, "Final Environmental Impact Statement for the Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste and GTCC-Like Waste." The document evaluated disposition paths for GTCC, and the Final EIS identified the preferred alternative as the WIPP geological repository and/or land disposal at generic commercial facilities. In October 2018, DOE issued an environmental assessment (EA) that provides a site-specific analysis of the potential environmental impacts of disposing the entire inventory – 12,000 m^3 [423,776 ft^3] – of GTCC LLRW and GTCC-like waste at WCS (DOE, 2018a). However, DOE's publication of these documents is not a decision on GTCC LLRW disposal. Under the Energy Policy Act of 2005, both DOE and Congress would require additional actions. The NRC's actions regarding review of the TCEQ request and determinations regarding GTCC are ongoing. The NRC reviewed the DOE's Final EIS and EA and developed a draft regulatory basis for GTCC and transuranic waste disposal (NRC, 2019c). Thus, because disposal of GTCC at WCS would require completion of the regulatory basis for GTCC and transuranic waste and actions by DOE and Congress, a detailed evaluation of this reasonably foreseeable future action is not feasible at this time but is included here for completeness.

5.1.1.4 Second Proposed CISF

In March 2017, Holtec International (Holtec) submitted a license application to the NRC requesting authorization to construct and operate a CISF for spent nuclear fuel (SNF) in Lea County, New Mexico. Similar to the proposed ISP CISF evaluated in this EIS, the function of the CISF would be to store SNF, GTCC waste, and a small quantity of mixed-oxide fuel generated at commercial nuclear power reactors (Holtec, 2017). The SNF would be transported from commercial reactor sites to the proposed CISF by rail. Although the initial license request is to store 8,680 metric tons of uranium (MTU) [9,568 short tons] at the CISF, Holtec intends to submit future license amendment requests such that the facility would eventually store up to 100,000 MTU [110,240 short tons] (Holtec, 2019). The NRC is in the process of reviewing the Holtec application. The NRC is conducting a safety evaluation that will be documented in a Safety Evaluation Report (SER) and will also prepare an EIS. This is an ongoing evaluation, and the NRC will not make a licensing decision for this facility until the EIS and SER are complete. However, because detailed information about the Holtec proposal is available, information about this reasonably foreseeable future action is included where appropriate in this EIS.

5.1.1.5 Solar, Wind, and Other Energy Projects

Both southeast New Mexico and the western portion of Texas have high potential for solar energy generation (Roberts, 2018). At the time of publication of this EIS, there are six operating solar power facilities and two under development in the region of the proposed CISF project area (EIA, 2019a; 7X Energy, 2019a,b,c) (EIS Figure 5.1-1). In Lea County, there are five operational solar power plants: SPS1 Dollarhide, SPS2 Jal, SPS3 Lea, SPS4 Monument, and Middle Daisy, all of which have been in operation since late 2011, with the exception of Middle Daisy, which began operations in 2017 (EIA, 2019a; EIA, 2019b). The sixth operational solar farm, Phoebe Photovoltaic Solar Project (Phoebe), is in Winkler County, Texas (7X Energy, 2019c). Phoebe has a capacity of 315 MWp and stretches across 769 ha [1900 ac] of land, making it the largest solar project in the State and one of the 10 largest in the United States (7X Energy, 2019c). Phoebe was completed in November 2019 and has a 12-year contract term (7X Energy, 2019c). The two solar farms currently under development are in Andrews County, Texas. The larger of the two is Prospero Energy Project, approximately 23 km [14 mi] southeast of the proposed project and 30 km [19 mi] west of the City of Andrews, Texas. Upon completion in 2020, Prospero will be one of the largest solar projects in Texas, covering approximately 1,860 ha [4,600 ac] and generating 300 MW of solar energy (7X Energy, 2019b). The second solar project in Andrews County is Lapetus Solar Energy Project. Lapetus is a 100 MW solar farm located on approximately 320 ha [800 ac] 25 km [16 mi] southeast of the proposed CISF project (7x Energy, 2019a). Construction on Lapetus began in early 2019 and is slated to be completed in late 2019 (7x Energy, 2019a).

According to the American Wind Energy Association, New Mexico, is a leader in wind power, growing faster in this arena than any other State and with a goal of sourcing at least 50 percent of its energy from renewable sources by 2030, while Texas ranks first in installed capacity and in under-construction capacity (AWEA, 2018; AWEA 2019a,b). There are currently three operational wind projects located in the region of the proposed project area (EIS Figure 5.1-1). Wildcat Wind Project, owned and operated by Exelon Generation, is located near Lovington, New Mexico, and went into operation in July of 2012, producing 27 MW of power for Lea County, New Mexico (Exelon, 2019). Gaines Cavern Wind Project supplies 2 MW of power to Gaines, Texas, and was completed in 2013 (RES, 2019). Located near the Winkler-Ector

County line is Notrees Windpower, a 95-turbine wind farm that began operations in 2009 (Duke Energy, 2019).

The Oso Grande Wind Project is in the development stage at the time of this EIS, with construction estimated to start late in 2019 and to be completed in late 2020. The Oso Grande Wind Project includes wind turbines, which would be built in Lea and Eddy Counties along with transmission lines. According to the contractors, the annual energy production is expected to power over 100,000 homes and reduce carbon emissions by 688,000 metric tons [758,390 short tons] annually (EDF, 2019a; EDF, 2019b).

Xcel Energy is currently in the middle of its Power for the Plains Project, which is a project designed to improve the reliability of the existing transmission grid and provide an outlet for additional wind generation. The project started in 2011 with completion planned in 2021 and aims to build new transmission lines and related facilities through portions of New Mexico and Texas (Xcel, 2019a). In the vicinity of the proposed CISF, there are five ongoing Power for the Plains projects, which will result in the addition of over 390 km [242 mi] of transmission line (Xcel Energy, 2019b,c,d,e,f). In Lea County, New Mexico, Xcel Energy plans to install and bring online 11.3 km [7 mi] of 115 kilovolt (kV) transmission line approximately 19 km [11.8 mi] west of Hobbs prior to the end of 2019 (Xcel Energy, 2019b). The Byrd-Cooper project is also located in Lea County, approximately 10.5 km [6.5 mi] west of Eunice, New Mexico, and plans to install and bring online 19.3 km [12 mi] of 115 kV transmission line by June 2021 (Xcel Energy, 2019c). The third ongoing Power for the Plains Project in Lea County, New Mexico, is slated for completion in November 2021 and will introduce a 64.4-km [40-mi] 345 kV transmission line that will run from 32 km [19.9 mi] west of Jal, New Mexico, to west of U.S. Highway 285, approximately 35.4 km [22 mi] south of Carlsbad, New Mexico (Xcel Energy, 2019d). The TUCO-Yoakum-Hobbs project stretches from Lea County, New Mexico, into Texas, through Yoakum County, Terry County, Hockley County, and Lubbock County, ending in Hale County, Texas (Xcel Energy, 2019e). When TUCO-Yoakum-Hobbs is completed and put online in June 2020, it will be a 270-km [168-mi]-long 345-kV transmission line originating west of Hobbs, New Mexico, and terminating in south Hale County, Texas, and includes an upgraded Yoakum Substation (Xcel Energy, 2019e). The fifth ongoing Power for the Plains project is a 115-kV transmission line that will run 32 km [20 mi] from east of Denver City, Texas, in Gaines County to the new Seminole substation just north of Seminole, Texas, in Yoakum County when completed in September 2020 (Xcel Energy, 2019f).

5.1.1.6 Agriculture

Agriculture and agribusiness are important parts of the economies of the counties around the proposed CISF, especially Yoakum, Gaines, and Andrews counties in Texas. The area is ideal for a number of crops, with over 25 different crops produced commercially, including wheat, sorghum, cotton, corn, hay, soybeans, and vegetables (PBRPC, 2014). From 2012 to 2017, the overall trend in the area was a decrease in the number of operations and in the average size of the operations; the only exceptions being Winkler County and Gaines County in Texas, where there were fewer farms but the average farm size increased, and Lea County in New Mexico, where farm sizes decreased but the number of farms increased (USDA, 2019). This slow overall decrease in agriculture will more than likely continue as long as the oil and gas industry continues to grow in the area, which, along with population growth and growth of other industries, places strain on water resources.

Animal operations, including dairy farms, are also present in the area, with the nearest dairy farm being approximately 32 km [20 mi] northwest of the proposed CISF site. The number of animal operations have increased from 2012 to 2017 (USDA, 2019). The only counties in the area of the proposed CISF with a decrease in animal operations are Gaines, Loving, and Eddy counties (USDA, 2019). Animal operations are likely to remain constant or increase because of support from locals and local groups, such as the Permian Basin Regional Planning Commission (PBRPC, 2014).

5.1.1.7 Recreation

Recreational areas in the vicinity of the proposed CISF project area are predominantly limited to local parks and recreational facilities (e.g., sport complexes, swimming pools, golf courses, hiking and biking trails, shooting ranges, and lakes), which are maintained by the cities of Lovington and Hobbs in New Mexico and Seminole, Andrews, and Kermit in Texas.

Approximately 5.5 km [3.3 mi] from the proposed CISF project area at the intersection of New Mexico Highways 234 and 18, there is a historical marker and picnic area. Located north of Hobbs, Green Meadow Lake Fishing Area is stocked for fishing by the New Mexico Department of Game and Fish (NMDGF) (City of Andrews, 2019a). The Ace Arena in Andrews County, Texas, has a large indoor arena, an outdoor arena, bull pens, horse stalls, and RV spaces and hosts several events all year long, including motocross races, roping competitions, barrel races, concerts, rodeos, and church events (Andrews County, 2019). The Andrews Bird Viewing Area, located in Andrews, Texas, is a 10.9-ha [26.9-ac] park, which includes a desert wetland, a nature trail, and RV camping sites (Texas Historical Commission, 2019).

5.1.1.8 Housing and Urban Development

Populations in the Permian Basin have been increasing over the past 20 years and are likely to continue to increase, potentially increasing housing demands near cities and towns (PBRPC, 2014; EIS Sections 3.11.1.1 and 5.11). However, housing development in the area is highly dependent on the oil and gas industry, which cycles through periods of booms and busts (PBRPC, 2014). This has resulted in difficulty in anticipating developmental needs for most communities, and therefore development is conducted through the determination of immediate needs and responding to those needs in the most appropriate way for that community.

One of the goals stated in Lea County’s most recent Comprehensive Plan is to increase housing in Lea County by 2025, as well as to increase the diversity in types of housing, including rentals, multi-family homes, and high-end homes (Lea County, 2005).

5.1.1.9 Waste Disposal Facilities

As the Permian Basin has grown in production, it has also seen an increase in the number of waste disposal facilities. These waste disposal facilities have been necessary to support the growing population and oil and gas industry.

Sprint Andrews County Disposal is a waste disposal facility currently in the planning phase, which, if built, would be on WCS-owned property, less than 3.2 km [2 mi] southeast of the proposed CISF site (Biggs & Mathews Environmental, 2019). The Sprint facility would store, treat, reclaim, and dispose of nonhazardous oil and gas waste (Biggs & Mathews Environmental, 2019). The facility would cover 66.8 ha [165 ac] and would consist of four processing units and an evaporation pond (Biggs & Mathews Environmental, 2019). The capacity of the facility, if permitted, would be 8,764,408 m^3 [11,463,414 yd^3], making the expected life of the facility 36 years (Biggs & Mathews Environmental, 2019).

Sundance Service is a full-service oilfield waste disposal facility with two existing locations: one in Eunice, New Mexico (Parabo Facility) and the other located less than 1.6 km [1 mi] west of the proposed CISF site, across the New Mexico-Texas State line (Sundance Services, Inc., 2019a). Together, the two facilities are approximately 340 ha [840 ac]. Since starting operations in 1978, Sundance Services has disposed both exempt (e.g., produced waters, drilling fluids, and drill cuttings) and nonexempt (e.g., waste solvents, cleaning fluids, and used hydraulic fluids) hazardous wastes (Sundance Services, Inc., 2019b). Sundance Services has proposed opening a new facility, Sundance West, 4.8 km [3 mi] east of Eunice, New Mexico, adjacent to the existing facility less than 1.6 km [1 mi] from the proposed CISF (Gordon Environmental, 2016). Sundance West would replace the older Sundance facility and would include a liquid oil field waste processing area and an oil field waste landfill (Gordon Environmental, 2016). Construction of the new 129-ha [320-ac] facility would be phased over four years after the issuance of the final permit (Gordon Environmental, 2016). A draft, tentative permit was released in January 2017 (NMEMNRD, 2017).

Also near the proposed CISF project area across the State line is the Lea County Sanitary Waste Landfill, which is approximately 3 km [1.8 mi] south/southwest of the proposed CISF project area, across New Mexico Highway 176. The landfill began operations in 1999 and is scheduled to close in 2048 (ISP, 2020). Lea County Sanitary Waste Landfill estimates they annually receive 90.7 metric tons [100 short tons] each of treated formerly characteristic hazardous waste, offal, sludge, and spill waste; 454 metric tons [500 short tons] each of industrial solid waste, petroleum-contaminated soils, and other solid waste; and up to 2,268 metric tons [2,500 short tons] of asbestos waste. The landfill is seeking a permit renewal and modification from NMED for an approximate 142-ha [350-ac] facility, of which 102 ha [252 ac] would be for municipal solid waste and 3.2 ha [8.1 ac] each for construction and demolition debris and asbestos waste (ISP, 2020).

ISP cited a potential surface waste disposal facility consisting of a landfill, liquid processing area, and deep well injection named CK Disposal in their RAI responses (ISP, 2019). According to ISP, the facility would encompass approximately 128 ha [317 ac] south of NEF, across State Highway 234, 2.4 km [1.5 mi] west of the proposed CISF project and would have an active life of 38 years (ISP, 2019). ISP noted that despite public concern and a request from NEF for a hearing, a permit was approved for CK Disposal on April 4, 2017 (ISP, 2019). The NRC staff was not able to verify any of the information concerning CK Disposal, including the 2017 permit, but includes the reported information for completeness.

The Oilfield Water Logistics (OWL) Surface Waste Management Facility 35.4 km [22 mi] northwest of Jal, New Mexico, is a new 218.5-ha [540-ac] oil and gas landfill, capable of handling over 400 loads per day of mud, cuttings, and other oil and gas solid wastes (OWL, 2018a,b). The OWL facility opened in 2019 and is approximately 53 km [33 mi] southwest of the proposed CISF (OWL, 2018b).

R360 (also known as the Lea Land Inc. industrial waste land farm) provides bioremediation of wellsite waste, disposal and recycling of nonhazardous oilfield operation materials, transportation of drilling waste, and other waste management services in support of the oilfield industry (R360, 2016). R360 has a facility approximately 66 km [41 mi] west of the proposed CISF. The facility is approximately 130 ha [321 ac] in size. NMED has received a request from R360 for a major modification to their current permit, which would modify and expand their current operations (NMEMNRD, 2019a; NMEMNRD, 2019b). The expanded facility would consist of 12 evaporation ponds and approximately 187.3 ha [463 ac], 40.5 ha [100 ac] of which would be set aside for permanent disposal of exempt and nonhazardous oil field waste (NMEMNRD, 2019b).

There are three potential waste facilities in Lea County, New Mexico, that currently have submitted permit applications to NMED (NMEMNRD, 2019a). One of the three new proposed facilities was applied for by Milestone Environmental Services, and the other two were applied for by NGL Waste Services. The proposed Milestone facility would be a 4-ha [10-ac] oil field waste landfill, 22.5 km [14 mi] west of Jal, New Mexico, 51.5 km [32 mi] southwest of ISP, and would operate an Underground Injection Control Class II disposal well for the injection of slurry into the subsurface (NMEMNRD, 2019c). The first of the NGL facilities, NGL North, would be located approximately 27 km [17 mi] west of Jal, New Mexico, and 58 km [36.1 mi] southwest of the proposed CISF, and consist of 122.6 ha [303 ac] for nonhazardous oil field waste (NMEMNRD, 2019d). NGL's second proposed facility, NGL South, would be located a little over 12.8 km [8 mi] southwest of Jal, New Mexico, and 61.2 km [38 mi] southwest of the proposed CISF (NMEMNRD, 2019e). The facility would consist of 72.8 ha [180 ac] for nonhazardous oil field waste (NMEMNRD, 2019e).

5.1.1.10 Other Projects

Permian Basin Materials has a ready-mix cement facility located approximately 1.2 km [0.75 mi] across the State line from the proposed CISF project. Permian Basin Materials has a sand and gravel quarry and a large spoil pile. There are three "produced water" lagoons for industrial purposes on the Permian Basin Materials quarry property. In addition, there is a man-made pond on the Permian Basin Materials quarry property that is stocked with fish for private use.

The Double Eagle Water Supply System improvement project is an initiative of Carlsbad, New Mexico, to increase water supply to oil and gas extraction facilities in east Eddy County and in west Lea County by drawing water from the Ogallala Aquifer. The City of Carlsbad expects construction of the project to continue through approximately 2020 (Onsurez, 2018).

5.1.2 Methodology

The NRC's general approach for assessing cumulative impacts is based on principles and guidelines described in the CEQ's *Considering Cumulative Effects under the National Environmental Policy Act* (CEQ, 1997) and relevant portions of the EPA's *Considerations of Cumulative Impacts in EPA Review of NEPA Documents* (EPA, 1999). Based on these documents, NRC's regulations in 10 CFR Part 51, and NRC's guidance for developing EISs in NUREG–1748 (NRC, 2003), the NRC developed the following methodology for assessing cumulative impacts in this EIS:

1. Identify the potential environmental impacts of the proposed action and evaluate the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions for each resource area. Potential environmental impacts are discussed and analyzed in EIS Chapter 4.

2. Identify the geographic scope for the analysis for each resource area. This scope will vary from resource area to resource area, depending on the geographic extent over which the potential impacts may occur.

3. Identify the timeframe for assessing cumulative impacts. For the purpose of this analysis, the timeframe begins with NRC acceptance of the CISF license application on January 26, 2017 (EIS Section 1.6.1), and ends in the year 2060, the date estimated for the expiration of the initial license, if the license is granted. Applicants can request licenses for storage facilities, such as the proposed CISF, under 10 CFR Part 72 for a term of up to 40 years. As discussed in Chapter 1 of this EIS, ISP proposes to build the CISF project in 8 phases (Phases 1-8); however, in its license application, ISP requests authorization only for the initial phase (Phase 1) of the proposed CISF project (i.e., the proposed action evaluated in this EIS). ISP plans to subsequently request amendments for each of 7 expansion phases of the proposed CISF to be completed over the course of 20 years, to expand the facility to eventually store up to 40,000 MTU [44,000 short tons] of SNF (ISP, 2020). ISP's expansion of the proposed project (i.e., Phases 2-8) is not part of the proposed action currently pending before the agency. However, as a matter of discretion, the NRC staff considered these expansion phases in its impacts analysis in Chapter 4 of this EIS, and carries forth those impacts into the description of cumulative impacts in this chapter, where appropriate, so as to conduct a bounded analysis for the proposed CISF project. Therefore, impacts are described in terms of the proposed action (Phase 1) and full build-out (Phases 1-8). ISP estimates that each phase will take two-and-a-half years to construct, while decommissioning would take 2 years (ISP, 2020).

4. Identify ongoing and prospective projects and activities that take place or may take place in the area surrounding the project site within the timeframe for this cumulative impacts analysis. These projects and activities are described in EIS Section 5.1.1.

5. Assess the cumulative impacts for each resource area from the proposed CISF project, and other past, present, and reasonably foreseeable future actions. This analysis would take into account the environmental impacts of concern identified in Step 1 and the resource-area-specific geographic scope identified in Step 2.

The NRC staff is using the following terms, as defined in NUREG–1748 (NRC, 2003), to describe the significance level of cumulative impacts:

SMALL: The environmental effects are not detectable or are so minor that they would neither destabilize nor noticeably alter any important attribute of the resource considered.

MODERATE: The environmental effects are sufficient to alter noticeably but not destabilize important attributes of the resource considered.

LARGE: The environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource considered.

The NRC staff recognizes that many aspects of the activities associated with the proposed CISF project would be expected to have SMALL impacts on the affected resources, as described in EIS Chapter 4. It is possible, however, that an impact that may be SMALL by itself, but could result in a MODERATE or LARGE cumulative impact when considered in combination with the impacts of other actions on the affected resource. Likewise, if a resource is regionally declining or imperiled, even a SMALL individual impact could be important if it contributes to or accelerates the overall resource decline. The NRC staff determined the appropriate level of analysis that was merited for each resource area the proposed CISF project potentially affects.

The level of analysis was determined by considering the impact level to the specific resource, as well as the likelihood that the quality, quantity, and stability of the given resource could be affected. EIS Table 5.1-1 summarizes the potential cumulative impacts of the proposed CISF project on environmental resources the NRC staff identified and analyzed for this EIS, which are then detailed in the subsequent sections. The potential cumulative impacts take into account the other past, present, and reasonably foreseeable activities identified in EIS Section 5.1.1.

Table 5.1-1 Summary Table of Cumulative Environmental Impacts Considering All Phases (Phases 1-8)	
Land Use	The proposed project is projected to have a SMALL incremental effect when added to the MODERATE impacts from other past, present, and reasonably foreseeable future actions, resulting in an overall MODERATE cumulative impact to land use.
Transportation	The proposed project is projected to have a SMALL incremental effect for traffic-related impacts and a SMALL effect for the radiological effects of SNF transportation, resulting in an overall SMALL cumulative transportation impact.
Geology and Soils	The proposed project is projected to have a SMALL incremental effect when added to the MODERATE impacts from other past, present, and reasonably foreseeable future actions, resulting in an overall MODERATE cumulative impact to geology and soils.
Surface Water	The proposed project is projected to have a SMALL incremental effect when added to the SMALL impacts from other past, present, and reasonably foreseeable future actions, resulting in an overall SMALL cumulative impact to surface water resources.
Groundwater	The proposed project is projected to have a SMALL incremental effect when added to the MODERATE impacts from other past, present, and reasonably foreseeable future actions, resulting in an overall MODERATE cumulative impact to groundwater resources.
Ecology	The proposed project is projected to have a SMALL to MODERATE incremental effect when added to the SMALL to MODERATE impact from other past, present, and reasonably foreseeable future actions, resulting in an overall SMALL to MODERATE cumulative impact to ecology. “No Effect” on Federally listed species, and “No Effect” on any existing or proposed critical habitats.
Air Quality	The proposed project is projected to have a SMALL incremental effect when added to the MODERATE impacts from other past, present, and reasonably foreseeable future actions, resulting in an overall MODERATE cumulative impact to air quality.

Table 5.1-1 Summary Table of Cumulative Environmental Impacts Considering All Phases (Phases 1-8)	
Noise	The proposed project is projected to have a SMALL incremental effect when added to the MODERATE impacts from other past, present, and reasonably foreseeable future actions, resulting in an overall MODERATE cumulative impact to noise resources.
Historic and Cultural	The proposed project is projected to have a SMALL incremental effect when added to the SMALL impact from other past, present, and reasonably foreseeable future actions, resulting in an overall SMALL cumulative impact to historic and cultural resources.
Visual and Scenic	The proposed project is projected to have a SMALL incremental effect when added to the MODERATE impacts from other past, present, and reasonably foreseeable future actions, resulting in an overall MODERATE cumulative impact to visual and scenic resources.
Socioeconomic	The proposed project is projected to have a SMALL to MODERATE incremental effect when added to the SMALL to MODERATE impacts from other past, present, and reasonably foreseeable future actions, resulting in a SMALL to MODERATE cumulative impact in the socioeconomic region of influence.
Environmental Justice	The cumulative impacts would have no disproportionately high and adverse impacts to low-income or minority populations.
Public and Occupational Health	The proposed project is projected to have a SMALL incremental effect when added to the SMALL impacts from other past, present, and reasonably foreseeable future actions, resulting in an overall SMALL cumulative impact to public and occupational health.
Waste Management	The proposed project is projected to have a SMALL incremental effect when added to the SMALL impacts from other past, present, and reasonably foreseeable future actions, resulting in an overall SMALL cumulative impact to waste management.

5.1.3 License Renewal and Use of the Continued Storage Generic Environmental Impact Statement (Continued Storage GEIS)

If the NRC grants a license for the proposed CISF, ISP would have to apply for license renewal before the end of the initial license term in order to continue operations. The license renewal process would require another NRC safety and environmental review for the proposed renewal period. For the period of time beyond the license term of the proposed CISF, the NRC’s Continued Storage GEIS (NUREG–2157) and rule at 10 CFR 51.23 apply. The Continued Storage GEIS analyzed the environmental effects of the continued storage of SNF at both at-reactor and away-from-reactor Independent Spent Fuel Storage Installations (ISFSIs) (NRC, 2014a).

The Continued Storage GEIS (NUREG–2157) is applicable only for the period of time after the license term of an away-from-reactor ISFSI (i.e., a CISF) (NRC, 2014a). Consistent with

10 CFR 51.23(c), this EIS serves as the site-specific review conducted for the construction and operation of the proposed CISF for the period of its proposed license term. The impact determinations from the Continued Storage GEIS (NRC, 2014a) are incorporated into this EIS only for the timeframe beyond the initial 40-year license, in accordance with the regulation at 10 CFR 51.23(b) and the discussions in the Section 5.0 of the GEIS. Thus, those impact determinations are not reanalyzed in this EIS.

Section 5.0 of the Continued Storage GEIS is based on several assumptions about the size and characteristics of a hypothetical CISF that were based on characteristics similar to the licensed, but not constructed, Private Fuel Storage Facility (PFSF) (NRC, 2014a). Although some characteristics of the proposed ISP CISF differ from the PFSF design, the Continued Storage GEIS acknowledges that not all storage facilities will necessarily match the "assumed generic facility," and therefore when it comes to "size, operational characteristics, and location of the facility, the NRC will evaluate the site-specific impacts of the construction and operation of any proposed facility as part of that facility's licensing process." Thus, based on the site-specific analysis contained in this EIS and in the NRC's accompanying SER, no further analysis of impacts beyond the license term of the CISF is needed, and the impact determinations in the GEIS are incorporated by reference.

5.2 Land Use

The NRC staff assessed the cumulative impacts on land use within an 8-km [5-mi] radius of the proposed project area, which is a land area of approximately 52,250 hectares (ha) [129,110 acres (ac)]. The timeframe for the analysis of cumulative impacts is 2017 to 2060, as described in EIS Section 5.1.2. Land use impacts result from (i) land disturbance; (ii) interruption, reduction, or impedance of livestock grazing and open wildlife areas; (iii) land access; and (iv) competition for mineral rights. The cumulative impacts on land use were not assessed beyond 10 km [6.2 mi] from the proposed project area because, at that distance, land use would not be anticipated to influence or be influenced by the proposed CISF project. Within the geographic scope of the analysis, activities on both private and public lands (e.g., the co-located waste disposal facility, livestock grazing, and oils and gas production) are ongoing and projected to continue in the future.

Land use within the region described in EIS Section 5.1.1 is predominantly rangeland used for livestock grazing (ISP, 2020). Cumulative impacts from the loss of rangeland within the geographic scope of the analysis for land use from existing and potential activities include a decrease in the area available for foraging, loss of forage or cropland productivity, loss of animal unit months (AUMs), and loss of water-related range improvements (e.g., improved springs, water pipelines, or stock ponds). Another impact could be dispersal of noxious and invasive weed species both within and beyond areas where the surface had been disturbed, which reduces the area of desirable grazing by livestock.

As described in EIS Section 4.2, the land use impacts from full build-out (Phases 1-8) of the proposed CISF project would be SMALL. If only the proposed action (Phase 1) were constructed and operated, the impacts would also be SMALL and would include access and cattle-grazing restrictions associated with the addition of the proposed project area. At full build-out (Phases 1-8), the proposed CISF project would disturb approximately 130 ha [320 ac] and restrict access and cattle grazing. Over the license term, the amount of land that would be disturbed and fenced would be minor at about 0.25 percent {130 ha [320 ac]} in comparison to the available grazing land within the land use geographic scope of the analysis {i.e., approximately 52,250 ha [129,110 ac] of land within an 8-km [5-mi] radius of the proposed CISF project}.

Existing and reasonably foreseeable future nuclear facilities within the region are described in EIS Section 5.1.1.2. These facilities include the co-located WCS facility, NEF, FEP/DUP, a second proposed CISF, and the proposed Eden facility. However, all but the co-located WCS facility, NEF, and Eden are outside the geographic scope of the analysis for land use that is anticipated to influence or be influenced by construction and operation of the proposed CISF. The co-located WCS facility is directly adjacent to the proposed CISF. Because WCS is a partner in ISP (the applicant for the proposed CISF) and owns the land proposed for the CISF, land use conflicts and access issues are not anticipated to arise between the co-located facilities. Access to the property is already controlled, and grazing does not occur within the WCS-controlled (fenced) area. NEF is located less than 2.4 km [1.5 mi] west of the proposed CISF project across the New Mexico State line. As part of a prior licensing analysis, the NRC staff assessed the environmental impacts for NEF and determined that all impacts would be small, with the exception of the positive impact of increased tax revenue (NRC, 2005). Because the NEF facility has already been constructed and has been operating since 2010, land disturbance associated with construction has already occurred. Additionally, land access and grazing restrictions are already in place. If licensed and constructed, Eden would be built east of Eunice, New Mexico, approximately 5 km [3.1 mi] southwest of the proposed CISF. Eden anticipates beginning construction in early 2022. However, at this time, land use impacts from this facility would be speculative. The NRC staff concludes that the impact of the past, present and reasonably foreseeable nuclear facilities on land use within the geographic scope would be small.

As described in EIS Section 5.1.1.1, the Permian Basin is the focus of extensive exploration, leasing, development, and production of oil and gas, with the most heavily concentrated area of wells located in the counties near the Texas-New Mexico State line. As described in EIS Section 3.2.4, oil and gas production activities surround the proposed project area. Impacts on land use from continued oil and gas development in the land use geographic scope would include construction of temporary access roads and 1.2-ha [3-ac] drill pads for each drill site (BLM, 2009). In addition, continued oil and gas development in the geographic scope of the analysis may lead to the need for additional support infrastructure such as compressor stations and pipelines to move oil and gas to market. Although potash mining is a major part of the Eddy and Lea County economies, potash mining occurs outside the geographic scope of the analysis for land use and is therefore not evaluated further.

Within the geographic scope of the analysis for land use is Sundance Service, a full-service oilfield waste disposal facility with two locations: one in Eunice, NM (Parabo Facility) and the other located less than 1.6 km [1 mi] west of the proposed CISF site, across the New Mexico-Texas State line (Sundance Services, Inc., 2019a). The Sundance Service facilities together are approximately 340 ha [840 ac] of privately-owned land with access restricted to customers of the facility. An additional potential oil and gas waste disposal facility is the Sprint Andrews County Disposal, on WCS-owned property, less than 2.8 km [1.75 mi] south of the proposed CISF site (ISP, 2019). The NRC staff anticipates that with the large amount of oil and gas activity in the area that both facilities would continue operating during the cumulative analysis timeframe. If constructed, the Sprint Andrews County Disposal would cover 66.8 ha [165 ac] with an expected life of the facility, if permitted, of 36 years (ISP, 2019).

Located about 2 km [1.2 mi] west of the proposed CISF project area is the Permian Basin Materials sand and gravel quarry and a large spoil pile (EIS Figure 5.1-1). Also near the proposed CISF project area is the Lea County Sanitary Waste Landfill, which is approximately 3 km [1.8 mi] south-southwest of the proposed CISF project area, across New Mexico Highway 176, just across the Texas-New Mexico State line. Similar to the Sundance Service facilities, Permian Basin Materials and the Lea County Landfill both have access restricted to customers of the facilities.

Both solar and wind energy projects (EIS Section 5.1.1.5) and urban development (EIS Section 5.1.1.8) in the region all occur outside of the geographic scope of the analysis for land use. If any future solar or wind energy projects are developed in the region, they would be generally compatible with other land uses, including livestock grazing, recreation, and oil and gas production activities (BLM, 2005) with long-term disturbance associated with permanent facilities (i.e., access roads, support facilities, and tower foundations) (BLM, 2011).

The NRC staff has determined that the cumulative impact on land use within the geographic scope of the analysis for land use resulting from past, present, and reasonably foreseeable future actions, not including the proposed CISF, would be MODERATE. This finding is based on the assessment of existing and potential impacts on land use within the geographic scope from the following actions:

- Land disturbance from existing and future oil and gas production and development activities, such as access road and drill pad construction as well as the oilfield waste facility

- Land disturbance and restrictions on livestock grazing from construction and operation of additional infrastructure (e.g., compressor stations, booster stations, and pipelines) to support existing and future oil and gas production

- Land disturbance and restrictions on livestock grazing, as well as access restrictions, from existing nuclear facilities

Other existing and reasonably foreseeable future actions are not expected to have a noticeable impact on land use within the land use geographic scope. There are no solar or wind energy generation projects, urban development, recreational facilities or potash mining planned within the land use geographic scope.

Summary

The estimated land disturbance of 130 ha [320 ac] at full build-out (Phases 1-8) for the proposed CISF project area is a small amount of land (approximately 0.25 percent) in comparison to the geographic scope of the analysis for land use of 52,250 ha [129,110 ac]. Livestock grazing would be restricted on this amount of land over the license term of the proposed CISF. After the end of the ISP license term, WCS (i.e., the owner of the land) would have the option to release the land for livestock grazing or continue to restrict grazing within the WCS site. Therefore, the NRC staff concludes that at full build-out (Phases 1-8), the proposed CISF would add a SMALL incremental effect to the already existing MODERATE impacts to land use from other past, present, and reasonably foreseeable future actions in the geographic scope of the analysis, resulting in an overall MODERATE cumulative impact in the land use geographic area.

5.3 Transportation

Cumulative transportation impacts related to increases in road traffic were evaluated locally and regionally within a geographic scope of analysis of an 80-km [50-mi] radius of the proposed CISF project. This region was chosen to be inclusive of areas close to the proposed CISF that would be most likely to notice changes in traffic but also consider more distant locations (e.g., WIPP, the proposed Holtec CISF) where other nuclear materials facilities engage in or have plans for the transportation of radioactive materials. Because the proposed CISF and other facilities in the region would ship radioactive materials on a national scale, the affected populations along the transportation routes and therefore the cumulative impact analysis goes beyond the geographic scope of the analysis to various national origins or destinations. The timeframe for the analysis is 2017 to 2060.

As discussed in EIS Section 4.3.1, the transportation impacts from the proposed CISF project and for all stages at full build-out would be SMALL. If only the proposed action (Phase 1) were licensed, the impact would also be SMALL. These impact analyses address the transportation impacts of supply shipments and commuting workers and the radiological and nonradiological impacts to workers and the public under incident-free and accident conditions from operational SNF shipments to and from the proposed CISF.

Other past, present, and reasonably foreseeable actions, including nuclear materials facilities and oil and gas waste facilities within the region of the proposed CISF project, are described in EIS Section 5.1.1. Traffic-generating activities within the geographic scope of the analysis that could overlap with traffic the proposed CISF activities would generate are accounted for in the existing annual average daily traffic counts and historical ranges for area roadways described in EIS Section 3.3.1. Based on the available information in EIS Section 3.3.1, roadways that provide access to the proposed CISF such as State Highway 176 have available capacity, and current levels of traffic are below historical maximums. Truck traffic represents approximately half the traffic on local roadways and the addition of more oil and gas waste facilities has the potential to sustain or increase the truck traffic if the level of resource extraction activity continues or increases from recent years. While some roadways in the region are seeing increases in traffic, the roads nearest the proposed CISF are showing decreases in traffic levels from past years. Overall, existing roadways appear to have the available capacity to accommodate current traffic, as well as additional traffic from potential future actions. If all proposed future actions were realized and operated at capacity, it is possible the associated additional traffic could reach noticeable levels; however, considering the uncertainties associated with the boom and bust of the oil and gas economy and the historic trends in traffic, a more mixed-future growth trend appears more likely, which would present modest overall traffic impacts. In addition, regarding nuclear facilities, if a second CISF were constructed, the NRC staff anticipates that the increase in traffic associated with the transport of construction materials would most likely come from west Texas because of its proximity and the availability of materials. Eden anticipates beginning construction in early 2022. However, at this time, traffic (as well as other) impacts from this facility would be speculative because of limited available plans. No other major future traffic-generating projects were identified in EIS Section 5.1.1.

Therefore, the NRC staff concludes that further analysis of the cumulative traffic-related transportation impacts from the other past, present, and reasonably foreseeable future actions (including traffic volume, safety, and infrastructure wear and tear) would not significantly change the traffic-related impacts previously evaluated in EIS Section 4.3.1 for the proposed CISF. The NRC staff does not anticipate rail-traffic related impacts because of SNF shipments to the proposed CISF. Currently, rail carriers, who direct traffic to maximize utility, manage the rail lines. While SNF shipments would be travelling at a slower speed than other trains on main line track, the NRC staff assumes that rail carriers would make any necessary traffic flow and routing adjustments to account for SNF shipments. Therefore, the cumulative impact from the proposed CISF SNF shipments with other past, present, and reasonably foreseeable actions would be SMALL. Additionally, worker safety-related transportation impacts (e.g., injuries and fatalities) pertain to individual worker and workplace risks that are not considered to be cumulative in nature, whereas annual occupational radiation exposures are cumulative but are monitored and limited by regulation, regardless of workplace. Therefore, the focus of the remaining analysis of the impacts of other past, present, and reasonably foreseeable future actions focuses on public radiation exposure to other current or future radioactive materials shipments.

Within the geographic scope of the analysis for transportation, there are several nuclear materials facilities that are described in EIS Sections 3.12.1.2 and 5.1.1, including WIPP, NEF, FEP/DUP, and the co-located existing WCS facilities. The Eden facility could be built in the future. Because of (i) the locations and distances from these facilities to the proposed CISF project, (ii) the predominant use of roadways to ship radioactive materials relative to the proposed CISF intent to use railways, and (iii) the separate local north-south rail lines serving facilities near Carlsbad and Hobbs, the NRC staff expects the potential for overlapping and accumulating radiation exposures to the public from this transportation (for example, shipments frequently exposing the same people in proximity to the transportation routes) would be low. However, because routes and locations of exposed individuals would vary, the cumulative impact analysis conservatively assumes the population dose estimates from all of these radioactive materials transportation activities are additive and therefore assume that the population is exposed to the radiation from all of the evaluated shipments.

EIS Table 5.3-1 summarizes the results of prior radioactive material transportation impact analyses conducted to evaluate the impacts of the proposed transportation for the aforementioned regional nuclear materials facilities. The analyses were conducted using the RADTRAN (version 5 or higher) (Neuhauser et al., 2000) transportation risk assessment software and the TRAGIS routing software (Johnson and Michelhaugh, 2003) based on projected transportation operations, including the materials to be shipped, the packaging, the mode of transportation, the number of expected shipments, the known or expected origin and destinations and estimated routing, the population along routes, and accident rates. The RADTRAN software calculated radiation doses to the exposed population along the routes as well as dose-risks based on the probabilities and consequences of accidents, representing a wide range of severities, and these results were converted to expected latent cancer fatalities (LCF) using applicable conversion factors in the reports that documented the analyses. No available prior transportation risk was located for the WCS waste disposal operations; therefore, the NRC staff assumed that the FEP/DUP facility results were applicable based on similarities in the types of materials shipped.

Table 5.3-1 Summary of Available Transportation Risk Assessment Results for Other Facilities Within an 80-km [50-mi] Radius of the Proposed CISF Project				
Facility	**Material Shipped**	**Mode**	**Estimated Incident-Free Impacts (LCF)**	**Estimated Accident Impacts (LCF)**
WIPP	Transuranic Waste	Truck	0.23	2.33×10^{-3}
NEF	UF_6, Depleted UF_6, Residuals and Wastes	Truck	0.009	0.5
FEP/DUP	Depleted UF_6 and LLRW	Truck	0.4	0.6
WCS Disposal	LLRW and Byproduct Material	Truck and Rail	0.4*	0.6*
Holtec Proposed CISF	Spent Nuclear Fuel	Rail	0.21**	0.04**
All Facility Total	Radioactive Material	Truck and Rail	1	2

*No prior transportation impact analysis was identified for WCS disposal operations; therefore, the NRC staff assumed that impacts would be similar to the estimated impacts for FEP/DUP, which included shipments of LLRW and uranium.
**LCFs for the proposed ISP CISF were estimated by the NRC staff using the representative-route calculation approach described in EIS Section 4.3.1.2.2 scaled by the proposed estimated number of Holtec SNF shipments (10,000) at full build-out (Phases 1-8).
Source: DOE, 2009; NRC, 2005; NRC, 2012b

As shown in EIS Table 5.3-1, the total estimated LCFs for incident-free radioactive materials transportation from decades of national transportation of radioactive materials from these other nuclear materials facilities within the region was 1 and the total estimated LCFs for transportation accidents was 2. While the exposed population was not reported in the source documents, for national interstate transportation, the NRC previously reported that the exposed population along several representative truck and rail routes RADTRAN calculated ranged from 132,939 to 1,647,190 people (NRC, 2014b). Therefore, the estimated incident-free and accident LCFs are on the order of 1 and 2 LCFs per 100,000 or more exposed people, respectively. By comparison, as described in EIS Section 3.12.3, the baseline lifetime risk in the U.S. is 1 in 5 (or 20,000 per 100,000) for anyone developing a fatal cancer (ACS, 2018). Based on this analysis, the cumulative estimated increase in LCFs from potential exposures to radiation from the other regional nuclear material facilities in the region would have a negligible contribution to the number of LCFs expected in the exposed population from the existing baseline national cancer risk described in EIS Section 3.12.3. Therefore, the NRC staff concludes that the potential cumulative public dose impacts from the other past, present, and reasonably foreseeable future actions would be SMALL.

Other past, present, and reasonably foreseeable actions within the geographic scope of the analysis for transportation include mining and oil and gas development (EIS Section 5.1.1.1), solar and wind energy projects (EIS Section 5.1.1.5), agriculture (EIS Section 5.1.1.6), recreational activities (EIS Section 5.1.1.7), urban development (EIS Section 5.1.1.8), and other projects (EIS Section 5.1.1.9). Because these types of actions are presently occurring in the region and are likely to continue, the potential impacts of these types of projects are reflected in the current traffic conditions in EIS Section 3.1.1 and the impact analyses in EIS Section 4.3. While future growth is possible for some types of actions, the area roadways have accommodated past peaks in traffic volume and have available capacity to accommodate further moderate growth. Therefore, these projects contribute to the overall SMALL transportation impact for past, present, and reasonably foreseeable future actions.

Summary

Based on the preceding analysis, the NRC staff has determined that the cumulative impact on transportation in the geographic scope of the analysis resulting from other past, present, and reasonably foreseeable future actions would be SMALL. As described in the preceding analysis, the estimates of combined radiological exposures and associated LCF estimates from radioactive materials transportation associated with currently operating and proposed future facilities in the geographic scope represent a negligible contribution to the expected LCFs in the exposed population derived from the baseline cancer risk in the United States. Considering the aforementioned estimated health effects from the SNF transportation ISP proposed for the CISF project at full build-out (Phases 1-8) of 0.071 public health effects (incident-free transportation) and 0.013 public health effects (accident conditions) and the preceding estimated LCF risk from other past, present, and reasonably foreseeable future actions of 3 LCFs, the cumulative health effects would be a negligible contribution to the estimated baseline cancer risk within the exposed populations that were evaluated. Therefore, the NRC staff concludes that at full build-out (Phases 1-8), the proposed CISF would add a SMALL impact for traffic-related impacts; and a SMALL radiological impact to the SMALL radiological and traffic effects of transportation from other past, present, and reasonably foreseeable future actions in the geographic scope of the analysis; resulting in an overall SMALL cumulative impact in the transportation geographic area.

5.4 Geology and Soils

The NRC staff assessed cumulative impacts on geology and soils within a geographic scope of analysis of 80 km [50 mi] to capture the large-scale nature of the geologic surface and subsurface formations in the region. The timeframe for the analysis of cumulative impacts is 2017 to 2060.

As described in EIS Section 4.4, the impacts to geology and soils from full build-out (Phases 1-8) of the proposed CISF project would be SMALL. If only the proposed action (Phase 1) was constructed and operated, the impacts would also be SMALL. Impacts to geology and soils during construction, operation, and decommissioning of the proposed CISF project would be limited to soil disturbance, soil erosion, and potential soil contamination from leaks and spills of oil and hazardous materials. As described in EIS Section 4.4.1, mitigation measures; BMPs; TPDES permit requirements; a Stormwater Pollution Prevention Plan (SWPPP); and a Spill Prevention, Control, and Countermeasures (SPCC) Plan would be implemented by ISP to limit soil loss, avoid soil contamination, and minimize stormwater runoff impacts (ISP, 2020).

As further discussed in EIS Section 4.4.1.2, geological and soil resources are not expected to be impacted by seismic events, sinkhole development, or subsidence in the proposed project area. The proposed CISF project would be located in an area of west Texas that has low seismic risk from natural phenomena.

As described in EIS Section 5.1.1.1, the Permian Basin is the focus of extensive exploration, leasing, development, and production of oil and gas. In recent years, fluid injection and hydrocarbon production have been identified as potential triggering mechanisms for numerous earthquakes that have occurred in the Permian Basin (Frohlich et al., 2016). A recent study

Snee and Zoback (2018) conducted used stress data to estimate or model the potential for slip on mapped faults across the Permian Basin in response to injection-related pressure changes at depths that might be associated with future oil and gas development activities. This study concluded that existing faults located in the western Delaware Basin and the Central Basin Platform where the proposed project area is located are unlikely (<10 percent probability) to slip in response to fluid-pressure increase, and therefore the potential for induced seismicity in this area is low (Snee and Zoback, 2018). The NRC's safety review will determine whether the proposed CISF project would be constructed in accordance with 10 CFR 72.122, General Design Criteria, Overall Requirements, which requires that structures, systems, and components important to safety be designed to withstand the effects of earthquakes without impairing their capability to perform safety functions.

Sinkholes and karst fissures formed in gypsum bedrock are common features on the rim of the Delaware Basin, a sub-basin of the Permian Basin, which abuts the Central Basin Platform in west Texas and southeastern New Mexico. New sinkholes form almost annually, often associated with upward artesian flow of groundwater from regional karstic aquifers that underlie evaporitic rocks at the surface (Land, 2003, 2006). A number of these sinkholes are man-made in origin and are associated with improperly cased, abandoned oil and groundwater wells, or with solution mining of salt beds in the shallow subsurface (Land, 2009, 2013). Within the geology and soils geographic scope, the location of man-made sinkholes and dissolution features include the Wink, Jal, Jim's Water Service, Loco Hills, and Denver City sinkholes and the I&W Brine Well. The Wink sinkholes in Winkler County, Texas, are approximately 72 km [45 mi] south-southwest of the proposed CISF project area and were probably formed by dissolution of salt beds in the upper Permian Salado Formation that resulted from an improperly cased, abandoned oil well (Johnson et al., 2003). The Jal Sinkhole near Jal, New Mexico, is approximately 30 km [18 mi] southwest of the proposed CISF and was also probably formed by dissolution of salt beds in the Salado Formation caused by an improperly cased groundwater well (Powers, 2003). The Jim's Water Service Sinkhole, Loco Hills Sinkhole, Denver City Sinkhole, and I&W Brine Well resulted from injection of freshwater into underlying salt beds and pumping out the resulting brine for use as oil field drilling fluid (Land, 2013). Because of the distance between the above mentioned sinkholes and the proposed CISF, the man-made nature of the sinkhole development, and the lack of effluents from the proposed CISF that could contribute to formation of such sinkholes, the NRC staff concludes that the potential for sinkhole development within and surrounding the proposed CISF project area is low because no thick sections of soluble rocks are present at or near the land surface.

Recent studies employing satellite imagery have identified movement of the ground surface across an approximate 10,360-km^2 [4,000-mi^2] area of west Texas that includes Winkler, Ward, Reeves, and Pecos counties (Kim et al., 2016; SMU Research News, 2018). In one area, as much as 102 cm [40 in] of subsidence was identified over the past 2.5 years. This area is approximately 0.8 km [0.5 mi] east of the Wink No. 2 sinkhole in Winkler County, Texas, where there are two subsidence bowls. The rapid sinking in this area is most likely caused by water leaking through abandoned wells into the Salado Formation and dissolving salt layers (SMU Research News, 2018). Similar to sinkhole development, because of the distance between the afore-mentioned subsidence bowls and the proposed CISF and the lack of effluents from the proposed CISF or extraction of fluids from the subsurface by the proposed CISF project that could contribute to subsidence, the NRC staff does not anticipate that the proposed CISF would increase the potential of sinkholes or subsidence, and the risk of subsidence at the site is low.

Within the geological and soil resources geographic scope, nuclear-related activities, livestock grazing, oil and gas production, potash mining, wind energy projects, and recreational activities are ongoing and projected to continue in the future (EIS Section 5.1.1). These are discussed next.

Existing and reasonably foreseeable future nuclear facilities within the geological and soil resources geographic scope are described in EIS Section 5.1.1.2. These facilities include the co-located WCS facility, WIPP, NEF, FEP/DUP, a second proposed CISF, and the proposed Eden facility. Based on information in the license applications, continued operation or development of future nuclear-related projects in the region (e.g., the proposed second CISF) would have impacts on geology and soils because of increased vehicle traffic, clearing of vegetated areas, soil salvage and redistribution, discharge of stormwater runoff, and excavation associated with construction and maintenance of project facilities and infrastructure (e.g., roads, pipelines, industrial sites, and associated ancillary facilities). The NRC staff assumes that the continued operation or development of such projects within the region would have similar potential for surface impacts to geology and soils as the proposed CISF, although specific impact determinations have been assessed in or would be made in site-specific licensing reviews of those facilities. The construction and operation of the infrastructure for these future projects would be subject to similar requirements for monitoring, mitigation, and response programs to limit potential surface impacts (e.g., erosion and contamination from spills) as those for the proposed CISF project. Reclamation and restoration, when applicable, of disturbed areas would mitigate loss of soil and soil productivity associated with project activities.

Other past, present, and reasonably foreseeable future actions in the geology and soils geographic scope include livestock grazing, oil and gas production and development, and potash exploration and mining. Surface-disturbing activities related to these actions, such as construction of new access roads and drill pads and overburden stripping, would have direct impacts on geological and soil resources. Direct effects on geology and soils from these activities would be limited to excavation and relocation of disturbed bedrock and unconsolidated surface materials associated with surface disturbances. Impacts from these activities include loss of soil productivity due primarily to wind erosion, changes to soil structure from soil handling, sediment delivery to surface-water resources (i.e., runoff), and compaction from equipment and livestock pressure. Reclamation and restoration of soils disturbed by historic livestock grazing and exploration activities would mitigate loss of soil and soil productivity, and salvaged and replaced soil would become viable soon after vegetation is established.

As described in EIS Section 5.1.1.1, within the geographic scope of the analysis for geology and soils, potash mining occurs in counties west of the proposed CISF (i.e., Eddy and Lea Counties, New Mexico) (EIS Figure 5.1-1). However, because of the distance between the proposed CISF and active and potential future potash mines, and because the proposed CISF is a surface facility with a maximum excavation depth of 3 m [10 ft], the NRC staff does not anticipate that the proposed CISF would impact potash mining activity nor be impacted by potash mining activity.

Both solar and wind energy projects (EIS Section 5.1.1.5) occur within the geographic scope of the analysis for geology and soils. Solar and wind energy projects in the region would be generally compatible with other land use in the region. Impacts would be associated with long-term disturbance associated with permanent facilities (i.e., access roads, support facilities, and tower foundations) (BLM, 2011). Impacts to geology and soils from wind energy projects include use of geologic resources (e.g., sand and gravel), activation of geologic hazards (e.g., landslides and rockfalls), and increased soil erosion. Sand and gravel and/or quarry stone would be needed for access roads. Concrete would be needed for buildings, substations, transformer pads, wind tower foundations, and other ancillary structures. These materials would be mined as close to the potential wind energy site as possible. Tower foundations would typically extend to depths of 12 m [40 ft] or less. The diameter of tower bases is generally 5 to 6 m [15 to 20 ft], depending on the turbine size. Construction activities can destabilize slopes if they are not conducted properly. Soil erosion would result from (i) ground surface disturbance to construct and install access roads, wind tower pads, staging areas, substations, underground cables, and other onsite structures; (ii) heavy equipment traffic; and (iii) surface runoff. Any impacts to geology and soils would be largely limited to the proposed energy project area. Erosion controls that comply with county, State, and Federal standards would be applied. Operators would identify unstable slopes and local factors that can induce slope instability. Implementation of BMPs would limit the impacts from earthmoving activities. Foundations and trenches would be backfilled with originally excavated material, and excess excavation material would be stockpiled for use in reclamation activities (BLM, 2005).

Other past, present, and reasonably foreseeable actions within the geographic scope of the analysis for geology and soils include development, recreational activities, and oilfield waste facilities. Urban development occurring in the area would be planned and developed under the regulations and policies of the local governments. Thus, the NRC staff assumes that any new development would be protective of the landscape. Present recreational activities would not be anticipated to impact subsurface geologic systems or soils. National and State parks operate under the policies of park systems, which the NRC staff assumes would have policies in place to protect the natural environment. Oilfield waste facilities (oilfield landfarms) are owned and operated by private entities that must abide by all applicable State of Texas and New Mexico regulations. The occurrence of urban development, recreational activities, and oilfield waste facilities all contribute to noticeable but not destabilizing impact to geology and soils.

Surface-disturbing activities associated with ongoing and reasonably foreseeable future nuclear-related energy resource exploration and development (i.e., oil and gas and potash), wind energy projects, urban development, and recreational activities would have direct impacts on geology and soils. In addition, induced seismicity, sinkholes, and subsidence resulting from oil and gas production and development and potash mining activities could have direct impacts on geology and soils in the various project areas, although as discussed in EIS Section 4.4, they are not anticipated within the proposed CISF project area. Therefore, the NRC staff determines that the cumulative impacts on geology and soils within the geographic scope of the analysis from all past, present, and reasonably foreseeable future actions is MODERATE. Direct impacts would result from construction of any additional infrastructure because of increased traffic, clearing of vegetated areas, soil salvage and redistribution, and construction of project facilities and infrastructure.

Summary

Factors that the NRC staff considered for the cumulative impact determination for geology and soil resources include (i) the systems, plans, and procedures that would be in place to limit soil loss, avoid soil contamination, and minimize stormwater runoff; (ii) available information showing that the proposed project area is in an area of low seismic risk from natural phenomena and is not likely to be affected by significant induced seismicity from oil and gas production and wastewater injection; (iii) a low potential for sinkhole development due to the absence of soluble rocks at or near the land surface; and (iv) available information showing a low potential for subsidence from potash mining. Therefore, the NRC staff concludes that at full build-out (Phases 1-8), the proposed CISF would add a SMALL incremental effect to the existing MODERATE impacts to geology and soils from other past, present, and reasonably foreseeable future actions in the geographic scope of the analysis, resulting in an overall MODERATE cumulative impact in the geology and soils geographic area to capture the large-scale nature of the geologic surface and subsurface formations in the region.

5.5 <u>Water Resources</u>

5.5.1 Surface Water

The NRC staff assessed cumulative impacts on surface waters within the City of Eunice-Monument Draw Watershed, defined by the Watershed Boundary Dataset (USGS, 2019b). As described in EIS Section 5.1.2, the timeframe for the analysis is from 2017 to 2060.

The City of Eunice-Monument Draw Watershed is approximately 1,029 square kilometers (km^2) [397 square miles (mi^2)] and includes Monument Draw, New Mexico, Baker Springs, and Fish Pond. The proposed project area is in the City of Eunice-Monument Draw Watershed and, as described in EIS Section 3.5.1, has some surface drainage to Baker Springs but primarily drains to the large drainage depression to the southwest of the proposed project area, which may overflow to Ranch House Draw (EIS Figure 3.5-2). The cumulative surface water impact analysis outside of the City of Eunice-Monument Draw Watershed was not evaluated, because drainage in other watersheds is not anticipated to influence or to be influenced by the proposed CISF project.

As described in EIS Section 3.5.1.2, there are no perennial streams in the proposed CISF project area, and any water in the surface water features occurs predominantly in response to surface drainage after precipitation events or is a stock tank refilled periodically with groundwater (ISP, 2020). Evaporation and infiltration are the only mechanisms for water loss in the Baker Springs, Ranch House Draw, and in the surface depressions within the WCS property (ISP, 2020). Surface water that collects in the surface depressions near the proposed CISF project area evaporates, leaving the soil and remaining water highly saline.

The surface water impacts from full build-out of the proposed CISF project (Phases 1-8), as described in EIS Section 4.5.1, would be SMALL. If only the proposed action (Phase 1) was constructed, operated, and decommissioned, the impacts would also be SMALL. Almost all the surface water runoff from the approximate 130-ha [320-ac] footprint of the facility would drain to the southeast and be captured in the large drainage depression. The 100-year storm would be fully captured, while larger storm events would result in temporary discharge from the depression towards Ranch House Draw (ISP, 2018). The small amount of surface water runoff not draining to the southeast would drain to the southwest, across the State Line Road into New Mexico prior to draining into Baker Springs. Prior to entering the surface depressions, surface water runoff would be managed in accordance with ISP's Stormwater Pollution Prevention Plan (SWPPP), TPDES permit, and Spill Prevention, Control, and Countermeasures Plan (SPCC Plan), as described in EIS Section 4.5.1.1, which includes erosion and sediment control best management practices (BMPs). These BMPs would help mitigate the impacts of soil erosion, sedimentation, and spills and leaks of fuels and lubricants on surface water resources in the area.

In the region of the proposed project, past, present, and foreseeable future actions include oil and gas production and exploration, nonfuel mining, nuclear-related activities, wind and solar energy projects, agriculture, recreational activities, urban development, and waste disposal (EIS Section 5.1.1).

Recreational activities and plans for future developments, specifically those aimed at addressing the increase in population (EIS Section 5.1.1.5) are unlikely to impact the City of Eunice-Monument Draw Watershed because of the rural nature of the area (EIS Section 4.2). Recreational activities and the development of housing are more likely to occur near the cities of Andrews, Texas, and Hobbs, New Mexico, where populations are larger. The operations at R360, as well as the improvements to the Double Eagle Water System, are also outside of the surface water study area and unlikely to impact the same surface water feature the proposed CISF project impacts.

Within the surface water resources study area (City of Eunice-Monument Draw Watershed), the ongoing and reasonably foreseeable projects include oil and gas production and exploration and mining operations, as described in EIS Section 5.1.1.1. Oil and gas production and nonfuel mining are economic drivers in Andrews, Gaines, and Lea Counties. All three counties have a history of extensive exploration, leasing, development, and production of oil, gas, and nonfuel mining, and this trend is expected to continue. Impacts on surface water resources from the continued development of the oil and gas and mining operations in the surface water study area would include runoff from disturbed areas and leaks or spills of fuels or lubricants from equipment or operations. Oil and gas development activities and mining are monitored and regulated in New Mexico by the New Mexico State Land Office, New Mexico Oil Conservation Division, and BLM. In Texas, oil and gas development and mining is regulated by the Railroad Commission of Texas. Any activities affecting Waters of the U.S. (WOTUS) or Surface Waters of the State would be required to follow the stipulations of the USACE's 404 permit and 401 certifications. Also, all industrial operations would be required to obtain a National Pollutant Discharge Elimination System (NPDES) permit if in New Mexico or a Texas Pollutant Discharge Elimination System (TPDES) permit if in Texas, which would mandate the development and implementation of a SWPPP, thus protecting surface water resources in the area.

There are several existing nuclear facilities in the region; however, only the co-located WCS, NEF, and proposed Eden facilities are within the City of Eunice-Monument Draw Watershed. The WCS facility is currently licensed by the TCEQ to dispose of LLRW and byproduct material and is part of ongoing evaluation by DOE and the NRC for permission to dispose of GTCC and transuranic waste. WCS's current operations, according to the TCEQ, protect health and minimize danger to life and the environment. Further actions at WCS, such as the disposal of GTCC, would be regulated by the TCEQ, DOE, and/or NRC, all of which would ensure that actions taken at the property would be conducted in such a way as to ensure the protection of surface water features. Furthermore, any actions at WCS that could impact protected surface water features, such as jurisdictional wetlands, would potentially be subject to additional USACE and/or EPA oversight. NEF, located in New Mexico, is licensed and regulated by the NRC and therefore required to conduct operations in a manner that is protective of public health. Furthermore, operations at the NEF must comply with all applicable New Mexico regulations, including those NMED set, which require a NPDES permit for all industrial operations. Part of the NPDES permit is the development and implementation of a SWPPP, which prescribes BMPs to protect surface water resources from negative impacts associated with the industrial operations. The oversight of NEF by NRC, NMED, and EPA (the NPDES permitting authority) ensures that surface water resources are protected. Eden, if built, would be under the same regulatory oversight as NEF. Eden would be licensed and regulated by the NRC and would be required to comply will all applicable Federal and New Mexico regulations. The regulation and oversight of Eden by NRC, NMED, and EPA, would ensure that surface water resources would be protected from adverse impacts resulting from the construction, operation, and decommissioning of the Eden facility.

Both New Mexico and Texas have high potential for wind and solar energy generation. There are no wind projects within the surface water cumulative impact study area; however, the Byrd-Cooper portion of the Power for the Plains Project lies partially in the City of Eunice-Monument Draw Watershed. The primary impact to surface water from the Byrd-Cooper project would result from stormwater runoff from the soil disturbances during construction of the transmission line. Because the project is in New Mexico and would be required to comply with all applicable regulations, the NRC anticipates that adequate surface water protections would be required through the NPDES and associated SWPPP as well as any other relevant regulatory requirements (e.g., 401 certification or SPCC Plan). There are currently six operating solar plants and two under development in the region of the proposed CISF project, but only the SPS3 Lea solar farm is within the surface water study area for cumulative impact analysis. Because the project has been operational since 2011, the NRC staff anticipates that the potential for surface water impacts would be limited to those resulting from spills and leaks because disturbed areas have already been revegetated, where practicable. Should additional solar energy, wind energy, and associated infrastructure projects be constructed, the impacts to surface waters would be highest during construction because of the potential for stormwater runoff from disturbed area and spills and leaks from construction equipment. However, the NRC staff anticipates that the stormwater runoff during construction would be managed according to a SWPPP, that spills and leaks would be prevented and handled in accordance with a SPCC Plan, and that any surface water discharges would fall under the jurisdiction of a NPDES or TPDES permit.

Agriculture, such as farming and animal operations, is important to the Texas counties of Yoakum, Gaines, and Andrews as well as part of Lea County, New Mexico. In Lea County, between 2012 and 2017, farm sizes decreased, but the number of farms increased (USDA, 2019). The potential for future decrease in the overall number of acres used for farming in Lea County is likely representative of the trend in City of Eunice-Monument Draw Watershed, as the City of Eunice-Monument Draw Watershed is primarily in Lea County. The NRC anticipates that a decrease in farming acres would lessen negative surface water impacts from farming operations because nonpoint source pollution from pesticides and fertilizer in stormwater runoff and irrigation returns would decrease. Animal operations in Lea County increased slightly from 2012 to 2017 (USDA, 2019). If animal operations in Lea County continue to increase, it is possible for the area of City of Eunice-Monument Draw to experience an increase in animal operations. The NRC anticipates that an increase in animal operations in City of Eunice-Monument Draw could result in a small increase in stormwater runoff contaminated with animal waste because most of the operations do not have stormwater permit requirements and would be classified as nonpoint source pollutants.

The Sprint facility, Sundance Services, the Lea County Sanitary Waste Landfill, and CK Disposal facility are all within the City of Eunice-Monument Draw Watershed. The Sprint facility and CK Disposal are potential foreseeable projects and may not be built. If they are built, they would be required to comply with Federal and State (Texas for the Sprint facility and New Mexico for CK Disposal) regulations, including requirements to protect surface water features from adverse impacts. The surface water features on the sites of Sundance Services and Lea County Sanitary Waste Landfill are limited to surface depressions that temporarily hold water after precipitation events and evaporation ponds. As NMED requires, all these facilities, both existing and potential, if built, must have a NPDES permit (TPDES permit if in Texas) and SWPPP. The NRC staff anticipates that any spills or leaks of fuel and lubricants would be handled in accordance with a SPCC Plan and that any hazardous or toxic material would be handled in compliance with the appropriate State or Federally mandated plan and regulations.

The NPDES or TPDES permit, SWPPP, and other applicable plans would prescribe BMPs to protect surface water features from negative impacts from each facility's operations.

The Permian Basin Materials facility is within the City of Eunice-Monument Draw Watershed. On Permian Basin Materials property, there are three "produced water" lagoons for industrial purposes, a private man-made pond stocked with fish, and some surface depressions, which can temporarily hold water after precipitation events. As NMED requires, all these facilities must have a NPDES permit and SWPPP. The NRC staff anticipates that any spills or leaks of fuel and lubricants would be handled in accordance with a SPCC Plan and that any hazardous or toxic material would be handled in compliance with the appropriate State or Federally mandated plan and regulations. The NPDES permit, SWPPP, and other applicable plans would prescribe BMPs to protect surface water features, excluding the private pond, from negative impacts from each facility's operations.

The NRC staff concludes that the cumulative impact on surface water resources within the surface water study area resulting from past, present, and reasonably foreseeable future actions would be SMALL. This finding is based on the lack of major surface water features in the area and the assessment of existing and potential impacts on surface waters within the City of Eunice-Monument Draw Watershed from existing and future oil and gas exploration, production and development, mining, wind and solar projects, agricultural operations, and existing facilities. Other existing and reasonably foreseeable future actions are not expected to have a noticeable impact on surface water within the surface water study area, because there are currently no nuclear, solar or wind energy, recreational, or housing development projects planned within the City of Eunice-Monument Draw Watershed.

Summary

The impacts to the surface water resources in the surface water study area from the proposed action (Phase 1) and the full build-out (Phases 1-8) of the proposed CISF would result from surface water runoff and potential spills and leaks but would be mitigated by the implementation of ISP's SWPPP, SPCC Plan, and TPDES permit. These impacts would cease at the end of decommissioning when the land is returned to unrestricted ISP use, in accordance with an NRC-approved decommissioning plan and 10 CFR Part 20 (ISP, 2020). Therefore, the NRC staff concludes that at full build-out (Phases 1-8), the proposed CISF project would add a SMALL incremental effect to the SMALL cumulative impacts to surface waters from past, present, and reasonably foreseeable future actions, resulting in an overall SMALL cumulative impact to surface water resources in the geographic area.

5.5.2 Groundwater

The NRC staff assessed cumulative impacts for groundwater within 32 km [20 mi] of the proposed project area, focusing specifically on the areas in the Ogallala Aquifer (also known as the High Plains Aquifer or the Ogallala/Antlers/Gatuña (OAG) Unit) and the Pecos Valley Aquifer (the groundwater study area). The groundwater study area covers approximately 386,112 ha [945,100 ac] in eastern Lea County, New Mexico; western Andrews County, Texas; and southwestern Gaines County, Texas. The timeframe for the analysis is from 2017 to 2060, as described in EIS Section 5.1.2.

Important sources of groundwater in the groundwater study area (the Ogallala Aquifer and the Pecos Valley Aquifer within 32 km [20 mi] of the proposed project area) include the Santa Rosa and Trujillo Formations of the Dockum Group, the Trinity Group Antlers Formation, Ogallala

Formation (Ogallala Aquifer), and the Pecos Valley Alluvium of the Gatuña Formation (also known as the Cenozoic alluvium). As described in EIS Section 3.5.2.3, water from these formations is used for both potable and nonpotable applications, with the primary use of water in the area being agriculture, followed by municipal use. Groundwater quality, as described in EIS Section 3.5.2.4, is variable in each of the aquifers, ranging from highly saline to freshwater and from to very poor water quality with high TDS concentrations and brines in Lea County (Bjorklund and Motts, 1959; Richey et al., 1985). The Ogallala Aquifer is a major source of groundwater in the groundwater study area, supplying water to Hobbs and Eunice, as well as Andrews, Texas (ISP, 2020; City of Andrews, 2019b). However, the Ogallala Formation is discontinuous and is not present at the proposed CISF project area, but where remnants are present at the WCS site, the Ogallala is unsaturated.

The groundwater impacts from full build-out (Phases 1-8) of the proposed CISF project, as described in EIS Section 4.5.2, would be SMALL. If only the proposed action (Phase 1) was constructed, operated, and decommissioned, the impacts would also be SMALL. Groundwater impacts would result mainly from consumptive use and infiltration into shallow aquifers. Potable water demands for the proposed action (Phase 1) and full build-out (Phases 1-8) would be provided by the City of Eunice's Water and Sewer Department with water drawn from the Ogallala Aquifer (ISP, 2018). Negative impacts to groundwater quality in shallow aquifers resulting from infiltration of stormwater and spills and leaks of fuels and lubricants would be mitigated by the implementation of the SWPPP, SPCC Plan, and the requirements of the TPDES permit. At the end of the license term, for either the proposed action (Phase 1) or full build-out (Phases 1-8), the proposed CISF project would be decommissioned such that the proposed project area and remaining facilities could be released for unrestricted use in accordance with 10 CFR Part 20 (ISP, 2020).

In the region of the proposed project, past, present, and foreseeable future actions include oil and gas production and exploration, nonfuel mining, nuclear-related activities, wind and solar energy projects, agriculture, recreational activities, urban development, and waste disposal (EIS Section 5.1.1).

Within the groundwater resources study area {within 32 km [20 mi] of the proposed CISF project and in either the Ogallala Aquifer or the Pecos Valley Aquifer}, the ongoing and reasonably foreseeable projects include oil and gas production and exploration and mining operations, as described in EIS Section 5.1.1.1. Oil and gas production and nonfuel mining are economic drivers in Andrews, Gaines, and Lea counties. All three counties have a history of extensive exploration, leasing, development, and production of oil, gas, and nonfuel mining, and this trend is expected to continue.

Historically, groundwater consumption to support oil and gas development negatively impacted water availability in the area and competed with irrigation. These negative impacts have been partially mitigated in recent years by (i) an increase in State regulations regarding water use and administration of water rights; (ii) water-saving advancements in mining, agriculture, and manufacturing; and (iii) reduced irrigation demands in the area (TWDB, 2017).

The continued development of the oil and gas and potash industries would continue to impact groundwater resources through the consumptive use of water and potential groundwater quality deterioration from infiltration to shallow aquifers from improperly plugged or cased wells. Water rights in New Mexico are administered through the New Mexico Office of the State Engineer (NMOSE), which helps ensure water availability in New Mexico (NMOSE, 2019). According to the Texas Water Development Board (TWDB) (2017), groundwater rights in Texas are generally governed by the rule of capture, although restrictions can be implemented by groundwater conservation districts or groundwater subsidence districts, where they exist; this means that groundwater is generally considered to be owned by the land owner and can be used at the land owner's discretion, unless otherwise regulated. The TWDB created groundwater conservation districts, which require landowners to register their wells and can impose additional restrictions on water wells, such as limiting the amount of water appropriated from the well (TAMU, 2014). These restrictions vary by conservation district and in response water availability predictions by the TWDB aim to protect groundwater resources in Texas and ensure future water availability.

The NRC staff anticipates that consumptive groundwater use because of mining operations would be limited by water right restrictions imposed by NMOSE and TWDB's groundwater conservation districts. The NRC staff also anticipates that impacts from construction of these facilities would be subject to the same required monitoring, mitigation, and response programs (NPDES or TPDES permit, SWPPP, and SPCC Plan), limiting potential groundwater quality impacts. Operation of the facilities would be regulated by the Railroad Commission of Texas and in New Mexico, by the New Mexico Oil Conservation Commission, U.S. Department of the Interior, and BLM. The NRC staff anticipates that the regulatory framework in both Texas and New Mexico would require groundwater quality protections during the operation of oil-, gas-, and mining-related facilities, which would be adequate to ensure water availability and to protect groundwater quality in the groundwater study area.

Of the nuclear facilities in the region, only the co-located WCS facility, NEF, and Eden Radioisotopes are within the groundwater study area. The NRC staff anticipates that impacts to groundwater from the existing facilities would remain similar to current uses. The WCS facility is part of ongoing DOE and NRC evaluation for permission to dispose GTCC and transuranic waste. The Eden facility has started the process of seeking a license from the NRC to produce medical isotopes. Future actions at WCS or at the proposed Eden site, such as the disposal of GTCC or the production of isotopes, would be subject to similar monitoring, mitigation, and response programs required to limit potential groundwater quality impacts at the proposed CISF project and other NRC-regulated facilities. NRC, EPA, TCEQ, and NMED oversight would further mitigate adverse impacts to groundwater resources in the groundwater study area.

Both New Mexico and Texas have high potential for wind and solar energy generation. There is one operating solar plant, one operating wind farm, two solar farms under development, and one Power for the Plains project in the groundwater study area for cumulative impact analysis. The operating solar farm, SPS2 Jal, is in Lea County, New Mexico, and has been operational since 2011. The operating wind farm is Gaines Cavern Wind Project in Gaines County, Texas, and has been operational since 2012. The NRC staff anticipates that because SPS2 Jal and Gaines Cavern Wind Project are already operational, the groundwater impacts from these two facilities would remain constant and would primarily be minor consumptive use in support of the facility. Groundwater impacts from the two solar farms under development in Andrews County, Texas, the installation of Power for the Plains' Byrd-Cooper transmission line, and any future solar or wind projects would be highest during construction and consist of consumptive use and potential deterioration of groundwater quality from stormwater runoff and spills and leaks from construction equipment. However, the NRC staff anticipates that water availability would be assessed prior to construction, stormwater runoff during construction would be managed according to a SWPPP, that spills and leaks would be prevented and handled in accordance with a SPCC Plan, if applicable, and that any surface water discharges would fall under the jurisdiction of a TPDES permit, thereby protecting groundwater resources.

Agriculture, such as farming and animal operations, is important to the Texas counties of Yoakum, Gaines, and Andrews as well as part of Lea County, New Mexico. The main groundwater impacts from agricultural operations is consumptive use, which is largely impacted by the weather and the need for irrigation of fields and pastures. Due to the unpredictable nature of agricultural water demands, the effects of climate change, and implementation of innovative farming and irrigation techniques, impacts to groundwater from agricultural operations in the future are likely to fluctuate.

As populations increase in the Permian Basin, the demand for potable water will increase as well. Because most of the region relies on water from the Ogallala Aquifer, this would strain water availability, perhaps significantly. Construction related to development would also have groundwater impacts similar to those of construction of the proposed CISF project. However, the NRC staff anticipates that groundwater availability would be assessed prior to construction of development, stormwater runoff during construction would be managed according to a SWPPP, spills and leaks would be prevented and handled in accordance with a SPCC Plan, and that any surface water discharges would fall under the jurisdiction of a NPDES or TPDES permit, thereby protecting groundwater resources from negative impacts associated with the construction of urban developments.

The Sprint facility, Sundance Services, the Lea County Sanitary Waste Landfill, and CK Disposal facility are all within the groundwater cumulative impact study area. The Sprint facility and CK Disposal are potential foreseeable projects and may not be built. If they are built, they would be required to comply with Federal and State (Texas for the Sprint facility and New Mexico for CK Disposal) regulations, including requirements to protect groundwater resources from adverse impacts. Because Sundance Services and the Lea County Landfill are already operational, the NRC staff anticipates that the groundwater impacts (i.e., consumptive use and potential contaminated groundwater recharge) would remain similar to the current groundwater impacts. As NMED requires, all these facilities must have a NPDES (or TPDES, if in Texas) permit and SWPPP. The NRC staff anticipates that any spills or leaks of fuel and lubricants would be handled in accordance with a SPCC Plan, if applicable, and that any hazardous or toxic material would be handled in compliance with the appropriate State or Federally mandated plan and regulations. The NPDES permit, SWPPP, and other applicable plans would prescribe BMPs to protect surface water features from negative impacts from each facility’s operations, thereby protecting groundwater from contaminated recharge.

Permian Basin Materials is an operational facility within the groundwater cumulative impact study area. Because this facility is already operating, the NRC staff anticipates that the groundwater impacts (i.e., consumptive use and potential contaminated groundwater recharge) would remain similar to the current groundwater impacts. As NMED requires, Permian Basin Materials must have a NPDES permit and SWPPP. The NRC staff anticipates that any spills or leaks of fuel and lubricants would be handled in accordance with a SPCC Plan and that any hazardous or toxic material would be handled in compliance with the appropriate State or Federally mandated plan and regulations. The NPDES permit, SWPPP, and other applicable plans would prescribe BMPs to protect surface water features, excluding Permian Basin’s private pond, from negative impacts from each facility’s operations, thereby protecting groundwater from contaminated recharge.

The NRC staff concludes that the cumulative impact on groundwater resources within the groundwater study area resulting from past, present, and reasonably foreseeable future actions would be MODERATE. This finding is based on the assessment of existing and potential impacts on groundwater within the groundwater study area from existing and future oil and gas exploration, production and development; mining; nuclear-related facilities; solar and wind projects; agriculture; and housing developments, all of which would require consumptive water use and have potential impacts on groundwater quality.

Summary

The impacts to groundwater resources in the groundwater study area from the proposed action (Phase 1) and the full build-out (Phases 1-8) would result from consumptive use and infiltration of surface water runoff and spills and leaks to shallow aquifers. The implementation of ISP's SWPPP, SPCC Plan, and TPDES permit would mitigate these impacts. After the land is returned to unrestricted use following the decommissioning of the proposed CISF project area, in accordance with an NRC-approved decommissioning plan, the impacts to groundwater resources would cease. Therefore, the NRC staff concludes that at full build-out (Phases 1-8), the proposed CISF project would have a SMALL incremental effect on the MODERATE cumulative impacts to groundwater from past, present, and reasonably foreseeable future actions, resulting in an overall MODERATE cumulative impact to groundwater resources in the geographic area.

5.6 Ecology

The impacts analysis in EIS Section 4.6 describes the ecological impacts that could occur within an approximate 3.2-km [2-mi] radius of the proposed project area. Given that wildlife and vegetation occurrences fluctuate over time within unpredictable boundaries, the cumulative impacts geographic scope of the analysis for ecology is an approximate 8-km [5-mi] radius from the middle of the proposed CISF project area. The cumulative impact analysis is limited to this radius because ecological resources are not anticipated to influence or to be influenced by the proposed CISF project outside of this area.

As described in EIS Section 3.6.1, the mesquite shrubland vegetation type covers the majority of the southern portion of the proposed CISF project area (93.3 ha [230.5 ac]), and the sandy shinnery shrubland vegetation type covers roughly the northern 30.7 ha [76 ac] of the proposed CISF project area. An east-west strip of land approximately 7.2 ha [17.8 ac] in size across the middle of the proposed CISF project that follows an existing road is described as maintained grassland (ISP, 2020). The proposed project does not occur on FWS-designated critical habitat for any Federally listed threatened or endangered plant or animal species (EIS Sections 3.6.4 and 4.6.1). All phases of the proposed CISF would have "No Effect" on Federally listed species, and "No Effect" on any existing or proposed critical habitats. As described in EIS Section 4.6, impacts to ecological resources from full build-out (Phases 1-8) of the proposed CISF project would be SMALL to MODERATE because (i) there is ample undeveloped land surrounding the proposed project area, which has native vegetation and habitats suitable for native species; (ii) there is abundant suitable habitat in the vicinity of the project to support displaced animals; (iii) there are no rare or unique communities, habitats, or wildlife within the proposed CISF project area; (iv) the impacts from full build-out of the proposed CISF to vegetation would be expected to contribute to the change in vegetation species' composition, abundance, and distribution within and adjacent to the proposed CISF project (i.e., ecosystem function); and, (v) per BLM (BLM, 2017a), the establishment of mature, native plant communities may require decades. If only the proposed action (Phase 1) was constructed and operated, the impacts to ecological resources would also be SMALL to MODERATE.

Activities in the region evaluated for cumulative ecological impacts include cattle grazing, oil and gas exploration and waste disposal, a sand and gravel quarry, recreational activities, NEF, and the colocation of the WCS disposal and storage facilities described in EIS Section 5.1.1.3. The proposed Eden radioisotopes facility and the proposed Sprint Andrews County Disposal facility and Sundance West are also located within the region evaluated for cumulative ecological impacts, nonfuel mineral mining, the licensed IIFP facility, the WIPP facility, the proposed Holtec CISF project, wind and solar projects, agricultural farming, and housing developments described in EIS Section 5.1.1 are outside of the geographic scope of analysis for ecological resources. The cumulative effects of farming, cattle grazing, waste disposal, industrial facilities (NEF), and mineral extraction have had historical impacts on ecology directly due to habitat loss and segmentation, stresses on wildlife, and direct and indirect wildlife mortalities. These ongoing activities will continue to influence habitats indirectly (i.e., segmentation) or directly (i.e., altering vegetation types or preventing revegetation). The NRC staff estimates that, based on measurements obtained from aerial imagery found in Google Earth (2019), that approximately 30 percent {about 627 ha [1,500 ac]} of land within the geographic scope of the analysis for ecology has been disturbed from industrial development (i.e., NEF, WCS, Lea County Sanitary Waste Landfill, Sundance Services, and Permian Basin Materials), not including disturbances from oil and gas pads, access roads and utility lines to the oil and gas pads, fencing, land disturbed for cattle grazing, and other proposed facilities (Eden, IIFP, Sprint Andrews County Disposal, Sundance West, CK Disposal). The WCS facility has disturbed the most land among the industrial facilities within the study area. Potential effects to ecological resources resulting from the past and present activities within the geographic scope of the analysis for ecology include the reduction in wildlife habitat and forage productivity, reduction and modification of existing vegetative communities through land-clearing activities, degradation of air and water quality, and potential spread of invasive species and noxious-weed populations from land disturbance, displacement of and stresses on wildlife; and direct and indirect wildlife mortalities.

Impacts to surface water also affect ecological resources from channel siltation and silt deposition, chemical releases to the ground affecting plants and animals, and from exposure to contaminated water. At the NEF facility, liquid effluents that meet prescribed standards are discharged onsite into lined evaporation and retention basins, and stormwater would be discharged into an unlined detention basin (NRC, 2005). The Texas-licensed WCS facility handles hazardous and LLRW, and discharges noncontaminated stormwater, stormwater associated with construction activities, noncontact industrial stormwater, noncontact cooling water, and landfill wastewaters, and contaminated stormwater under a TPDES permit to four outfalls, two of which discharge within New Mexico. The NRC staff anticipates that management of wastewater and the lack of direct discharge of water at the NEF and WCS facilities limits potential impacts on ecological resources (NRC, 2005). Mining and oil and gas activities typically involve the handling of hazardous materials. The NRC staff anticipates that responses to hazardous materials incidents at such facilities would be as outlined and approved by the appropriate State or Federally required plans (e.g., TPDES permit requirements, a SWPPP, or an SPCC). As stated in EIS Section 5.5.2, Sundance Services, the Lea County Sanitary Waste Landfill, and the Permian Basin Materials facility are required by NMED to have a NPDES permit and SWPPPs. Other ongoing impacts from the industrial and mineral extraction activities within the geographic scope of the analysis for ecology include the disturbance to wildlife from the use of lights at night, ground vibrations from digging and drilling, and the generation of fugitive dust from motorized vehicles and stockpiled soils that may settle on forage and edible vegetation rendering it undesirable to animals. Therefore, the NRC staff determines that the cumulative impacts on ecological resources resulting from cattle grazing, waste disposal, industrial facilities (NEF and WCS), quarrying, oil and gas exploration, and proposed facilities (Eden, IIFP, Sprint Andrews County Disposal, Sundance West, CK Disposal) within the geographic scope of the analysis for ecology would be MODERATE.

The cumulative impacts to resources in the geographic scope of the analysis for ecology would be mitigated by Federal and State management actions for the reasonably foreseeable future. All reasonably foreseeable future actions in the geographic scope of the analysis for ecological resources are subject to Federal laws (e.g., the Endangered Species Act, the Migratory Bird Treaty Act, the Federal Mine Safety & Health Act, the Safe Drinking Water Act, and the Clean Water Act), and most private projects are subject to other State requirements such as land reclamation and complying with State- or EPA-issued NPDES permits. Adherence to these standards would reduce many of the cumulative adverse impacts from reasonably foreseeable future actions. Conservation partnerships such as the TPWD Range-Wide Conservation Plan described in EIS Section 4.6.1.1 and the BLM Restore New Mexico program would contribute additional beneficial cumulative impacts as additional acres are restored to historical, native vegetative communities annually (TPWD, 2017; BLM, 2018).

Summary

Significant development of the facilities within 8 km [5 mi] of the proposed CISF project has had a noticeable impact on ecological resources, because wildlife and habitat are no longer present where the facilities have been developed. Once those facilities are decommissioned, the establishment of mature, native plant communities may require decades (EIS Section 4.6.1). However, because a large amount of the land in the geographic scope of the analysis for ecological resources is part of a facility that requires Federal or State permits, reasonably foreseeable future actions within 8 km [5 mi] of the proposed CISF project are not expected to significantly impact ecological resources during the license term of the proposed CISF (Phases 1-8). The NRC staff concludes that for the proposed action (Phase 1) and for full build-out (Phases 1-8), the proposed CISF project would add a SMALL to MODERATE incremental effect to the MODERATE impacts to ecological resources from other past, present, and reasonably foreseeable future actions in the geographic scope of the analysis, resulting in an overall MODERATE cumulative impact in the ecology geographic area.

5.7 <u>Air Quality</u>

The NRC staff assessed cumulative impacts on air quality within the region (inclusive of the geographic scopes of all other resource areas) with primary focus on the portions of the Pecos-Permian Basin and Midland-Odessa-San Angelo Intrastate Air Quality Control Regions (EIS Figure 3.7-3) located within this region (EIS Figure 5.1-1). The NRC staff defined this as the geographic scope of the analysis for air quality. As described in EIS Section 5.1.2, the timeframe for the analysis is from 2017 to 2060.

5.7.1 Nongreenhouse Gas Emissions

As described in EIS Section 4.7.1.1, the air quality impacts from full build-out (Phases 1-8) of the proposed CISF project would be SMALL. This determination was based on the NRC staff's consideration of the following assessment factors: (i) the existing air quality, (ii) the proposed CISF emissions levels, and (iii) the proximity of the proposed CISF emissions sources to receptors. If only the proposed action (Phase 1), including the rail sidetrack was considered, the impacts would also be SMALL based on these same factors. The cumulative impacts analysis also considers similar factors such as the air quality in the geographic scope of the analysis, the contribution of the proposed CISF emission levels relative to the overall emission levels in the geographic scope of the analysis, and the ability of proposed CISF impacts to overlap with the impacts from the other emission sources (e.g., proximity of the emission sources to one another).

The effects of past and present activities on the geographic scope of the analysis's air quality are represented in the EPA's National Ambient Air Quality Standards (NAAQS) compliance status for that area. As described in EIS Section 3.7.2.1, the EPA currently designates the entire geographic scope of the analysis as an attainment area for all pollutants. Based on this attainment status, the NRC staff considers the air quality in the geographic scope of the analysis to be good. However, all of the activities described in EIS Section 5.1.1 generate gaseous emissions at some level. In particular, the Permian Basin is one of the largest and most active oil basins in the United States. The geographic scope of analysis continues to be the focus of extensive exploration, leasing, development, and production of oil and gas. The proposed CISF project area is located in the midst of the Permian Basin oil hub, near the Texas-New Mexico State line. The oil and gas industries drive the economies of Andrews and Gaines Counties in Texas, as well as Lea County in New Mexico. Activities associated with the oil and gas industry contribute to the air emissions generated within these three counties (EIS Table 3.7-4). The NRC staff considers that the emission levels within the geographic scope of analyses are noticeable but not destabilizing. The future pollutant levels generated within the geographic scope of the analysis would be based on (i) the emission-level trends for the existing sources and activities and (ii) the new emissions from reasonably foreseeable future actions. BLM conducted air-dispersion modeling to support their update of the Carlsbad Regional Management Plan. To analyze future cumulative impacts, BLM conducted modeling using an emission inventory based on the projected future emissions in the year 2028. The results predicted that the air quality specific to the western portion of the geographic scope of the analysis for this EIS would continue to meet the NAAQS (URS, 2013). Based on the available data, the NRC staff expects that the future air quality in the geographic scope of the analysis would remain good.

The NRC staff has determined that the cumulative impact on air quality with the geographic scope of analysis from the past, present, and reasonably foreseeable future actions for air emissions would be noticeable (EIS Table 3.7-4) but not destabilizing (i.e., in attainment for NAAQS compliance) and therefore MODERATE.

A factor for the cumulative impacts analysis is the contribution of the proposed CISF emission levels relative to the overall emission levels in the geographic scope of the analysis. EIS Table 3.7-4 describes the pollutant levels the various activities would generate within the geographic scope of the analysis. EIS Table 5.7-1 describes the contribution (i.e., percent) of the proposed CISF estimated annual emission levels compared to the overall geographic scope of the analysis emission levels. Specifically, the proposed CISF emissions levels are, at most, 0.17 percent of the geographic scope of the analysis emission levels (i.e., the total emissions from the combined three counties in EIS Table 5.7-1).

Table 5.7-1 The Contribution (i.e., Percentage) of the Proposed CISF Estimated Annual Emissions Compared to the Geographic Scope's Estimated Annual Emission Levels

	Pollutant						
County	**Carbon Monoxide**	**Hazardous Air Pollutants**	**Nitrogen Oxides**	**Particulate Matter $PM_{2.5}$**	**Particulate Matter PM_{10}**	**Sulfur Dioxide**	**Volatile Organic Compounds**
Andrews TX	0.35	0.003	0.29	0.12	0.11	0.71	0.03
Gaines TX	0.51	0.005	0.57	0.03	0.02	2.4	0.05
Lea NM	0.15	0.001	0.15	0.02	0.007	0.25	0.02
Total	0.09	0.0008	0.08	0.01	0.005	0.17	0.009

Source: Generated from the information in EIS Tables 2.2-2 and 3.7-4

Proximity of the proposed CISF to the other sources identified in EIS Section 5.1.1 influences the ability for impacts to overlap. EIS Section 5.1.1 identifies four new or expanding waste-disposal facilities that would be located between 1.6 km [1 mi] and 3.2 km [2 mi] from the proposed CISF as well as the proposed Eden Radioisotopes facility that would be located 5 km [3.1 mi] from the proposed CISF. The air dispersion modeling the applicant conducted showed that the proposed project emissions alone and when combined with background levels (i.e., existing emission sources) are well below the NAAQS for all pollutants (EIS Section 4.7.1). The proposed action (Phase) 1 peak-year emission levels [i.e., the proposed action (Phase 1) construction stage emissions] served as the input for this air-dispersion modeling. The proposed action (Phase 1) peak-year emissions occur during the first year of the proposed CISF. As depicted in EIS Table 5.7-2, the emission levels for the remaining 39 years of the license term range between approximately 1 to 6 percent of the peak-year emission levels. Phases 2-8 peak-year emissions occur when the subsequent construction and operations stages overlap. When estimating the subsequent construction stage emission levels, the applicant assumed that these emissions would occur within a single year, which would bound the estimated emission levels should the construction last more than one year. Phases 2-8 peak-year emission levels range between approximately 16 to 47 percent of the proposed action (Phase 1) emission levels. Because of the proposed CISFs low emission levels and the short duration when activities generate peak air-emission levels, the NRC staff concludes that the ability of the impacts of these projects to overlap would be limited.

As described in EIS Section 5.1.1.3, this EIS cumulative impacts analysis considers the proposed disposal of GTCC at the co-located WCS site. The environmental assessment for this action (DOE, 2018a) stated that this action would not require any additional construction and would not change the existing operations at the WCS site. This environmental assessment concluded that GTCC disposal would not be expected to increase air emissions in the vicinity of the WCS site. Therefore, the NRC staff concludes that impacts would not overlap with the proposed CISF, because disposal of GTCC at the WCS site does not increase the WCS site air emission levels.

Table 5.7-2 Percentage of Emission Levels of Relative to the Proposed Action (Phase 1) Peak-Year Emission Levels

Pollutant	Proposed Action (Phase 1) Construction*	Proposed Action (Phase 1) Operation	Proposed Action (Phase 1) Decommissioning†	Phases 2-8 Peak Year
Carbon Monoxide	100	5.2	5.2	46.6
Hazardous Air Pollutants	100	6.2	6.2	43.7
Nitrogen Oxides	100	1.3	1.3	40.7
Particulate Matter $PM_{2.5}$	100	2.9	2.9	38.2
Particulate Matter PM_{10}	100	1.0	1.0	16.3
Sulfur Dioxide	100	5.2	5.2	46.4
Volatile Organic Compounds	100	5.2	5.2	46.4

*Proposed action (Phase 1) construction stage emission levels were the proposed action (Phase 1) peak-year emission levels. Full build-out (Phases 1-8) peak-year emission levels were the same as the proposed action (Phase 1) peak-year emission levels.
†NRC staff assumed decommissioning stage emission levels were bounded by the operations stage emission levels. Operations and decommissioning stage emission levels were the same for the proposed action (Phase 1), Phases 2-8, and full build-out (Phases 1-8).
Sources: Modified from EIS Tables 2.2-2 and 2.2-3

Summary

In summary, the geographic scope of the analysis possesses good air quality; the proposed CISF emission levels are relatively minor when compared to the overall geographic scope of the analysis emission levels; and the overlapping impacts are limited, primarily because of the relatively minor emission levels from the proposed CISF. Therefore, the NRC staff concludes that at full build-out (Phases 1-8), the proposed CISF project would add a SMALL incremental effect to the already existing MODERATE impacts to air quality from other past, present, and reasonably foreseeable future actions in the geographic scope of the analysis, resulting in an overall MODERATE cumulative impact in the air quality geographic area**.**

5.7.2 Greenhouse Gas Emissions and Climate Change

5.7.2.1 Proposed CISF Greenhouse Gas Emissions

The impact magnitude resulting from a single source or a combination of greenhouse gas emission sources over a larger region must be placed in geographic context for the following reasons:

- The environmental impact is global rather than local or regional.
- The effect is not particularly sensitive to the location of the release point.
- The magnitude of individual greenhouse gas sources related to human activity, no matter how large compared to other sources, are small when compared to the total mass of greenhouse gases resident in the atmosphere.
- The total number and variety of greenhouse gas emission sources is extremely large, and the sources are ubiquitous.

Based primarily on the scientific assessments of the U.S. Global Climate Research Program (GCRP) and National Research Council, the EPA Administrator issued a determination in 2009 (74 FR 66496) that greenhouse gases in the atmosphere may reasonably be anticipated to endanger public health and welfare, based on observed and projected effects of greenhouse gases, their effect on climate change, and the public health and welfare risks and effects associated with such climate change. Therefore, the NRC staff concludes that the national cumulative impacts of greenhouse gas emissions are noticeable but not destabilizing.

Greenhouse gas emissions are generated by activities at the proposed CISF as well as during the SNF transportation to and from the proposed CISF. As described in EIS Section 2.2.1.4, the peak year proposed action (Phase 1) activities at the proposed CISF, generate an estimated 7,121 metric tons [7,849 short tons] of carbon dioxide. This peak-level value is the same for both the proposed action (Phase 1) and full build-out (Phases 1-8). As described in EIS Section 3.7.2.2, the EPA established thresholds for greenhouse gas emissions in the Tailoring Rule that define whether sources are subject to EPA air permitting. For new sources, the threshold is 90,718 metric tons [100,000 short tons] of carbon dioxide equivalents per year, and for modified existing sources, the threshold is 68,039 metric tons [75,000 short tons] of carbon dioxide equivalents per year. As described in EIS Section 4.7.1.1, the EIS compares estimated emission levels to such thresholds to provide context for understanding the magnitude of these emissions, which are mostly from mobile and fugitive sources rather than stationary sources. This comparison in the EIS does not document or represent a formal determination for air permitting or regulatory compliance. Because emission estimates for the proposed project are below the EPA thresholds in the Tailoring Rule, the NRC staff concludes that the activities at the proposed CISF would generate low levels of greenhouse gases relative to other sources and would have a minor impact on air quality in terms of greenhouse gas emissions. For context, the proposed CISF generates about 0.002 percent of the total projected greenhouse gas emissions in Texas of 374 million metric tons [412.3 million short tons] of carbon dioxide equivalents in 2017 (EPA, 2018). This also equates to about 0.0001 percent of the total United States annual emission rate of 6.5 billion metric tons [7.2 billion short tons] of carbon dioxide equivalents in 2017 (EPA, 2019).

The NRC staff also estimated the greenhouse gas emissions from transporting the SNF from the generation sites to the proposed ISP site by prorating the greenhouse gas estimates for transporting SNF along the Caliente rail alignment for the Yucca Mountain Project (DOE, 2008). This prorating accounted for the differences in the distance the SNF traveled and the amount of SNF transported. EIS Table 5.7-3 contains the prorating information and the proposed CISF emission estimates. The purpose of this basic estimate was to provide a value for comparison to the EPA thresholds specified in the previous paragraph. Because proposed CISF emission estimates are above the thresholds in the Tailoring Rule, the NRC staff expects that transporting SNF for both the proposed action (Phase 1) and full build-out (Phases 1-8) would have a noticeable but not destabilizing impact on air quality in terms of greenhouse gas emissions.

Table 5.7-3 Proposed CISF Greenhouse Gas (GHG) Emission Estimates for Transporting SNF

Proposed CISF SNF Transportation Event		Yucca Mountain GHG Emissions (Tons)*	Distance Prorating Factor†	Amount of SNF Prorating Factor‡	GHG Emissions (tons)§ Total‖	GHG Emissions (tons)§ Annual¶
From Generation Sites to Proposed CISF	Proposed Action (Phase 1)	2,040,248	5.22	0.0714	760,417	190,104
	Full Build-out (Phases 1-8)	2,040,248	5.22	0.571	6,081,204	264,400
From Proposed CISF to Repository	Proposed Action (Phase 1)	2,040,248	2.03	0.0714	295,718	147,859
	Full Build-out (Phases 1-8)	2,040,248	2.03	0.571	2,364,913	236,491

* Greenhouse gas emissions from SNF transportation along the Caliente rail alignment, which is only a portion (i.e., the last segment) of the distance between the generation site and the Yucca Mountain site. To convert metric tons to short tons, multiply by 1.1023

† Since the distance traveled for the estimated Yucca Mountain greenhouse gas emissions varies from the distance traveled for the proposed CISF, a prorating factor is used. The distance prorating factor is calculated by dividing the distance SNF travels for the proposed CISF transportation events {3,362 km [2,089 mi] for the generation site to the proposed CISF and 1,308 km [813 mi] for the proposed CISF to Yucca Mountain site} by the distance SNF travels for the Caliente rail alignment segment {644 km [400 mi]}.

‡ Since the amount of SNF transported for the estimated Yucca Mountain greenhouse gas emission varies from the amount of SNF transported for the proposed CISF, a prorating factor is used. The amount of SNF prorating factor is calculated by dividing the amount of SNF transported for the proposed CISF [5,000 MTU for the proposed action (Phase 1) and 40,000 MTU for full build-out (Phases 1-8)] by the amount of SNF transported for the Yucca Mountain analysis (70,000 MTU).

§ To convert metric tons to short tons, multiply by 1.1023

‖ Proposed CISF total greenhouse gas emissions calculated by multiplying the Yucca Mountain emissions by the two prorating factors.

Table 5.7-3 Proposed CISF Greenhouse Gas (GHG) Emission Estimates for Transporting SNF					
Proposed CISF SNF Transportation Event	Yucca Mountain GHG Emissions (Tons)*	Distance Prorating Factor[†]	Amount of SNF Prorating Factor[‡]	GHG Emissions (tons)[§]	
				Total[‖]	Annual¶
¶ Proposed CISF annual greenhouse gas emissions calculated by dividing the proposed CISF total greenhouse gas emissions by the number of years the activity takes (EIS Table 8.3-2). Source for Yucca Mountain information: Final Environmental Impact Statement for a Rail Alignment for the Construction and Operation of a Railroad in Nevada to a Geologic Repository at Yucca Mountain, Nye County, Nevada (DOE, 2008).					

To provide additional context, transporting SNF generates about 0.004 percent of the total United States annual emission rate of 6.5 billion metric tons [7.2 billion short tons] of carbon dioxide equivalents in 2017 (EPA, 2019).

In summary, the activities from the proposed CISF, in combination with national SNF transportation, would generate greenhouse gas levels above the EPA thresholds. Therefore, the NRC staff expects that both the proposed action (Phase 1) and full build-out (Phases 1-8) in combination with the transportation of SNF would generate high levels of greenhouse gas emissions relative to other sources and would add a MODERATE incremental effect to air quality in terms of greenhouse gas emissions when added to the MODERATE impact to air quality from other past, present, and reasonably foreseeable future actions in the geographic scope of the analysis, resulting in an overall MODERATE cumulative impact to air quality greenhouse gas emissions in the geographic scope.

Greenhouse gas generation is considered in a nation-wide context; thus, the NRC staff considers it appropriate for the cumulative impacts analysis to include carbon footprint as a relevant factor in evaluating distinctions between alternatives, including the No-Action alternative. For activities associated with storing SNF, emissions for the proposed CISF and the No-Action alternative would be similar. The proposed CISF would add another site that generates emissions, but at the same time, would allow for the elimination of emissions from nuclear power plants and ISFSIs that are fully decommissioned. For activities related to transporting SNF, the No-Action alternative would generate fewer emissions than the proposed CISF because the overall distance traveled from the nuclear power plants and ISFSIs to a repository would likely be less than from the nuclear power plants and ISFSIs to the proposed CISF and then to a repository.

5.7.2.2 Overlapping Impacts of the Proposed CISF and Climate Change

Climate change impacts could overlap with impacts from the proposed CISF. Based on the list of climate change projections for the State of Texas in EIS Section 3.7.1.2, the NRC staff concludes that water scarcity would be the most likely area where impacts from both climate change and the proposed action could overlap. Climate change is expected to increase drought intensity in Texas. Droughts can cause increased competition for limited water resources. Although some aspects of SNF storage require water, the amount of water needed is minimal and water use for SNF storage is not expected to cause water-use conflicts, even under the changed conditions that climate change could cause. Therefore, impacts from the proposed CISF that may overlap the impacts of climate change are likely to be minor.

5.8 Noise

The NRC staff assessed cumulative impacts on noise resources within a 10-km [6-mi] radius of the proposed CISF project area. The timeframe for the analysis is from 2017 to 2060, as described in EIS Section 5.1.2. Cumulative noise impacts outside of a 10-km [6-mi] radius of the proposed project area were not evaluated because, at that distance, noise from the proposed project would not be anticipated to propagate (carry), such that there could be a cumulative impact with other noise sources. Activities that contribute to noise within the study area include vehicular and train traffic; oil and gas production; sand and gravel quarrying; and solid, hazardous, and LLRW waste disposal and storage operations (EIS Section 5.1.1). These activities are ongoing and are projected to continue in the future.

The nearest noise receptors are travelers on State Highway 176 and workers at several commercial facilities located within a 3.0-km [1.8-mi] radius of the proposed site (EIS Section 3.8). The commercial facilities include WCS's existing hazardous waste and LLRW disposal facilities, NEF, Permian Basin Materials, Sundance Services, and the Lea County Sanitary Waste Landfill (EIS Figure 3.1-1). The nearest residential noise receptors are homes located west of the proposed CISF project area on the east side of Eunice, New Mexico (ISP, 2020). The nearest residential noise receptor is located at a distance of approximately 6 km [3.8 mi] west of the proposed CISF project area (ISP, 2020).

As described in EIS Section 4.8, the impacts to noise from full build-out (Phases 1-8) of the proposed CISF project would be SMALL. If only the proposed action (Phase 1) was constructed, operated, defueled, and decommissioned, the impacts would also be SMALL. Noise impacts associated with construction are from (i) heavy equipment and machinery use; (ii) construction of new buildings and infrastructure; and (iii) additional vehicle traffic. As described in EIS Section 4.8, the nearest residence is located approximately 6 km [3.8 mi] from the proposed CISF project area and because of dissipation of sound with distance from the source, residents are not expected to perceive an increase in noise levels because of construction activities. Proposed and recommended mitigation measures, such as keeping sound-abatement controls on operating equipment in proper working condition and using hearing protection in work areas, would ensure that noise levels remain within OSHA guidelines for workers. Because of existing heavy truck traffic on State Highway 176, the incremental increase in construction-related noise because of truck traffic on this road is not expected to be noticeable. During operations, the main project-related noises are associated with the transfer of the casks and include noise from delivery trucks and rail cars and operation of cranes and loading equipment (EIS Section 4.8.1.2). Noise levels to onsite and offsite receptors would be less than during the construction phase and would be mitigated by keeping sound-abatement controls on operating equipment in proper working condition and adherence to OSHA regulatory limits for noise to workers. Train traffic associated with SNF shipments would be infrequent and result in only short-term noise, and traffic noise from commuting workers would not noticeably increase noise levels to sensitive receptors along local highways. After the license term ends, for either the proposed action (Phase 1) or full build-out (Phases 1-8), the proposed CISF project area would be decommissioned such that the area would be released for unrestricted use, at which point all noise impacts would cease (EIS Section 4.8.1.3). It is expected that the greatest noise impacts would occur during the construction of the proposed action (Phase 1). Although there are no applicable noise restrictions in the area, OSHA standards limit noise exposure for employees within a facility.

Within the cumulative impact region described in EIS Section 5.1.1, other actions include oil and gas production and exploration, other mining (potash, caliche, and sand and gravel), nuclear-related activities, disposal and storage facilities for solid, hazardous, and LLRW, wind and solar energy projects, agriculture, and recreation. However, for the cumulative impact analysis of noise, only the ongoing and reasonably foreseeable actions related to oil and gas production and exploration, sand and gravel mining, nuclear-related activities, and disposal and storage facilities for solid, hazardous, and LLRW are considered because they occur within the cumulative impacts study area for noise.

Within 10 km [6.2 mi] of the proposed CISF project area, there are numerous oil and gas facilities in operation. As described in EIS Section 3.2.4, the Elliott Littman oil field is to the northwest, the Freund and Nelson oil fields are to the south, the Paddock South and Drinkard oil fields are to the southwest, and the Fullerton oil field is to the east. Expansion or development of future oil- and gas-related projects would have an impact on noise resources in the area because of increased vehicle traffic, heavy equipment use, and construction and maintenance of project facilities and infrastructure (e.g., roads, drill pads, oil pump jacks, pipelines, electric lines, processing sites, and associated ancillary facilities). The NRC staff anticipates that the noise impacts of past, present, and reasonably foreseeable future oil and gas production would last over the license term and have the potential to contribute to the ambient noise (i.e., background noise) of the area. The largest temporary impacts to noise would be associated with the facilities construction, especially if construction activities of one facility overlap with those of another, or with the construction of either the proposed action (Phase 1) or the full build-out (Phases 1-8). However, OSHA standards would limit the amount of noise generated from these sites.

The Permian Basin Materials sand and gravel quarry is located about 2 km [1.2 mi] west of the proposed CISF project area (EIS Figure 3.1-1) and also has a ready-mix cement facility (EIS Section 5.1.1.9). As described in EIS Section 3.8, operating equipment at Permian Basin Materials consists of front-end loaders, conveyers, ready-mix concrete plant, and heavy-haul truck traffic (Permian Basin Materials, 2019). As further described in EIS Section 4.8.1.1, the use of heavy equipment can generate noise levels up to 120 decibels (dBA) and excavation and earthmoving activities and large trucks typically generate noise levels ranging from 80-95 dBA at approximately 15 m [50 ft]. The NRC staff anticipates that present and future noise impacts from Permian Basin Materials would last over the license term and would contribute to the ambient (i.e., background noise) of the area.

As described in EIS Section 5.1.1.2, NEF is located approximately 2.4 km [1.5] mi west of the proposed CISF project area (EIS Figure 3.1-1). Noise-generating activities at NEF consist predominantly of commuter and truck traffic (EIS Section 3.8). As further described in EIS Section 5.1.1.2, Eden has stated its intent to build and operate a medical isotopes production facility directly west of the existing Lea County Landfill and anticipates beginning construction in early 2022 and production in late 2024, depending on when and whether the NRC would issue a license. Like NEF, noise generating activities at Eden would consist predominantly of commuter and truck traffic. The NRC staff anticipates that present and future noise impacts from NEF and the proposed Eden facility would last over the license term and would contribute to the ambient (i.e., background noise) of the area.

As discussed in EIS Section 5.1.1, disposal and storage facilities for solid, hazardous, and LLRW within the cumulative impacts study area for noise include WCS's existing hazardous and LLRW disposal facilities, Sundance Services oilfield waste disposal facility, and the Lea County Sanitary Waste Landfill (EIS Figure 3.1-1). Noise-generating activities at WCS's existing hazardous and LLRW waste disposal facilities include commuter and truck traffic; operating equipment (e.g., cranes, canister transport vehicles, and heavy haul truck traffic); and rail and tractor-trailer traffic associated with waste shipments. Operations at Sundance Services consists predominantly of heavy-haul truck traffic and roll-off and container services (Sundance Services, Inc., 2019c). Noise-generating activities associated with the Lea County Sanitary Waste Landfill include heavy-truck traffic on State Highway 176 and heavy equipment operation (e.g., front end loaders and graders). As described in EIS Section 5.1.1.9, reasonably foreseeable future waste disposal facilities within the cumulative impacts study area for noise include Sprint Andrews County Disposal, Sundance West, and CK Disposal. Sprint Andrews County Disposal would store, treat, reclaim, and dispose of nonhazardous oil and gas waste. Sundance West would replace the older Sundance Services facility and would include a liquid oil field waste processing area and an oil field waste landfill. CK Disposal would be a surface waste disposal facility consisting of a landfill, liquid processing area, and deep injection well. The NRC staff anticipates that present and future noise impacts from WCS's existing and reasonably foreseeable future disposal facilities for solid, hazardous, and LLRW would last over the license term and would contribute to the ambient (i.e., background noise) of the area.

The NRC staff has determined that the cumulative impacts to noise resources within the cumulative noise impact study area resulting from all past, present, and foreseeable future actions would be MODERATE. This finding is based on the assessment of existing and potential impact on noise within the noise impact study area from existing and future oil and gas exploration, production, and development activities, sand and gravel mining, nuclear-related activities, and activities at disposal and storage facilities for solid, hazardous, and LLRW.

Summary

Noise impacts from the proposed action (Phase 1) and full build-out (Phases 1-8) of the proposed CISF are expected to be dominated by construction noise from (i) heavy equipment and machinery use, (ii) construction of new buildings and infrastructure, and (iii) additional vehicle traffic. The nearest residence is located approximately 6 km [3.8 mi] from the proposed CISF project area and due to dissipation of sound with distance from the source, residents are not expected to perceive an increase in noise levels because of construction activities. Because of existing heavy truck traffic on State Highway 176, the incremental increase in construction-related noise because of truck traffic on this road is not expected to be noticeable. Proposed and recommended mitigation measures, such as keeping sound-abatement controls on operating equipment in proper working condition and using hearing protection in work areas, would ensure that noise levels remain within OSHA guidelines for workers (EIS Section 4.8). At the end of the license term, noise impacts from the proposed CISF would cease after the decommissioning of the facility. Therefore, the NRC staff concludes that at full build-out (Phases 1-8), the proposed CISF project would add a SMALL incremental effect to the already existing MODERATE impacts to noise from other past, present, and reasonably foreseeable future actions in the geographic scope of the analysis, resulting in an overall MODERATE cumulative impact in the geographic area evaluated for noise.

5.9 Historic and Cultural Resources

Cumulative impacts on historic and cultural resources were assessed within a geographic radius of influence that extends 16 km [10 mi] around the proposed ISP CISF project. The study area covers a larger spatial extent than either the direct or indirect area of potential effects (APE) in order to evaluate activities outside the proposed project area. The assessment of cumulative impacts on historic and cultural resources beyond 16 km [10 mi] was not undertaken, because at that distance, the impacts on historic and cultural resources from the proposed CISF on other past, present, and reasonably foreseeable future actions would be minimal. The timeframe for this analysis is 2017 to 2060, based on the estimated period of construction and operation of the proposed project.

Most of the cumulative impacts on historic and cultural resources in the study area result from mineral mining, other nuclear facilities, oil and gas development, and solar and wind projects, which are expected to continue at the same or increased intensity for the foreseeable future. Potential impacts to cultural and historic resources could also result from increased land area access and surface-disturbing activities associated with new projects in the study area. Impacts from these activities would result primarily from the loss of or damage to historic, cultural, and archaeological resources; temporary restrictions on access to these resources; or erosion and destabilization of land surfaces. As new developments start, the NRC staff anticipates that activities associated with surface-disturbing activities would be surveyed for historic and cultural resources, as appropriate. Given the Federal regulations involved with energy generation and transmission projects, it is likely that most mining, nuclear, oil and gas, and other energy developments would be subject to appropriate historic and cultural resource preservation requirements. For example, if these projects will affect historic and cultural resources, it is anticipated that measures to avoid, minimize, or mitigate the impacts would be developed and implemented. Additionally, the reliance on Federal and State regulations would ensure protection of cultural and historical resources. Therefore, the NRC staff concludes that historic and cultural resources would not be adversely affected by other past, present, and reasonably foreseeable future nuclear facilities, mining projects, and oil and gas operations.

As discussed in EIS Section 4.9, no historic or cultural resources were identified within the direct APE, which accounted for approximately 133.4 ha [330 ac] of the total proposed project area. The direct APE includes the area that would receive the most land disturbance (i.e., all of the protected area and a portion of the OCA). Therefore, the NRC staff concludes that the proposed action (Phase 1) would not affect cultural and historic resources, and impacts would be SMALL. For Phases 2-8, the proposed CISF project would be similar to the proposed action (Phase 1) in that there are no historic or cultural resources identified. Because no historic or cultural resources have been identified in the direct APE, the NRC staff concludes that the proposed project (Phase 1) and Phases 2-8 would not affect historic and cultural resources, and impacts would be SMALL.

Although no historic or cultural resources were identified, ISP has committed to implement an inadvertent discovery plan to manage ISP's activities in the event of a discovery of human remains or other items of archeological significance during any phase of the project (ISP, 2020). The inadvertent discovery plan would include cessation of any work upon the inadvertent discovery of cultural resources and contacting the Texas State Historic Preservation Officer (SHPO) to determine the appropriate measures to identify, evaluate, and treat the discovery. ISP also committed to locating water supply and natural gas lines along existing roadway to avoid additional surface disturbance.

Summary

Because of the lack of historic or cultural resources within the direct APE and ISP's commitment to an inadvertent discovery plan, the NRC staff concludes that full build-out (Phases 1-8) of the NRC-licensed facility would not affect historic properties. Because of the reliance on Federal and State regulations to ensure protection of cultural and historical resources, historic properties would not be affected by past, present and reasonably foreseeable future projects. Therefore, the NRC staff concludes that the proposed project would add a SMALL incremental impact when added to the SMALL impact on historic and cultural resources from all other past, present, and reasonably foreseeable future actions, which would result in a SMALL overall cumulative impact to historic and cultural resources.

5.10 Visual and Scenic Resources

The NRC staff assessed cumulative impacts to visual and scenic resources within a 10-km [6-mi] radius of the proposed project area. The timeframe for the analysis is from 2017 to 2060, as described in EIS Section 5.1.2. Cumulative visual and scenic impacts outside of a 10-km [6-mi] radius of the proposed project area were not evaluated because, at that distance, visual and scenic resources would not be anticipated to influence or be influenced by the proposed CISF project. Visual and scenic resources in the vicinity of the proposed project area, as described in EIS Section 3.10, are classified as Class IV by the BLM Visual Resource Management (VRM) evaluation (BLM, 1986). Class IV land can have high characteristic changes to the landscape, and those changes are allowed to dominate the view and be the major focus of viewer attention.

As described in EIS Section 3.10, the area surrounding the proposed CISF project area is primarily classified as rangeland used for cattle grazing. Modifications to the landscape surrounding the proposed project area include oil and gas production facilities and infrastructure (pump jacks), transportation infrastructure (paved highways and caliche service roads), an electric power substation, electric transmission lines, a rail line, and agricultural infrastructure (fences and windmills). Industrial development within 3 km [1.8 mi] of the proposed CISF project area includes a sand and gravel quarry (Permian Basin Materials), a uranium enrichment plant (NEF), a county landfill (Lea County Sanitary Waste Landfill), hazardous and LLRW disposal facilities (WCS), and oilfield waste disposal facilities (Sundance Services) (EIS Section 3.2 and EIS Figure 3.1-1).

As described in EIS Section 4.10, the impacts to visual and scenic resources from full build-out (Phases 1-8) of the proposed CISF project would be SMALL. If only the proposed action (Phase 1) was constructed, operated, and decommissioned, the impacts would also be SMALL. Visual impacts related to facilities construction and operation for the proposed CISF would include SNF storage pads and systems, the cask-handling building, the security and administration building, and a rail sidetrack (EIS Section 4.10.1). Considering that there are no regional or local high-quality viewing areas and considering existing man-made structures near the project area (e.g., pump jacks, above-ground tanks, high power lines, and industrial buildings), the obstruction of existing views because of the proposed CISF structures would be similar to current conditions (EIS Section 4.10.1). In addition, considering existing structures associated with nearby industrial properties and activities (e.g., the Permian Basin Materials quarry, the WCS LLRW disposal facilities, the Lea County Landfill, NEF, and Sundance Services), the proposed CISF structures would be no more intrusive than those already existing in the area. Furthermore, as described in EIS Section 4.7 (Air Quality Impacts), standard dust-control measures (e.g., water application) would be implemented to reduce visual impacts from fugitive dust during construction and operations. After the license term ends, for either the proposed action (Phase 1) or full build-out (Phases 1-8), the proposed CISF project area would be decommissioned such that the area would be released for unrestricted use.

Within the larger cumulative impact study area described in EIS Section 5.1.1, other actions include oil and gas production and exploration, other mining (potash, caliche, and sand and gravel), nuclear-related activities, disposal and storage facilities for solid, hazardous, and LLRW, and wind and solar energy projects. However, within the visual and scenic resources study area {10 km [6.2 mi]}, only the ongoing and reasonably foreseeable actions related to oil and gas production and exploration, sand and gravel mining, nuclear-related activities, and disposal and storage facilities for solid, hazardous, and LLRW are considered because they occur within the cumulative impacts study area for visual and scenic impacts.

Within 10 km [6.2 mi] of the proposed CISF project area, there are numerous oil and gas facilities in operation that impact the visual landscape. As described in EIS Section 3.2.4, the Elliott Littman oil field is to the northwest, the Freund and Nelson oil fields are to the south, the Paddock South and Drinkard oil fields are to the southwest, and the Fullerton oil field is to the east. In addition, mining operations and facilities at the Permian Basin Materials sand and gravel quarry located 2 km [1.2 mi] west of the proposed CISF also has an impact on the visual landscape. Expansion or development of future oil- and gas-related projects and sand and gravel quarrying operations would have an additional impact on the visual and scenic resources of the area because of increased vehicle traffic, land disturbances, landscape changes, heavy equipment use, and construction and maintenance of project facilities and infrastructure (e.g., roads, pipelines, electric lines, industrial sites, and associated ancillary facilities). The NRC staff anticipates that the visual and scenic impacts of past, present, and reasonably foreseeable future oil and gas production and sand and gravel mining would last for the license term of the proposed project with the potential to notably change the characteristics of the landscape and become a major focus of viewer attention. These changes would be consistent with the BLM VRM Class IV classification for the area.

Within the cumulative impacts study area for visual and scenic resources, nuclear-related facilities and disposal and storage facilities for solid, hazardous, and LLRW have an impact on the visual landscape. These facilities include NEF, WCS's existing hazardous and LLRW disposal facilities, Sundance Services oilfield waste disposal facility, and the Lea County Sanitary Waste Landfill (EIS Figure 3.1-1). As described in EIS Section 5.1.1, reasonably foreseeable future nuclear-related and waste disposal facilities that have been proposed within the cumulative impact study area for visual and scenic resources include Eden (a medical isotopes production facility), Sprint Andrews County Disposal (a nonhazardous oil and gas waste storage, treatment, and disposal facility), Sundance West (a liquid oil field waste processing and landfill facility), and CK Disposal (a surface waste disposal facility consisting of a landfill, liquid processing area, and deep injection well). Expansion or development of future nuclear-related and disposal and storage facilities would have an additional impact on the visual and scenic resources of the area because of increased vehicle traffic, land disturbances, heavy equipment use, and construction of project facilities and infrastructure (e.g., roads and electric lines). The NRC staff anticipates that the visual and scenic impacts of existing and reasonably foreseeable future nuclear-related and disposal and storage facilities for solid, hazardous, and radioactive waste would last for the license term of the proposed project with the potential to notably change the characteristics of the landscape and become a major focus of viewer attention. These changes would be consistent with the BLM VRM Class IV classification for the area.

The NRC staff has determined that the cumulative impacts to visual and scenic resources within the cumulative scenic resources impact study area resulting from all past, present, and foreseeable future actions would be MODERATE. This finding is based on the assessment of existing and potential future impact on visual and scenic resources from existing and future oil and gas exploration, production, and development, sand and gravel mining, nuclear-related facilities, and disposal and storage facilities for solid, hazardous, and LLRW. Any changes to the visual landscape resulting from these existing and reasonably foreseeable future actions would be consistent with the BLM VRM Class IV classification for the area.

Summary

Because of the BLM VRM Class IV classification, the absence of regional or local high-quality viewing area, and the return of the land to unrestricted use after the decommissioning of the facility at the end of the license term, the NRC staff concludes that at full build-out (Phases 1-8), the proposed CISF project would add a SMALL incremental effect to the already existing MODERATE impacts to visual and scenic resources from other past, present, and reasonably foreseeable future actions in the geographic scope of the analysis resulting in an overall MODERATE cumulative impact in the visual and scenic resources geographic area.

5.11 Socioeconomics

The region of influence (ROI) for socioeconomics is the 3-county area described in EIS Chapters 3 and 4, including Andrews and Gaines counties in Texas, and Lea County, New Mexico. The timeframe for this analysis is from 2017 to 2060. As described in EIS Section 4.11.1, the NRC staff determined that construction (full build-out, Phases 1-8) of the proposed CISF project would have a small impact on employment, local finances, housing, school enrollment, and utilities and public services during the construction and decommissioning phases, and a moderate impact on population. NRC staff determined that operation (full build-out, Phases 1-8) of the proposed CISF project would have a small impact on population, housing, school enrollment, and utilities and public services during the operation phase, and a moderate impact on local finances. If only the proposed action (Phase 1) was constructed and operated, the socioeconomic impacts would be the similar to the impacts from full build-out (Phases 1-8) of the proposed CISF project because the peak number of annual workers would be directly employed at the CISF during Phase 1 (EIS Section 4.11.1.1).

As stated in EIS Section 4.11.1.1, impacts to socioeconomic and community services are primarily associated with workers who might move into an area and tax revenues that they would generate, which would influence resources availability for the community. Because of the rapid rise and fall of populations in response to the oil and gas industry boom and bust cycles since the 1920s, population centers in the region have expanded to accommodate greater populations over that time period (EIS Section 3.11.1.1). For example, historical population data demonstrate that the population of Lea County alone rose by 15,000 people in less than 10 years between 1970 and the early 1980s, and then declined by approximately 10,000 people over a 5-year period between the mid-1980s and 1990 (Rhatigan, 2015). These previous population changes have noticeably affected the socioeconomic ROI.

If the reasonably foreseeable future actions described in EIS Section 5.1.1 go forward and become functional within the geographic scope of the socioeconomic analysis, workers would be needed to build and operate these facilities. The reasonably foreseeable future actions described in EIS Section 5.1.1 within the socioeconomic scope of analysis include agriculture, oil and gas exploration, potash mining, waste disposal, energy related projects (nuclear facilities, wind, and solar), recreational, and housing development. Regarding work force, these projects would be anticipated to influence or be influenced by construction and operation of the proposed CISF. It is likely that any additional workers that would be hired as a result of reasonably foreseeable future actions would desire to live closer to their places of employment and become active in their communities. Therefore, the NRC staff anticipates that the communities of Hobbs, New Mexico, and Andrews and Seminole, Texas, would experience the largest growth in the future because of commercial presence, housing availability, and location of major transportation routes in those communities. Therefore, the NRC staff concludes that at full build-out (Phases 1-8), the proposed CISF would add a SMALL incremental effect for employment, housing, and public services, a SMALL to MODERATE impact on population, and a SMALL to MODERATE (and beneficial) incremental impact for local finance to the MODERATE impacts to socioeconomic resources from other past, present, and reasonably foreseeable future actions in the ROI, resulting in an overall SMALL to MODERATE cumulative impact in the socioeconomic ROI.

5.12 Environmental Justice

The NRC staff assessed cumulative impacts on environmental justice within a geographic scope of analysis of an 80-km [50-mi] radius of the proposed project area, comprising 109 block groups. The timeframe for the analysis of cumulative impacts is 2017 to 2060.

Adverse health effects are measured in terms of the risk and rate of fatal or nonfatal adverse impacts on human health. Disproportionately high and adverse human health effects occur when the risk or rate of exposure to an environmental hazard for a minority or low-income population is significant and exceeds the risk or exposure rate for the general population or for another appropriate comparison group. Disproportionately high environmental effects refer to impacts or risk of impact on the natural or physical environment in a minority or low-income community that are significant and appreciably exceed the environmental impact on the larger community. Such effects may include biological, cultural, economic, or social impacts, and these potential effects have been evaluated in resource areas presented in Chapter 4 of this EIS. Minority and low-income populations in the geographic scope of analysis for environmental justice are subsets of the general public residing in the area, all of whom would be exposed to the same hazards generated from the proposed CISF and reasonably foreseeable future actions.

As explained in detail in EIS Sections 3.11 and 4.12, 66 percent of the 109 block groups within 80 km [50 mi] of the proposed CISF project have potentially affected minority populations; 3.7 percent of the block groups have potentially affected low-income families; and 5.5 percent of the 109 block groups also have potentially affected low-income individuals. As described in EIS Section 4.12.1, after reviewing the information presented in the license application and associated documentation, considering the information presented throughout Chapters 1 through 4 of this EIS, and considering any special pathways through which potentially affected environmental justice populations could be more affected or affected differently from other segments of the general population, the NRC staff did not identify any disproportionately high and adverse human health or environmental impacts on any potentially affected environmental justice populations from full build-out of the proposed CISF. If the proposed action (Phase 1) were constructed and operated, there would be no disproportionately high and adverse impacts on any potentially affected environmental justice populations. The same minority and low-income populations would be affected from full build-out (Phases 1-8); thus, there would also be no disproportionately high and adverse impacts on any potentially affected environmental justice populations from full build-out (Phases 1-8).

Past, present, and reasonably foreseeable future actions described in EIS Section 5.1.1 could potentially contribute to cumulative disproportionately high and adverse human health or environmental effects within 80 km [50 mi] of the proposed CISF project. In this geographic scope, there are three other nuclear-related projects currently licensed and operating (WCS LLRW facility, WIPP, and NEF), one licensed but not yet operating facility (FEP/DUP), one proposed (Eden), and one undergoing review (the Holtec CISF). These facilities have undergone license reviews and are required to meet Federal and State environmental and safety regulations As described more fully in EIS Section 5.13, the NRC staff found that, because of the distance of nuclear-related projects from the proposed CISF project, these projects would not add to the radiation in the immediate vicinity of the proposed CISF project area. However, it is possible that an individual that routinely spends time at different locations within the region could be exposed to low levels of radiation from more than one facility over the course of a year. If the proposed second CISF {in Lea County, New Mexico, within 80 km [50 mi] of ISP's proposed CISF} is licensed, constructed, and operated, it could have site-specific impacts on environmental justice. Those impacts are being evaluated in a separate NRC licensing review, but, in general, are expected to have impacts similar to the proposed action evaluated in this EIS if the location has a similar population distribution and similar socioeconomic characteristics.

As described in EIS Section 5.1.1.1, the Permian Basin is the focus of extensive exploration, leasing, development, and production of oil and gas. Potash mining is also a major part of the Eddy and Lea County economies. The NRC staff assumes that the administrative controls New Mexico State Land Office, New Mexico Oil Conservation Division, and BLM implemented would ensure that oil and gas development activities and potash mining activities within 80 km [50 mi] of the proposed CISF project are monitored and regulated. There are six operating solar power facilities and two under development in the region of the proposed CISF project area (EIS Section 5.1.1.5). There are currently three operational wind projects located in the region of the proposed project area and one under development. In addition, new transmission lines and related facilities through portions of New Mexico and Texas are planned. Development of wind energy projects are associated with long-term disturbances such as access roads, support facilities, and tower foundations (BLM, 2011). Therefore, the NRC staff anticipates that all of these facilities would continue to operate according to their Federal and State license and permitting requirements and would not have a disproportionately high and adverse effect on minority or low-income populations compared to other segments of the general population. Other existing and reasonably foreseeable future actions such as livestock grazing, land development, and recreational projects are not expected to contribute to cumulative disproportionately high and adverse human health or environmental effects.

While certain Tribal groups have expressed a heightened interest in cultural resources potentially affected by the proposed project and other nuclear facilities in the geographic region of analysis for environmental justice, the impacts to Indian Tribes would not be disproportionately high or adverse, because there are no Tribal lands and no potentially affected American Indian populations in the region. ISP would follow inadvertent discovery procedures regarding the discovery of previously undocumented human remains or other items of archeological significance during the project lifetime (EIS Section 5.9) (ISP, 2020). These procedures would entail the stoppage of work and the notification of appropriate parties (Federal, Tribal, and State agencies).

The NRC staff determined in the Public and Occupational Health and Safety sections of this EIS (EIS Sections 3.12 and 4.13) that the level of potential nonradiological impacts and radiological doses to the public from both the proposed action and full build-out (Phases 1-8) would be within NRC regulatory limits and applicable Federal, State, and local regulatory limits. ISP's safety evaluation of accident events described in EIS Section 4.15 concluded that the proposed CISF would not exceed applicable 10 CFR Part 20 and 72.106(b) dose limits to individuals at or beyond the controlled area boundary and satisfies applicable acceptance criteria for maintaining safe operations regarding criticality, confinement, retrievability, and instruments and control systems (ISP, 2018). Different segments of the population, including minority or low-income populations, would not be affected differently by accident events. In addition, accident events do not yield any pathways that could lead to adverse impacts on human health to minority or low-income populations. Based on this analysis, the NRC staff determined that there would be no disproportionately high and adverse impacts on any environmental justice populations from the proposed CISF project and that there would most likely be no disproportionately high and adverse impacts on environmental justice communities from any past, present, or reasonably foreseeable future projects within 80 km [50 mi] of the proposed CISF.

Summary

In summary, the environmental justice cumulative impact analysis assesses the potential for disproportionately high and adverse human health and environmental effects on minority and low-income populations that could result from past, present, and reasonably foreseeable future actions, including construction, operation, and decommissioning of the proposed CISF for both Phase 1 (the proposed action) and at full build-out (Phases 1-8). The NRC staff finds that the impacts from the proposed CISF on the resources evaluated in this EIS would be SMALL for most resources and SMALL to MODERATE for ecological resources, and in some cases population, and local finances. Furthermore, the NRC staff did not identify any high and adverse human health or environmental impacts from the past, present, or reasonably foreseeable future actions in the geographic region of analysis {80 km [50 mi]} on minority and low-income populations and concludes in EIS Section 4.12 that there would be no disproportionately high and adverse impacts on any environmental justice populations as a result of the proposed CISF. Therefore, the NRC staff finds that cumulative impacts would not be considered disproportionately high and adverse on low-income or minority populations.

5.13 Public and Occupational Health

The geographic scope of the analysis for public and occupational health were evaluated within an 80-km [50-mi] radius of the proposed CISF project. This distance was chosen to be inclusive of areas in the region where other nuclear facilities that work with radioactive materials are located. This is a conservative approach (that is, it is expected to overestimate typical impacts) because the distances between the existing facilities are sufficient to limit cumulative exposures to radiation from operations of each facility unless the exposed individual moves from one facility to another. This approach is reasonable because it is possible for an individual to live, work, and spend additional time near separate facilities. The timeframe for the analysis is 2017 to 2060.

The public and occupational health impacts from the proposed CISF Project would be SMALL and are discussed in detail in EIS Section 4.13.1. The potential exposure pathways at the proposed CISF include direct exposure to radiation emitted from the storage casks. During normal activities associated with all phases and stages of the project lifecycle, radiological and nonradiological worker and public health and safety impacts would be SMALL. Annual radiological doses to workers and the most highly exposed nearest residents from the proposed CISF project would be below applicable NRC regulations. For the full build-out (Phases 1-8) of the proposed CISF, ISP estimated an annual dose of 0.07 mSv [7 mrem] to a hypothetical individual who spends 8,860 hours at the proposed controlled area boundary at 1,006 m [3,300 ft] from the proposed CISF (ISP, 2020). Doses to individuals located a greater distance from the proposed CISF project or who spend less than 8,860 hours at the boundary would be smaller. Occupational exposures would not exceed the NRC dose limit for workers, and therefore the radiological impacts to workers would be SMALL. Nonradiological impacts to public and occupational health include impacts associated with typical construction work and would also be SMALL.

Past, present, and reasonably foreseeable nuclear materials facilities within the region of the proposed CISF project are described in EIS Section 5.1.1. Within an 80-km [50-mi] radius of the proposed CISF project, there are several nuclear materials facilities that are described in EIS Section 5.1.1 and Section 3.12.1.2, including WIPP, NEF, FEP/DUP, Eden, and the co-located WCS facilities. Eden anticipates beginning construction in early 2022; however, at this time, evaluating public and occupational impacts from this facility would be speculative. Because of the distances from the proposed CISF project, the NRC staff considers that these projects (except for the co-located WCS facility) would not add to the radiation in the immediate vicinity {e.g., within 1 km [0.6 mi]} of the proposed project area. However, it is possible that an individual who routinely spends time at different locations within the region could be exposed to low levels of radiation from more than one facility over the course of a year.

EIS Section 3.12.1.2 summarizes available information documenting public dose estimates at the boundary of each of the other nuclear materials facilities that include 1.04×10^{-06} mSv [1.04×10^{-04} mrem] for WIPP (DOE, 2018b), 0.019 mSv [19 mrem] for NEF (NRC, 2005), 0.21 mSv [20.8 mrem] for FEP/DUP (NRC, 2012b), and 0.027 mSv [2.7 mrem] for WCS (WCS, 2015). Additionally, Holtec is seeking an NRC license to construct another CISF project in Lea County, New Mexico, that would be larger than the proposed ISP CISF and therefore would have higher public-dose impacts relative to the proposed CISF. Holtec estimated the public dose from their proposed CISF would be 0.122 mSv [12.2 mrem] (Holtec, 2019). Because these facilities are dispersed throughout the region, it would be unlikely for any individual to receive the full annual estimated dose from all of these facilities of 0.55 mSv [55 mrem], and therefore actual public doses would be a fraction of this total dose. Based on this analysis, the cumulative public dose to an individual from potential exposures to all of the other regional facilities, for context, would be below the NRC 10 CFR Part 20 annual public dose limit of 1 mSv [100 mrem] and have a negligible contribution to the 6.2 mSv [620 mrem] background radiation dose described in EIS Section 3.12.1.1. Therefore, the NRC staff concludes that the potential cumulative public dose impacts from the other past, present, and reasonably foreseeable future actions would be SMALL.

Summary

As described in the preceding analysis, the estimates of combined radiological exposures from currently operating and proposed future facilities in the geographic scope of the analysis, for context, are well below the regulatory public dose limit of 1.0 mSv/yr [100 mrem/yr] and have a negligible contribution to the 6.2 mSv [620 mrem] average yearly background dose for a member of the public from all sources. Adding the aforementioned public dose from the proposed ISP CISF project at full build-out (Phases 1-8) of 0.07 mSv [7 mrem] to the preceding estimated dose from other past, present, and reasonably foreseeable future actions would not increase the estimated public dose above the NRC 10 CFR Part 20 annual public dose limit of 1 mSv [100 mrem]. Therefore, the NRC staff concludes that at full build-out (Phases 1-8), the proposed CISF would add a SMALL incremental effect to the SMALL impacts to public and occupational health from other past, present, and reasonably foreseeable future actions in the geographic scope of the analysis, resulting in an overall SMALL cumulative impact in the public and occupational health geographic area.

5.14 <u>Waste Management</u>

This section evaluates the proposed CISF project effects on the capacity and operating lifespan of waste-management facilities when added to the aggregate effects of other past, present, and reasonably foreseeable future actions. The NRC staff assessed cumulative impacts for waste management resources within a geographic scope of analysis of an 80-km [50-mi] radius around the proposed project area. This geographic scope includes the projects and activities discussed in EIS Section 5.1.1 that are anticipated to dispose waste at the same waste facilities as those EIS Sections 3.13 and 4.14 identified, or other nearby facilities. The timeframe for the analysis of cumulative impacts is 2017 to 2060, as described in EIS Section 5.1.2.

As discussed in EIS Section 4.14.1, based on the types of activities and limited volumes of hazardous, nonhazardous, and sanitary waste generated during the construction, operation, and decommissioning stages for both the proposed action (Phase 1) and full build-out (Phases 1-8), and the capacity of waste management facilities (i.e., disposal sites discussed in EIS Section 4.14.1) to dispose of the waste volumes generated during these stages, the NRC staff considers the impacts to waste management facilities to be SMALL. As discussed in EIS Section 4.14.1, because small quantities of LLRW (e.g., cloth wipes, paper towels, protective clothing, and used HEPA filters) generated as a result of health physics-related activities during operations and decommissioning would be limited and represent a small fraction of the remaining available capacity of the WCS LLRW disposal facility, the NRC staff determined that the impact to waste management resources from LLRW would be SMALL. As discussed in EIS Section 4.14.1, decommissioning for both the proposed action (Phase 1) and full build-out (Phases 1-8) does not include significant demolition activities and would only produce limited volumes of nonhazardous waste; therefore, the NRC staff determined that the impacts to waste management resources from nonhazardous waste produced as a result of decommissioning of the proposed action (Phase 1) and for full build-out (Phases 1-8) would also be SMALL. As discussed in EIS Sections 3.13.2 and 4.14.1, the duration of the proposed CISF project would exceed the operational life of the landfill ISP cited (ISP, 2020); however, because of the limited nonhazardous waste produced, as a result of decommissioning, and the minor fraction of a typical landfill's capacity that this waste volume would represent, the NRC staff expects that disposal capacity for nonhazardous solid waste would be available to meet future demands at the time when decommissioning would occur.

Past, present, and reasonably foreseeable actions within the region of the proposed CISF project are described in EIS Section 5.1.1. Activities within this area that could contribute additional impacts to waste management resources during the timeframe for the analysis of cumulative impacts include current and potential nuclear facilities; solar, wind, and other generation projects; housing developments; potash mining; agriculture; recreational activities; and extensive exploration, leasing, development, and production of oil and gas. As discussed in EIS Section 5.1.1.5, there are six operating solar power facilities and two under development in the region of the proposed CISF project area. There are currently three operational wind projects located in the region of the proposed CISF, and one under development. Because existing power-generation facilities are already constructed and operating, are passive systems, and require minimal maintenance, the NRC staff anticipates that the waste streams (i.e., nonhazardous, hazardous, and sanitary wastes) generated from these facilities would be minor. Because future power-generation projects would have to comply with Federal and State guidelines for waste management and would not typically involve a significant influx of workers or involve activities such as demolition that would produce significant quantities of waste, the NRC staff anticipates that waste streams (i.e., nonhazardous, hazardous, and sanitary wastes) resulting from future power-generation projects described in EIS Section 5.1.1.5 would also not have an adverse effect on waste management resources. Recreational activities and housing development are ongoing in the region of the proposed CISF. Because these activities produce minimal waste (nonhazardous, hazardous, and sanitary) that existing regional landfill throughput currently adequately handles, the NRC staff anticipates that these activities would continue to have a minor impact to waste management resources. The oil and gas industry operating within the geographic scope currently produces waste streams, is expected to produce waste streams as a result of ongoing operations, and would continue to dispose wastes at facilities within and outside the region of the proposed CISF. Future oil and gas development would also produce hazardous waste, nonhazardous waste, and sanitary waste. Currently, the oil and gas industry disposes hazardous and nonhazardous oilfield waste using several currently available specialized waste disposal facilities (e.g., those described in EIS Section 5.1.1.9) in the region of the proposed CISF, the NRC staff assumes that any waste streams produced as a result of ongoing and future oil and gas activity would continue to be appropriately disposed and not have a significant or adverse effect on existing or future waste management resources.

Similarly, agriculture and the mining industry currently operate within the region of the proposed CISF. Because mining activities are ongoing, subject to regulation, and produce typical mine waste (e.g., tailings or process water) that would be disposed using approved methods for these facilities (e.g., surface storage impoundments and underground backfilling), the NRC staff expects that continuing or future mining activities would not have a significant or adverse effect on waste management resources in the region of the proposed CISF. Agricultural activity is ongoing in the region of the proposed CISF and produces typical agricultural waste (e.g., manure, silage and horticultural plastics, and wood waste) as well as limited volumes of hazardous waste (e.g., oil or unused fertilizer) from farming. Based on the number of existing and planned waste disposal facilities discussed in EIS Section 5.1.1.9, available existing landfill and waste management capacity for hazardous and nonhazardous waste, and additional onsite disposal methods for nonhazardous waste that are typically used for farming operations (e.g., bioremediation or onsite disposal), the NRC staff expects that mining and agriculture activities would not have a significant or adverse effect on waste management resources in the region of the proposed CISF.

Most of the activities described in EIS Section 5.1.1 produce limited volumes of sanitary waste from onsite workforces. Because sanitary wastewater produced as a result of activities within the region of the proposed CISF project area would be managed using typical best practices (e.g., collected from temporary facilities and disposed at a publicly owned sanitary waste water treatment facility, or disposed using existing onsite disposal in accordance with Federal and State guidelines), the NRC staff does not anticipate a significant or adverse effect on sanitary waste management resources from any of the activities in the cumulative impacts geographic area.

Most of the facilities described in EIS Section 5.1.1 do not produce LLRW. However, as described in EIS Section 5.1.1.2, existing and future nuclear facilities within the region of the proposed CISF are expected to generate LLRW and include the co-located WCS facility, NEF, FEP/DUP, the WIPP facility, and a second proposed CISF. In NUREG–1790 and NUREG–2113, the NRC staff concluded that the impact of LLRW generated from the NEF and FEP/DUP on LLRW disposal facilities would be SMALL (NRC, 2005; 2012b). The WCS disposal facility is a minimal producer of LLRW and is already licensed to dispose LLRW. Because WIPP is a permanent disposal facility for TRU waste, with ongoing U.S. Department of Energy (DOE) operations since 1999, the NRC staff expects that it would continue to be a minimal producer of LLRW, and that LLRW generated as a result of ongoing activities would continue to be disposed at LLRW disposal facilities within and beyond the region of the proposed CISF. The second proposed CISF identified in EIS Section 5.1.1.4 would be more than twice the size of the proposed ISP CISF. However, because the second proposed CISF would have similar design and operational characteristics to the proposed ISP CISF, the NRC staff expects that the second proposed CISF would also produce a minor amount of LLRW, as analyzed for the proposed ISP CISF in EIS Section 4.14.1.

If the past and present actions described in EIS Section 5.1.1 continue, waste streams (e.g., nonhazardous, hazardous, sanitary, and LLRW) produced as a result of these ongoing activities would continue to be disposed at facilities within and beyond the region of the proposed CISF. As described in EIS Section 4.14, the existing landfill (i.e., the Lea County Solid Waste Authority landfill); the City of Andrews Wastewater Treatment Plant; and the WCS hazardous waste treatment, storage, and disposal facility have ample capacity for nonhazardous, sanitary, and hazardous waste management. Additionally, the WCS LLRW disposal facility and other licensed facilities are expected to have ample capacity to disposition the LLRW produced from nuclear facilities in the region of the proposed CISF project. Historically, private industry has met the demand for LLRW disposal capacity, and the NRC staff expects that this trend will continue. If future activities described in EIS Section 5.1.1 occur, based on the characteristics of these activities, the types and quantities of wastes produced that would be typical for these activities, and the existing and future capacity of waste management facilities to dispose of wastes in the region of the proposed CISF, the NRC staff does not anticipate that waste streams from future activities would have significant or adverse effects on future waste management resources. Based on the aforementioned characteristics of activities within the region of the proposed CISF project, the quantities of nonhazardous, hazardous, LLRW, and sanitary waste generated as a result of these activities, and the capacity for waste management in the area, the NRC staff determined that the cumulative impacts in the geographic scope of the analysis are minor.

Based on the preceding assessment, the NRC staff has determined that the cumulative impacts on waste management facilities in the geographic scope of the analysis resulting from other past, present, and reasonably foreseeable future actions would be SMALL. The negligible quantities of hazardous, nonhazardous, LLRW, and sanitary waste that would be produced from construction, operation, and decommissioning of both the proposed action (Phase 1) and full build-out (Phases 1-8) would not significantly add to the quantities of wastes generated by the past, present, and reasonably foreseeable future actions in the geographic area of analysis.

Thus, the NRC staff concludes that the SMALL impacts from proposed action (Phase 1) and full build-out (Phases 1-8) on waste management resources within the geographic scope of analysis, when added to the SMALL cumulative impacts on waste management resources resulting from other past, present, and reasonably foreseeable future actions, would result in an overall SMALL cumulative impact to waste management resources.

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6 MITIGATION

6.1 Introduction

This chapter summarizes mitigation measures that would reduce adverse impacts from the construction, operation, and decommissioning of the proposed consolidated interim storage facility (CISF) project.

Under Title 40 of the *Code of Federal Regulations* (40 CFR) 1508.20, the Council on Environmental Quality defines mitigation to include activities that

- avoid the impact altogether by not taking a certain action or parts of a certain action;
- minimize impacts by limiting the degree or magnitude of the action and its implementation;
- rectify the impact by repairing, rehabilitating, or restoring the affected environment;
- reduce or eliminate the impact over time by preservation and maintenance operations during the life of the action; and
- compensate for the impact by replacing or providing substitute resources or environments.

Mitigation measures are those actions or processes that would be implemented to control and minimize potential adverse impacts from construction and operation of the proposed CISF project. Potential mitigation measures can include general best management practices (BMPs) and more site-specific management actions.

BMPs are processes, techniques, procedures, or considerations that can be used to effectively avoid or reduce potential environmental impacts. While BMPs are not regulatory requirements, they can overlap with and support such requirements. BMPs will not replace any U.S. Nuclear Regulatory Commission (NRC) requirements or other Federal, State, or local regulations.

Management actions are active measures that an applicant specifically implements to reduce potential adverse impacts to a specific resource area. These actions include compliance with applicable government agency stipulations or specific guidance, coordination with governmental agencies or interested parties, and monitoring of relevant ongoing and future activities. If appropriate, corrective actions could be implemented to limit the degree or magnitude of a specific action leading to an adverse impact (reducing or eliminating the impact over time by preservation and maintenance operations) and repairing, rehabilitating, or restoring the affected environment. The applicant may also minimize potential adverse impacts by implementing specific management actions, such as programs; procedures; and controls for monitoring, measuring, and documenting specific goals or targets; and, if appropriate, instituting corrective actions. The management actions may be established through standard operating procedures that appropriate local, State, and Federal agencies (including NRC) review and approve. The NRC may also establish requirements for management actions by identifying license conditions. These conditions are written specifically into the NRC license and then become commitments that are enforced through periodic NRC inspections.

The mitigation measures that Interim Storage Partners (ISP) has proposed to reduce and minimize adverse environmental impacts at the proposed CISF project are summarized in this Environmental Impact Statement (EIS) in Section 6.2 and Table 6.3-1. Based on the potential impacts identified in EIS Chapter 4, the NRC staff has identified additional potential mitigation measures for the proposed CISF project. These mitigation measures are summarized in EIS Section 6.3 and Table 6.3-2. The proposed mitigation measures provided in this chapter do not include environmental monitoring activities. Environmental monitoring activities are described in EIS Chapter 7.

6.2 Mitigation Measures ISP Proposed

ISP identified mitigation measures in its license application (ISP, 2020) as well as in responses to the NRC staff's requests for additional information (RAIs) (ISP, 2019). EIS Table 6.3-1 lists the mitigation measures that the applicant has committed to for each resource area. Because ISP committed to these, they were included as appropriate in the resource area impact determinations in EIS Chapter 4.

6.3 Potential Mitigation Measures the NRC Identified

The NRC staff has reviewed the mitigation measures the applicant proposed and identified additional mitigation measures that could potentially reduce impacts (EIS Table 6.3-2). The NRC has the authority to address unique, site-specific characteristics by identifying license conditions, based on conclusions reached in the safety and environmental reviews. These license conditions could include additional mitigation measures, such as modifications to required monitoring programs. While the NRC cannot impose mitigation outside its regulatory authority under the Atomic Energy Act, the NRC staff has identified mitigation measures in EIS Table 6.3-2 that could potentially further reduce the impacts of the proposed CISF project. These additional mitigation measures are not requirements being imposed upon the applicant. For the purpose of the National Environmental Policy Act (NEPA) and consistent with 10 CFR 51.71(d) and 51.80(a), the NRC is disclosing measures that could potentially reduce or avoid environmental impacts of the proposed project. Because the applicant has not committed to these, they are not credited in the resource area impact determinations in EIS Chapter 4.

Table 6.3-1 Summary of Mitigation Measures ISP Proposed		
Resource Area	**Activity**	**Proposed Mitigation Measures**
Land Use	Land Disturbance	Use common corridors when locating pipelines and utilities. Minimize the construction footprint to the extent practicable. Stabilize disturbed areas with natural and low-water maintenance landscaping. Protect undisturbed areas with silt fencing and straw bales, as appropriate.
	Access Restrictions	Maintain an adequate buffer between operational and construction areas to ensure that construction of additional SNF storage pads would not adversely impact operations. Prohibit grazing on the 130-ha [320-ac] owner-controlled area (OCA) containing the storage pads and cask-handling building to restrict and control access. Designate the proposed project area as “Off Limits” to prevent accidental public use and post “No Trespassing” along the boundary of the property in accordance with State and Federal requirements for posting real estate property.
Transportation	Transportation Safety	Use staged construction and operations to disperse impacts from additional traffic and SNF shipments over a 40-year period. Use existing rail and constructed rail sidetrack for SNF shipments to reduce the number of shipments that would be needed and the risk of accidents.
Geology and Soils	Soil Disturbance, Contamination	Utilize materials from higher portions of the proposed site for fill at the lower portions of the site to the extent possible, and reuse excavated materials whenever possible. Use earthen berms, dikes, and sediment fences to limit suspended solids in runoff. Stabilize cleared areas not covered by pavement or structures as soon as practicable. Create berms with silt fencing/straw bales to reduce flow velocity and prohibit scouring. Implement a Spill Prevention, Control, and Countermeasures (SPCC) Plan to minimize the impacts of potential soil contamination. Conduct routine monitoring and inspections of canisters and SNF storage systems during all phases to verify that the proposed CISF project is performing as expected.

Table 6.3-1 Summary of Mitigation Measures ISP Proposed		
Resource Area	**Activity**	**Proposed Mitigation Measures**
Surface Water Resources	Erosion, Runoff, and Sedimentation	Control of impacts to water quality during construction through compliance with the Construction General Permit requirements and a Storm Water Pollution Prevention Plan (SWPPP). Use of erosion and sedimentation BMPs including earthen berms, dikes, sediment fences, silt fencing and/or sediment traps. Use of BMPs for dust control during construction. Minimize construction footprint to the extent possible. Stabilize disturbed areas and soil stockpiles as soon as practicable. Stabilize drainage culverts and ditches with rock aggregate/rip-rap or through silt fence/straw bale berms. Control impacts to water quality during operation through compliance with the TDPES Industrial Storm Water Permit requirements.
	Spills and Leaks	Maintain construction equipment to prevent leaks of oil, grease, or hydraulic fluids. Utilize berms around all above ground diesel storage tanks.
Groundwater Resources	Water Use	Use low-water consumption landscaping. Use low-flow toilets, sinks, and showers. Use self-contained machines and mops for floor washing. Use of environmental monitoring program to detect potential radiological contamination. Immediate investigation and corrective action in the case of radioactive contaminant detection.
	Spills and Leaks	Obtain construction and industrial TPDES permits, which require reporting spills of petroleum products or hazardous chemicals. Develop and implement spill-response procedures to correct and remediate accidental spills. Report all regulated substance spills that occur at the site to the TCEQ and remediate in accordance with State requirements.

Table 6.3-1 Summary of Mitigation Measures ISP Proposed		
Resource Area	**Activity**	**Proposed Mitigation Measures**
Ecology	Reduce Human Disturbances	Minimize the construction footprint to the extent practicable. Stabilize disturbed areas with native grass species, pavement, and crushed stone to control erosion, and repair eroded areas. Comply with a TPDES general construction permit as part of the permitting process to reduce the potential impacts to surface water runoff receptors. Bury newly constructed power lines. Install new water supply and natural gas lines along the existing rights of way to minimize impacts to vegetation and wildlife. Monitor for and repair leaks and spills of oil and hazardous material from operating equipment. Minimize fugitive dust that may settle on forage and edible vegetation (rendering it undesirable to animals). Use animal-friendly fencing around the proposed CISF. Down-shield security lighting for all ground-level facilities and equipment to keep light within the boundaries of the proposed CISF project during the operations stage, helping to minimize the potential for impacts on wildlife. Conduct most construction activities during daylight hours (10-hour workdays), limiting the disruption of nocturnal animals. Maintain noise suppression systems on construction vehicles. Develop a Spill Prevention, Control, and Countermeasures Plan (SPCC), if required, for above-ground diesel fuel storage tanks at the CISF.
Air Quality	Fugitive Dust	Suppress dust by spraying water. Stabilize disturbed areas and soil stockpiles as soon as practicable.
Noise	Exposure of Workers and Public to Noise	Avoid construction activities during nighttime hours. Use sound-abatement controls on operating equipment and facilities. Use personal hearing protection by workers in high-noise areas.

Table 6.3-1 Summary of Mitigation Measures ISP Proposed		
Resource Area	**Activity**	**Proposed Mitigation Measures**
Cultural and Historic Resources	Disturbance of Prehistoric Archaeological Sites and Sites Eligible for Listing on the National Register of Historic Places (NRHP)	Have inadvertent discovery procedures in place to manage ISP's activities in the event of a discovery of human remains or other items of archeological significance during any phase of the project. Cease any work upon the inadvertent discovery of human remains or other items of archeological significance during any phase of the project and contact the Texas State Historic Preservation Officer (SHPO) to determine the appropriate measures to identify, evaluate, and treat the discovery. Locate water supply lines along existing roadway to avoid additional surface disturbance.
Visual and Scenic	Potential Visual Intrusions in the Existing Landscape Character	Suppress fugitive dust by spraying water. Use accepted natural, low-water-consumption landscaping with native vegetation. Revegetate and cover bare areas during construction.
Socioeconomics	Effects on Surrounding Communities	No mitigations identified.
Public and Occupational Health and Safety	Effects from Facility Construction and Operation	Design transfer facilities and operations to limit direct radiation exposure to workers by limiting direct exposure to the unshielded canister during transfer. Incorporate in the facility layout a setback distance of more than 1,006 m [3,300 ft] from the center of the proposed storage pads to the controlled area fence to limit exposures to members of the public at the facility boundary.

Table 6.3-1 Summary of Mitigation Measures ISP Proposed		
Resource Area	**Activity**	**Proposed Mitigation Measures**
Waste Management	Disposal Capacity	Store all waste in designated locations of the facility until administrative limits are reached, at which time waste would be shipped offsite to the appropriate licensed treatment, storage, and/or disposal facility.
	Waste Reduction	Do not dispose of waste onsite at the proposed CISF. Store all waste in designated locations of the facility until administrative limits are reached, at which time waste would be shipped offsite to the appropriate, licensed treatment, storage, and/or disposal facility. Contain sanitary wastes generated during construction of the proposed CISF with an adequate number of portable systems until installed plant sanitary facilities are available. Dispose all industrial and municipal wastes at licensed offsite disposal facilities. Implement administrative procedures for the collection, temporary storage, processing, and offsite disposal of categorized solid waste in accordance with regulatory requirements. Collect different waste types in separate containers to minimize contamination of one waste type with another. Maximize recycling to the extent possible. Identify, store, and dispose all hazardous wastes in accordance with State and Federal requirements applicable to Conditionally Exempt Small Quantity Generators (CESQGs). Decontaminate any contaminated storage casks to levels at or below applicable NRC limits for unrestricted use. Decontaminate all radioactively contaminated items becoming wastes and/or re-use to reduce waste volume. Design and implement handling and treatment processes to limit wastes and effluents. Conduct sampling and monitoring to assure that facility administrative and regulatory limits are not exceeded, and/or monitoring of solid wastes prior to offsite treatment, and disposal will be implemented.

Table 6.3-2 Summary of Additional Mitigation Measures Identified by the NRC		
Resource Area	**Activity**	**Proposed Mitigation Measures**
Land Use	Land Disturbance	No additional mitigations identified.
Transportation	Transportation Safety	No additional mitigations identified.
Geology and Soils	Soil Disturbance	No additional mitigations identified.
Surface Water Resources	Spills and Leaks	Seek USACE 401 certification (if necessary)
Groundwater Resources	Contamination	No mitigations identified.
Ecology	Reduce Human Disturbance	Control the spread of invasive plant species and noxious weeds. Construct above-ground storage tanks with secondary containment structures (e.g., concrete berms and floor sumps) to stop fluids from spilling on the ground immediately around the tank or fuel pump, or potentially impacting downstream environments. Follow U.S. Fish and Wildlife Service (FWS) and Texas Parks and Wildlife Department (TPWD) recommendations that activities requiring vegetation removal occur outside the general bird-nesting season between March 1 and September 1. If project activities must be conducted during this time, conduct nest surveys prior to the vegetation removal or disturbance. In addition, if the nest of a migratory bird is found during the survey, establish a buffer of vegetation that would remain around the nest until the young have fledged or the nest is abandoned. Follow TPWD's recommendation to monitor the listing status of the lesser prairie-chicken, and enroll in the voluntary Range-Wide Conservation Plan for the species intended to conserve suitable habitat. Follow FWS's Nationwide Standard Conservation Measures and APLIC's Suggested Practices for Avian Protection on Power Lines to construct, modify, and abandon power lines to prevent or minimize risk of avian collision or electrocution of raptors. Follow TPWD's recommendation to avoid disturbing Texas horned lizards and colonies of their primary food source and the harvester ant during construction stages, and employ a permitted biological monitor to be present during construction activities so that Texas horned lizards can be relocated if found. In addition, revegetate disturbed areas within suitable habitat with patchy, native vegetation rather that sod-forming grass. Follow TPWD's recommendations to limit potential impacts to the dunes sagebrush lizard: (i) maximize the use of the

Table 6.3-2 Summary of Additional Mitigation Measures Identified by the NRC		
Resource Area	**Activity**	**Proposed Mitigation Measures**
		existing developed areas and roadways, (ii) limit construction activities to the months from October through March, (iii) minimize the development footprint (as already committed to by the applicant), (iv) restrict vehicle travel when possible, (v) avoid aerially sprayed herbicides for weed control, (vi) avoid the introduction of nonnative vegetation, (vii) reclaim suitable dunes sagebrush lizard habitat with locally sourced native seeds and vegetation, and (viii) control mesquite and other invasive woody species from impairing suitable dunes sagebrush lizard habitat. Consult with TPWD to develop a survey plan for the Texas horned lizard and dunes sagebrush lizard. Follow TPWD-provided fence designs that TPWD deems appropriate to use during the CISF construction activities. Follow FWS recommendations to educate all employees, contractors, and/or site visitors of relevant rules and regulations that protect wildlife. Develop a wildlife inspection plan to identify animals that may be present at the proposed CISF project, and take action to remove animals found within the storage and operations area, if present. Consult with TPWD to determine appropriate mitigation measures to discourage wildlife use and habitation of the proposed project area, particularly near cask vents. Periodically inspect roads and rights-of-way for invasion of noxious weeds, train maintenance staff to recognize weeds and report locations to the local weed specialist, and maintain an inventory of weed infestations and schedule them for treatment on a regular basis.
Air Quality	Fugitive Dust and Combustions Emissions from Construction Equipment and Mobile Sources	Apply erosion-mitigation methods on disturbed lands, soil stockpiles, and unpaved roads. Limit access to construction sites and staging areas to authorized vehicles only, through designated roads. Pave or put gravel on dirt roads and parking lots, if appropriate. Develop and implement a comprehensive fugitive dust-control plan. Cover trucks carrying soil and debris to reduce dust emissions from the back of trucks. Perform road maintenance (e.g., promptly remove earthen material on paved roads). Set appropriate speed limits throughout the proposed site.

Table 6.3-2 Summary of Additional Mitigation Measures Identified by the NRC		
Resource Area	**Activity**	**Proposed Mitigation Measures**
		Clean vehicles and construction equipment to remove dirt when appropriate. Ensure vehicle and equipment exit construction areas through designated and treated access points. Coordinate construction and transportation activities to reduce maximum dust levels. Limit dust-generating activities when unfavorable metrological conditions occur (e.g., high winds). Train workers to comply with the speed limits, use good engineering practices, minimize disturbed areas, and employ other BMPs, as appropriate. Minimize unnecessary travel. Develop and implement a construction traffic and parking management plan. Limit the number of hours in a day that effluent-generating activities can be conducted. Implement fuel-saving practices, such as minimizing vehicle and equipment idle time or utilizing a no-idle rule. If utilizing fossil-fuel vehicles, use those that meet the latest emission standards. Utilize newer, cleaner-running equipment (e.g., use construction equipment engines with the best available emissions-control technologies). Ensure that equipment (e.g., construction equipment, generators) is properly tuned and maintained. Burn low-sulfur fuels in all diesel engines and generators. Consider using electric vehicles or other alternative fuels to reduce emissions of National Ambient Air Quality Standards (NAAQS) pollutants and greenhouse gases. Encourage employee carpooling.
Noise	Exposure of Workers and the Public to Noise	Follow recommended EPA sound level guidelines for offsite receptors in outdoor areas to protect against hearing loss. Impose speed limits to reduce vehicle noise.

Table 6.3-2 Summary of Additional Mitigation Measures Identified by the NRC		
Resource Area	**Activity**	**Proposed Mitigation Measures**
Cultural and Historic Resources	Disturbance of Prehistoric Archaeological Sites and Sites Eligible for Listing on the National Register of Historic Places (NRHP)	No additional mitigations identified.
Visual and Scenic	Potential Visual Intrusions in the Existing Landscape Character	Follow the land use mitigation measures for land disturbance activities, which will also minimize impacts to vegetation and wildlife. Reclaim disturbed areas and remove debris after construction is complete. Remove and reclaim roads and structures after operations are complete. Select building materials and paint that complement the natural environment. Down-shield all security lights at the CISF. Minimize removal of natural barriers, screens, and buffers. Impose speed limits to reduce fugitive dust generation.
Socioeconomics	Effects on Surrounding Communities	Coordinate emergency response activities with local authorities, fire departments, medical facilities, and other emergency services before operations begin.
Public and Occupational and Health and Safety	Effects from Facility Construction and Operation	No additional mitigations identified.
Waste Management	Disposal Capacity	Use decontamination techniques that reduce waste generation. Institute preventive maintenance and inventory management programs to minimize waste from breakdowns and overstocking. Develop a standard operating procedure to maximize the amount of recycling; minimize the production of hazardous waste; and for the collection, sorting, and temporary storage of all solid, nonhazardous solid waste. Salvage extra materials and use them for other construction activities. Avoid using hazardous materials when possible.

Table 6.3-2 Summary of Additional Mitigation Measures Identified by the NRC		
Resource Area	**Activity**	**Proposed Mitigation Measures**
		Store and properly label hazardous chemicals in an appropriate area away from byproduct material to prevent any potential release. Ensure that equipment is available to respond to spills and identify the location of such equipment. Inspect and replace worn or damaged components.

6.4 References

10 CFR 51.71. Code of Federal Regulations, Title 10, *Energy*, § 51.71, "Draft Environmental Impact Statement—Contents." Washington, DC: U.S. Government Publishing Office.

10 CFR 51.80. Code of Federal Regulations, Title 10, *Energy*, § 51.71, "Draft Environmental Impact Statement—Materials License." Washington, DC: U.S. Government Publishing Office.

40 CFR 1508.20. Code of Federal Regulations, Title 40, *Protection of the Environment*, § 1508, "Mitigation." Washington, DC: U.S. Government Printing Office.

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7 ENVIRONMENTAL MEASURES AND MONITORING PROGRAMS

7.1 Introduction

This chapter will describe the Interim Storage Partners, LCC (ISP) proposed monitoring programs to demonstrate compliance with regulations in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20 and 10 CFR Part 72 regarding radiological effluent release limits, public and occupational dose limits, and reporting. Monitoring programs provide data on operational and environmental conditions so that prompt corrective actions can be implemented when adverse conditions are detected. Thus, these programs help to limit potential environmental impacts at independent spent fuel storage installations (ISFSI) facilities such as the proposed consolidated interim storage facility, or (CISF) and the surrounding areas.

Required monitoring programs or those proposed in the license application can be modified to address unique site-specific characteristics by adding license conditions to address findings from the U.S. Nuclear Regulatory Commission (NRC) safety and environmental reviews. The NRC staff is conducting the safety review of the proposed CISF project, which will be documented in a Safety Evaluation Report (SER), and any license conditions resulting from the safety review would be discussed in the final environmental impact statement (EIS) and Record of Decision (ROD). The description of the proposed monitoring programs for the proposed CISF project is organized as follows:

- Radiological Monitoring and Reporting (EIS Section 7.2)
- Other Monitoring (EIS Section 7.3)

Pursuant to 10 CFR Part 20, the NRC requires that licensees conduct surveys necessary to demonstrate compliance and to demonstrate that the amount of radioactive material present in effluent from the proposed facility is kept as low as reasonably achievable (ALARA). Specifically, the NRC, in 10 CFR 20.1301, requires each licensee to conduct operations so that the total effective dose equivalent (TEDE) to individual members of the public from the licensed operation does not exceed 100 mrem [1 mSv] in a year, exclusive of the dose contributions from background radiation. The dose in any unrestricted area from external sources may not exceed 2 mrem [0.02 mSv] in any one hour. In addition, pursuant to 10 CFR Part 72, the NRC requires that licensees submit annual reports specifying the quantities of the principal radionuclides released to unrestricted areas and other information needed to estimate the annual radiation dose to the public from operations.

7.2 Radiological Monitoring and Reporting

In establishing the environmental monitoring program for SNF storage, ISP would build upon the current monitoring program maintained by ISP joint venture member, Waste Control Specialists (WCS), for the existing WCS facilities (ISP, 2018). Radiation-monitoring requirements would be met by using area radiation monitors in the Cask-Transfer Building for monitoring general area dose rates from the casks and canisters during canister transfer operations, and with thermoluminescent dosimeters (TLDs) or optically stimulated luminescence dosimeters (OSLDs) along the perimeters of the restricted and controlled areas (ISP, 2018, 2020). Both detection methods provide a passive means for continuous monitoring of radiation levels and provide a basis for assessing the potential impact on the environment.

The radiological environmental monitoring program (REMP) includes the collection of data during preoperational years to establish baseline radiological information that would be used in determining and evaluating potential impacts from operation of the proposed CISF project on the local environment. The REMP would be initiated at least one year prior to the operations stage. Radionuclides would be identified using technically appropriate analytical instruments (e.g., liquid scintillation or gamma/alpha spectrometry). Data collected during the operational years would be statistically compared to the baseline generated by the preoperational data. These comparisons would provide a means of assessing the magnitude (if any) of potential radiological impacts on members of the public and demonstrate compliance with applicable radiation protection standards (ISP, 2020). Revisions to the REMP may be necessary and appropriate to assure reliable sampling and collection of environmental data. Any revisions to the program would be documented and reported to the NRC and other appropriate regulatory agencies, as required (ISP, 2020).

Dosimeters (OSLDs or TLDs) would be used to record dose rates in the protected area and along the operational control area (OCA) boundary fence (ISP, 2018). The dosimeters would primarily detect gamma radiation. Each side of the boundary would have one dosimeter. These dosimeters would be used to record dose along the boundary fence and to document radiation levels at these boundaries to verify they are within regulatory limits (ISP, 2018). Dosimeters would also be placed on the outside of several buildings as follows: northwest corner of the security and administration building, northwest corner of the cask-handling building, and at three locations along the east wall of the security and administration building. Additionally, dosimeters would be located at strategic locations inside the cask-handling building where personnel would normally be working. These dosimeters would serve as a backup for monitoring personnel radiation exposure and maintaining this exposure ALARA. The dosimeters would be retrieved and processed quarterly (ISP, 2018).

Compliance with the regulations in 10 CFR Part 72 and Part 20 would be demonstrated through project boundary monitoring and environmental sampling data. If a release occurs, then routine operational environmental data would be used to assess the extent of the release. Compliance with regulations in 10 CFR 20.1301 would be demonstrated using a calculation of the dose to the individual who is likely to receive the highest dose, in accordance with regulations in 10 CFR 20.1302(b)(1). Compliance with 10 CFR 72.104 and 10 CFR 72.106 would be demonstrated by the annual reporting 10 CFR 72.44(d)(3) requires (ISP, 2019).

Reporting procedures would comply with the requirements of 10 CFR 72.44(d)(3). Reports of the concentrations of any radionuclides released to unrestricted areas would be provided and would include the Minimum Detectable Concentration (MDC) for the analysis. Each year, ISP would submit a summary report of the environmental sampling program to the NRC, including all associated data, as 10 CFR 72.44(d)(3) requires. The report would include the types, numbers, and frequencies of environmental measurements and the identities and activity concentrations of facility-related nuclides found in environmental samples.

7.3 <u>Other Monitoring</u>

The potential for external radiological exposure to the public from the operations stage of the proposed CISF project would be from the SNF storage pad through direct radiation. Because the casks are sealed and welded shut, there would be no radiological exposure air pathway. Continuous air monitors would be located in the exhaust of the cask-transfer building and also available as portable air samplers (ISP, 2020). There would be no requirement for liquid monitoring, because there is also no potential for a liquid pathway, and because there would be no liquid component of SNF within the casks. The casks are sealed to prevent liquids from contacting the SNF assemblies (ISP, 2018, 2020).

Surface Water and Groundwater Monitoring

Although no pathways exist for radiological exposures because of liquid effluents, ISP stated that it would establish administrative investigation and action levels for monitoring surface water runoff as an additional step in the radiation-control process. However, at the proposed project area the surface water drainage paths are normally dry, therefore it would not be possible to monitor runoff on a continuous basis (ISP, 2018, 2020).

Detection of radionuclide impacts to surface water runoff would be conducted in a two-step process. First, all casks would be checked for surface contamination during weekly surveys, and all storage pads would be checked for surface contamination during monthly surveys. Second, soil samples would be collected on a quarterly basis at the culverts leading to the proposed facility outfalls (ISP, 2018, 2020).

Onsite sewage would be routed to holding tanks, which would be periodically pumped; the sewage would then be sent offsite for disposal in publicly owned treatment works. Each holding tank would be periodically sampled (prior to pumping) and analyzed for relevant radionuclides (ISP, 2018).

Soil and Sediment Monitoring

ISP stated that quarterly soil samples would be collected at culverts leading to CISF outfalls coupled with weekly and monthly radiological surveys on the casks and storage pad (ISP, 2018, 2020).

Air Monitoring

ISP stated there would be no air exposure pathway, because the casks are sealed by being welded shut (ISP, 2020). However, continuous air monitors would be located in the cask-handling building. Air monitoring (i.e., Low Volume air sampling or High Volume air sampling, as applicable) would be conducted for each SNF offload. Should contamination be detected above U.S. Department of Transportation conveyance limits, proper notification would be given to all the applicable regulatory entities (ISP, 2018).

The surveys of the cask-handling building would be performed per approved procedures for direct alpha, beta, gamma, and neutron measurements. The measurements would be conducted using Ludlum hand-held instruments (ISP, 2018).

The environmental air samples would be collected using Hi-Q Low Volume 0.15 – 1.2 cubic meters per minute [0.5 – 4 cubic feet per minute] air samplers or equivalent (ISP, 2018).

Physiochemical Monitoring

ISP stated that chemicals are not anticipated to be stored at the proposed CISF and; therefore, no physiochemical monitoring would be required (ISP, 2020).

Ecological Monitoring

ISP stated that ecological monitoring would not be required given that no radiological effluent releases are expected. Further, there are no Federally listed threatened or endangered species that would be impacted during the construction and operation of the proposed CISF project (ISP, 2020).

7.4 References

10 CFR Part 20. Code of Federal Regulations, Title 10, *Energy*, Part 20. "Standards for Protection Against Radiation." Washington, DC: U.S. Government Printing Office.

10 CFR 20.1301. Code of Federal Regulations, Title 10, *Energy*, § 20.1301, "Dose limits for individual members of the public." Washington, DC: U.S. Government Printing Office.

10 CFR 20.1302. Code of Federal Regulations, Title 10, *Energy*, § 20.1302, "Compliance with dose limits for individual members of the public." Washington, DC: U.S. Government Printing Office.

10 CFR Part 72. Code of Federal Regulations, Title 10, *Energy*, Part 72. "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste." Washington, DC: U.S. Government Publishing Office.

10 CFR 72.44. Code of Federal Regulations, Title 10, *Energy*, § 72.44, "License conditions." Washington, DC: U.S. Government Publishing Office.

10 CFR 72.104. Code of Federal Regulations, Title 10, *Energy*, § 72.104, "Criteria for radioactive materials in effluents and direct radiation from an ISFSI or MRS." Washington, DC: U.S. Government Publishing Office.

10 CFR 72.106. Code of Federal Regulations, Title 10, *Energy*, § 72.106, "Controlled area of an ISFSI or MRS." Washington, DC: U.S. Government Publishing Office.

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8 COST-BENEFIT ANALYSIS

This chapter presents the cost-benefit analysis for the proposed Consolidated Interim Storage Facility (CISF) and the No-Action alternative. Section 8.1 provides an introduction; Section 8.2 identifies high-level assumptions associated with the overall analyses; Section 8.3 describes the proposed CISF's costs and benefits; Section 8.4 describes the No-Action alternative's costs and benefits; and Section 8.5 compares the costs and benefits of the proposed CISF to those of the No-Action alternative.

8.1 Introduction

In accordance with 10 CFR 51.71(d), this EIS includes a consideration of the economic, technical, and other benefits and costs of the proposed action and alternatives. The analysis in this chapter considers both environmental and economic costs and benefits. The purpose of the cost-benefit analysis is not to exhaustively identify and quantify all of the potential costs and benefits, but instead to focus on those benefits and costs of such magnitude or importance that their inclusion in this analysis can inform the decision-making process (e.g., distinguish the proposed action from the No-Action alternative). The analysis in this chapter was informed by the Environmental Review Guidance for Licensing Actions Associated with the Office of Nuclear Material Safety and Safeguards (NMSS) Programs (NUREG–1748). As described in NUREG–1748 (NRC, 2003), the cost-benefit analysis provides input to determine the relative merits of various alternatives; however, the U.S. Nuclear Regulatory Commission (NRC) will ultimately base its decision on the protection of public health and safety.

The NRC staff generated the cost estimates in the Environmental Impact Statement (EIS) Tables 8.3-1 and 8.4-3, and EIS Appendix C provides additional details associated with generating the cost estimates in the tables.

8.2 Assumptions

Benefits and costs in this analysis focus on the societal perspective as opposed to the perspective of any individual, company, or industry. As described in EIS Section 2.2.1, the environmental analysis in this EIS considers the proposed action (Phase 1) as well as the subsequent license amendments (Phases 2-8), assuming the NRC approves such amendments. Similarly, this cost-benefit analysis will also consider both the proposed action (Phase 1) as well as full build-out (Phases 1-8). The cost-benefit analysis includes all phases (Phases 1-8) because facilities and infrastructure completed as part of the proposed action (Phase 1) and their associated costs are integral to the additional phases.

As described in EIS Section 2.2.1, the proposed facility would serve as an interim storage facility until the spent nuclear fuel (SNF) can be shipped to a permanent geologic repository or until the end of the 40-year license term. Therefore, for transportation there would be a two-part campaign. The first campaign would be transporting the SNF from the generation sites to the proposed CISF, and the second campaign would be transporting the SNF from the proposed CISF to the geologic repository. The No-Action alternative (i.e., the NRC would not grant a license for the proposed CISF) would include only a single campaign; specifically, transporting the SNF from the generation sites to a geologic repository.

As described in EIS Section 5.1.1.4, the cumulative impacts analysis considers the potential presence of a second CISF as a reasonably foreseeable future action. Therefore, the cost-benefit analysis will also consider the potential presence of a second CISF as it pertains to impacts (i.e., changes) to the costs and benefits associated with the proposed ISP CISF project.

As described in EIS Section 2.2.1, the license term for the proposed CISF project is 40 years. Therefore, cost estimates are discounted so that costs incurred over the 40-year license term can be compared to today's costs (i.e., present values), are comparable at a single point in time, and are expressed in constant 2019 dollars. Discounting reduces future values, to reflect the time value of money. In other words, costs and benefits have more value if they are experienced sooner rather than later. The higher the discount rate, the lower the corresponding present value of future cash flows. Consistent with the Office of Management and Budget guidance (OMB, 2003), this cost-benefit analysis uses discount rates of 3 and 7 percent.

The NRC staff's evaluation of issues related to the applicant's financial qualifications and decommissioning funding assurance will be addressed in the NRC's Safety Evaluation Report (SER) rather than this EIS.

8.3 Costs and Benefits of the Proposed CISF

8.3.1 Environmental Costs and Benefits of the Proposed CISF

In EIS Chapter 4, the NRC staff analyzed the potential impacts for the proposed CISF, which includes both negative and positive environmental impacts. Negative environmental impacts are classified as environmental costs. In contrast, positive environmental impacts are classified as environmental benefits. EIS Tables 8.3-1 and 8.3-2 define examples of environmental costs and environmental benefits of the proposed CISF, respectively.

Table 8.3-1 Examples of the Environmental Costs of the Proposed CISF

Resource	Description	Impact Assessment*
Land Use	For the duration of the license term, approximately 130 ha [320 ac] would be used by the proposed CISF and unavailable for other uses such as cattle grazing.	SMALL
Transportation	Vehicles transporting workers and materials during all stages would increase local traffic counts.	SMALL
Geology and Soils	Surface soils would be disturbed during all stages.	SMALL
Groundwater	The proposed CISF consumptively uses groundwater.	SMALL
Vegetation	Land disturbed by the proposed CISF results in a noticeable impact on vegetation at the proposed CISF project area.	MODERATE
Wildlife	Project-related traffic could cause wildlife injuries and fatalities. Wildlife could also be temporarily displaced by the proposed CISF project traffic and noise.	SMALL
Air Quality	The proposed CISF generates air effluents like fugitive dust and combustion emissions, which degrade air quality.	SMALL
Historic and Cultural Resources	Historic properties would not be affected by the NRC-licensed facility.	SMALL

Table 8.3-1 Examples of the Environmental Costs of the Proposed CISF		
Resource	Description	Impact Assessment*
Public and Occupational Health	Limited potential exists for radiological and nonradiological impacts.	SMALL
Waste Management	The proposed CISF project impacts the available waste disposal capacity in the region because of the volumes that would be disposed at permitted facilities.	SMALL
*EIS Table 2.4-1 presents impact assessments by phases and stages.		

Table 8.3-2 Summary of the Environmental Benefits of the Proposed CISF		
Resource	Description	Impact Assessment
Socioeconomics	For the duration of the license term, the proposed CISF would positively impact local finances through increased taxes and revenue.	SMALL to MODERATE

8.3.2 Economic and Other Costs and Benefits of the Proposed CISF

8.3.2.1 Economic and Other Costs

Estimated costs for the proposed CISF include the following activities: constructing the proposed CISF, transporting the SNF from the generation sites to the proposed CISF, operating and maintaining the proposed CISF, transporting the SNF from the proposed CISF to a permanent geologic repository, and decommissioning the proposed CISF.

EIS Table 8.3-3 contains the costs the NRC staff estimated for both the proposed action (Phase 1) and full build-out (Phases 1-8). The applicant provided cost estimates for 11 activities associated with the proposed CISF. As described in EIS Appendix C, Section C.2, the NRC staff consolidated these 11 activities into the 5 activities specified in EIS Table 8.3-3. In addition, the NRC staff generated two overall cost estimates for the proposed CISF based on two different scenarios: a lower proposed CISF operations estimate (Scenario A), which is based on costs from currently decommissioning reactor sites and a higher proposed CISF operations estimate (Scenario B) based on the costs the applicant identified. Details concerning the calculation of EIS Table 8.3-3 cost estimates, including the discounting, are presented in Appendix C, Section C.3.

Table 8.3-3 Estimated Costs (2019 dollars) for the Proposed CISF for both the Proposed Action (Phase 1) and Full Build-out (Phases 1-8)

Activity	Proposed Action (Phase 1)		Full Build-out (Phases 1-8)	
	Scenario A	Scenario B	Scenario A	Scenario B
Proposed CISF Construction	350,813,969	350,813,969	1,691,585,151	1,691,585,151
SNF Transport to Proposed CISF	251,364,578	251,364,578	779,644,910	779,644,910
Proposed CISF Operations and Maintenance	206,548,524	490,308,228	206,548,524	514,122,378

Table 8.3-3 Estimated Costs (2019 dollars) for the Proposed CISF for both the Proposed Action (Phase 1) and Full Build-out (Phases 1-8)				
Activity	**Proposed Action (Phase 1)**		**Full Build-out (Phases 1-8)**	
	Scenario A	**Scenario B**	**Scenario A**	**Scenario B**
SNF Transport to a Repository	251,364,578	251,364,578	779,644,910	779,644,910
Proposed CISF Decommissioning	56,740,382	56,740,382	405,340,890	405,340,890
Total Cost	1,116,832,032	1,400,591,736	3,862,764,382	4,170,338,236
3% Discounting*	755,112,738	920,053,410	2,173,459,770	2,348,012,784
7% Discounting	567,985,869	663,840,032	1,288,536,263	1,387,784,858

* Consistent with the Office of Management and Budget guidance (OMB, 2003), this cost-benefit analysis uses discount rates of 3 and 7 percent.
Sources: Modified from ISP, 2020.

Discounting requires specifying when the various activities occur. EIS Table 8.3-4 describes the project schedule the NRC staff used to estimate the costs in EIS Table 8.3-3. As the applicant stated (ISP, 2019), the assumptions associated with the schedule (e.g., the timing for transporting SNF to the proposed CISF) used for the cost-benefit analyses represent expectations or plans for these activities and may differ from the assumptions used for assessing the impacts of the proposed action (Phase 1) and full build-out (Phases 1-8) in EIS Chapter 4. With discounting, changing the timing of when an activity occurs also changes the estimated costs (i.e., the present values). Costs or benefits experienced closer to the present have more value than those experienced further into the future. This means that delaying or extending an activity results in lower estimated costs. From a discounting perspective, the estimated costs in EIS Table 8.3-3 are bounding because these costs are based on a project schedule prior to any delays.

The activities of proposed CISF construction and SNF transportation from the generation sites to the proposed CISF do not occur each project year within the range of project years specified in EIS Table 8.3-4. EIS Appendix C, Section C.2 and C.3 describe in detail the schedule for discounting the estimated costs. The NRC staff used two different estimated annual costs for the proposed CISF operations and maintenance. The lower cost estimate (Scenario A) of $5,163,713 million (2019 constant dollars) was based on the costs at currently decommissioned nuclear power plants, and the higher cost estimate (Scenario B) of $12,170,532 (2019 constant dollars) was based on the cost estimate for this activity specific to this proposed CISF (ISP, 2020). The higher estimate provides an upper limit for the operation and maintenance costs in this EIS.

Table 8.3-4 Project Years When Activities Occur for the Proposed CISF for Both the Proposed Action (Phase 1) and Full Build-out (Phases 1-8)		
Activity	**Project Years when Activity Occurs**	
	Proposed Action (Phase 1)	**Full Build-out (Phases 1-8)**
Proposed CISF Construction	1 to 9*	1 to 31*
SNF Transportation from Generation Site to Proposed CISF	3 to 9*	3-30*
Proposed CISF Operations and Maintenance	1 to 40	1 to 40
SNF Transportation from Proposed CISF to Repository	39 and 40	31 to 40
Proposed CISF Decommissioning	41	41
*Activities do not occur each project year within the range of project years specified. EIS Appendix C, Sections C.1 and C.2 provide a detailed description of the schedule for these activities. Source: Modified from ISP, 2020		

The applicant provided the schedule for all the activities in EIS Table 8.3-4, except for SNF transportation from the proposed CISF to the repository and the proposed CISF decommissioning. The NRC staff assumed the schedule for these two activities. For the proposed action (Phase 1), the NRC staff assumed that (i) the SNF transportation from the proposed CISF to a repository would take the same amount of time it took to transport the SNF from the generation sites to the proposed CISF, and (ii) the proposed CISF would be utilized for the full license term. For the proposed action (Phase 1), this meant that transporting SNF to a repository would occur during project years 39 and 40. For full build-out (Phases 1-8), the NRC staff assumed that the SNF transportation from the proposed CISF to a repository starts after the last SNF is received from the generation sites and continues until the end of the proposed CISF license term. For full build-out (Phases 1-8), this meant that transporting SNF to a repository would occur during project years 31 to 40. This represents an early baseline schedule for this activity, which would bound the cost analysis from a discounting perspective because delaying removal of all the material on site would result in lower estimated costs. For both the proposed action (Phase 1) and full build-out (Phases 1-8), the NRC staff assumed that decommissioning would take 1 year and would occur immediately after transporting the SNF to a repository was complete. The NRC staff chose a 1-year time frame for decommissioning because this would bound the estimated costs for this activity from a discounting perspective.

The following are other cost considerations for the proposed CISF that have not been incorporated into EIS Table 8.3-3.

A Potential Second CISF

As described in EIS Section 8.2, consideration of a second CISF in this EIS would be limited to the potential impacts on the costs and benefits of the proposed ISP CISF. The presence of a second CISF could impact the costs for the proposed ISP CISF in several ways.

A second CISF could delay the schedule for transporting SNF to the proposed ISP CISF, because two CISF sites would be available to receive and store SNF, thereby resulting in a lower cost estimate. This means the SNF transportation costs in EIS Table 8.3-3 are bounding from a discounting perspective because costs are based on an SNF transportation schedule prior to any delays. Changes to the SNF transportation schedule to the proposed CISF would likely affect the cost estimates for full build-out (Phases 1-8). Because of the timing of transport for full build-out (Phases 1-8), the applicant assumes that transport would occur from project years 3 to 30, whereas for the proposed action (Phase 1), transport occurs from project years 3 to 9.

The presence of a second CISF also could impact whether the proposed ISP CISF would reach full capacity {i.e., storing 40,000 MTU [44,000 short tons] of SNF}. This would potentially affect the full build-out (Phases 1-8) rather than the proposed action (Phase 1). As described in EIS Section 2.2.1, the ISP expansion plan consists of seven separate license amendment requests, with each one requesting to increase the proposed CISF capacity by an additional 5,000 MTU [5,500 short tons] of SNF. If the demand for SNF storage capacity decreases or no longer exists at some point in the future (e.g., because of the storage capacity provided by two CISFs), then ISP has the option to either delay expansion or not expand. Again, because of discounting, the proposed action (Phase 1) cost estimate in EIS Table 8.3-3 bounds the estimated costs for any subsequent phases. Similarly, the full build-out (Phases 1-8) cost estimate in Table 8.3-3 bounds the estimated costs if subsequent phases are delayed or not built.

Accidents at the Proposed CISF and During SNF Transport

For the proposed 40-year license term, the NRC staff's safety review will evaluate the potential for credible accidents at the proposed CISF. The EIS consideration of the cost of accidents at the proposed CISF will be informed by this safety determination. At this time, the safety analysis has not identified any credible accidents. Therefore, this EIS will not estimate the costs of an accident specific to this proposed CISF. ISP has proposed a license condition addressing liability and financial assurance arrangements with its customers that would be applicable to events occurring during proposed CISF operations, which the NRC staff will consider in its safety review.

Concerning SNF transportation, only a small fraction of accidents would result in any release of radioactive material, and the probability of a significant release is very small. As determined in NUREG–2125, Spent Fuel Transportation Risk Assessment (NRC, 2014), the NRC staff concluded that accidental release of canistered fuel during transportation would not occur under the most severe impacts studied, which encompassed all historic and realistic accident scenarios. Disregarding this conclusion, for fuel that was not canistered, the NRC staff found that more than 99.999999 percent of all accident scenarios would not lead to either a release of radioactive material or a loss of shielding. As discussed in EIS Section 4.3.1.2.2.3, at full build-out (Phases 1-8), the NRC staff estimates that there will be less than three rail accidents of any severity. Therefore, the NRC staff expects there to be zero accidents that would result in a release of radioactive material or a loss of shielding. As a result, the NRC staff has not attempted to directly quantify the economic cost of any particular hypothetical accident in this EIS. Any attempt to calculate the economic costs of unlikely accidents with any precision is difficult, because the costs can differ significantly depending on variables such as the location and conditions of the accident; the nature of the contamination dispersion and deposition; level of development; and land use. The NRC staff notes that for the Final Supplemental 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, final Yucca Mountain EIS (DOE, 2008), the U.S. Department of Energy (DOE) estimated that the costs for a severe, maximum reasonably foreseeable SNF transportation accident could range from $1 million to $10 billion.

The Price-Anderson Act provides accident liability for incidents (including those caused by sabotage) involving the release of nuclear material for SNF transportation (NRC, 2019).

Currently the amount of coverage per incident provided by this Act is more than $13 billion. In addition, Congress enacted legislation that developed a method to promptly consider compensation claims of the public for liabilities resulting from nuclear incidents that exceed this designated limit.

8.3.2.2 Economic and Other Benefits

Economic benefits for the proposed CISF are estimated as the costs society could save by using the proposed CISF. Potential savings are estimated by subtracting the costs associated with storing SNF at the proposed CISF from the costs of continuing to store SNF at reactor sites (i.e., the No-Action alternative). EIS Table 8.3-3 contains the estimated costs for the proposed CISF, and EIS Table 8.4-1 contains the estimated costs for the No-Action alternative costs. EIS Section 8.5 compares the estimated costs of the proposed CISF to the No-Action alternative and discusses the net economic outcome of this comparison.

As previously described, not all cost considerations for the proposed CISF are quantified and incorporated into EIS Table 8.3-1 cost estimates. For example, one possible benefit of the proposed CISF is the repurposing of land at the generation sites. For sites where the reactor is decommissioned and all of the SNF is relocated (i.e., sent to a CISF), the NRC can terminate its license and release the property for other uses. This benefit was not quantified in this EIS, because the cost of the land would be (i) difficult to establish and (ii) varied based on the individual generation site characteristics.

8.4 Costs and Benefits of the No-Action Alternative

8.4.1 Environmental Costs and Benefits of the No-Action Alternative

Under the No-Action alternative, SNF would continue to be stored at the various generation sites. The environmental costs and benefits experienced at these generation sites are analyzed and documented in the EISs associated with those specific generation sites.

8.4.2 Economic and Other Costs and Benefits of the No-Action Alternative

8.4.2.1 Economic and Other Costs of the No-Action Alternative

EIS Table 8.4-1 contains the estimated costs the NRC staff generated for the No-Action alternative, relevant to the proposed CISF for both the proposed action (Phase 1) and full build-out (Phases 1-8). The estimated costs for the No-Action alternative are based on two activities, the cost for operating and maintaining the ISFSIs at the generation sites and the cost for transporting the SNF from the generation sites to a geologic repository. Details concerning the calculation of the EIS Table 8.4-1 cost estimates, including the discounting, are presented in Appendix C, Section C.4.

Discounting requires specifying when the various activities occur. The operation and maintenance activities at the generation sites would occur during all 40 years associated with the proposed CISF. The NRC staff assumed that the schedule for transporting SNF to a repository would be the same as that for the proposed CISF described in EIS Table 8.3-4.

Table 8.4-1 Estimated Costs (2019 dollars) for the No-Action Alternative Relevant to the Proposed CISF for Both the Proposed Action (Phase 1) and Full Build-out (Phases 1-8)				
Activity	**Proposed Action (Phase 1)**		**Full Build-out (Phases 1-8)**	
	Scenario 1*	**Scenario 2†**	**Scenario 1***	**Scenario 2†**
Operation and Maintenance at the Generation Sites‡	3,842,859,599	3,842,859,599	4,801,129,653	9,992,304,015
SNF Transport to a Repository§	251,364,578	251,364,578	779,644,910	779,644,910
Total Cost	4,094,224,177	4,094,224,177	5,580,774,563	10,771,948,925
3% Discounting‖	2,304,739,510	2,304,739,510	3,178,471,120	5,691,371,029
7% Discounting	1,300,039,782	1,300,039,782	1,796,346,757	2,857,723,708

*Scenario 1 assumes no additional reactors shut down.
†Scenario 2 assumes additional reactors shut down.
‡SNF storage at the generation sites occurs during proposed CISF project years 1 to 40
§SNF transport to the repository based on the schedule in EIS Table 8.3-4.
‖ Consistent with the Office of Management and Budget guidance (OMB, 2003), this cost-benefit analysis uses discount rates of three and seven percent
Source: Modified from ISP, 2020

The estimated ISFSI operating costs for the No-Action alternative were based on the amount of SNF that would be stored at the proposed CISF. The cost-benefit analysis considered two key factors: the number of reactor sites associated with the amount of SNF that would be stored at the proposed CISF and whether these reactor sites were active (i.e., operating) or decommissioned. The applicant assumed that the No-Action alternative costs relevant to the proposed action (Phase 1) were based on storing 5,000 MTU [5,500 short tons] of SNF at 9 reactor sites over a 40-year period. For full build-out (Phases 1–8), the No-Action alternative costs were based on storing 40,000 MTU [44,000 short tons] of SNF at 36 reactor sites [i.e., an additional 27 sites relative to the proposed action (Phase 1)] over a 40-year period. It is important to identify whether the SNF is being stored at a decommissioned site or an active site because the estimated annual operations and maintenance costs vary for these two types of sites. Operations and maintenance costs at an active site are lower because of efficiencies gained by the presence of an operating reactor. The annual operation and maintenance costs for storing SNF at a decommissioned reactor site were estimated to be $10,864,743 (2019 constant dollars), whereas this cost was estimated at $1,086,474 (2019 constant dollars) for a site with an operating reactor (ISP, 2020). When determining the number of sites categorized in the active and decommissioned categories for the cost-benefit analysis, the applicant considered the types of SNF storage systems the applicant proposes to store at the proposed CISF (EIS Section 2.2.1.2). The applicant assumed that at project year one of the proposed CISF, eight reactor sites were already decommissioned, and two sites were in process of being decommissioned. For the nine reactor sites associated with the proposed action (Phase 1), this means at project year one, eight sites are already decommissioned, and one site was in process of being decommissioned. For the 36 reactor sites associated with the full build-out (Phases 1-8), this means at project year 1, 8 sites were already decommissioned, 2 sites were in process of being decommissioned, and 26 sites were operating.

For the No-Action alternative cost-benefit analysis, the NRC staff generated two different overall cost estimates based on two different applicant-proposed scenarios. Scenario 1 assumes that no additional reactors shut down, and Scenario 2 assumes that additional reactors shut down. For the proposed action (Phase 1), the cost estimates for the two scenarios were the same because there was no difference concerning operational status of the nine sites in question (i.e., for both scenarios, eight sites were already decommissioned, and the ninth site was already in process of being decommissioned). This was not the case for 36 sites under consideration for full build-out (Phases 1-8). For the 36 reactor sites associated with the full build-out (Phases 1-8), at project year 1, 8 sites were already decommissioned, 2 sites were in process of being decommissioned, and 26 sites were operating. Under Scenario 1 for full build-out (Phases 1-8), the 26 operating sites continued to operate over the 40-year period of the proposed CISF. Under Scenario 2 for full build-out (Phases 1-8), the 26 operating reactors undergo decommissioning based on a schedule the applicant provided (ISP, 2020). Scenario 2 bounds the storage costs for full build-out (Phases 1-8) because the annual estimated operations costs would increase from $1,086,474 (2019 constant dollars) to $10,864,743 (2019 constant dollars) for the active sites transitioning to decommissioned sites.

8.4.2.2 Economic and Other Benefits

EIS Section 8.5 compares the estimated costs of the proposed CISF to the No-Action alternative and discusses the net economic outcome of this comparison. This quantitative comparison is based on the cost factors incorporated into EIS Tables 8.3-3 and 8.4-1. Under the No-Action alternative, SNF would continue to be stored at the various generation sites. Other benefits experienced at these generation sites are analyzed and documented in each EIS associated with those specific generation sites.

8.5 Comparison of the Alternatives

8.5.1 Comparison of the Environmental Costs and Benefits

For the environmental costs and benefits, the key distinction between the proposed CISF and the No-Action alternative is the location where the impacts occur. Under the proposed action (Phase 1), the environmental impacts of storing SNF would occur at a new location: the proposed ISP CISF site. In addition, environmental impacts would continue to occur at the generation site ISFSIs, with the exception of any generation sites that are fully decommissioned such that NRC terminates its license and releases the property for other uses. Under the No-Action alternative, environmental impacts from storing SNF would continue to occur at the generation site ISFSI and would not expand to the proposed ISP site.

The proposed CISF consists of two SNF transportation campaigns while the No-Action alternative consists of just one campaign. This affects more than just the estimated costs. As described in EIS Section 4.3, the No-Action alternative results in a net reduction in overall occupational and public exposures from the transportation of SNF, because the overall distance traveled from reactor sites to a repository would likely be less than from reactor sites to the proposed CISF and then to a repository. Similarly, as described in EIS Section 5.7.2.1, this overall reduction in the distance SNF would likely travel means that the No-Action alternative would generate fewer combustion air emissions than the proposed CISF.

8.5.2 Comparison of the Economic and Other Costs and Benefits

For both the proposed action (Phase 1) and full build-out (Phases 1-8), the NRC staff compared the proposed CISF costs to the No-Action alternative costs. This quantitative comparison is based on the cost factors incorporated into EIS Tables 8.3-3 and 8.4-1. The NRC staff generated net values by subtracting the proposed CISF costs from the associated No-Action alternative costs. If the results were positive, then the No-Action alternative costs were higher than the proposed CISF costs and the proposed project generated a net benefit. If the results were negative, then the No-Action alternative costs were lower than the proposed CISF costs and the proposed project generated a net cost. Costs were also estimated with no discounting as well as discounting at 3 and 7 percent.

The amount of SNF associated with the proposed action (Phase 1) cost estimates was 5,000 MTU [5,500 short tons]. The amount of SNF associated with the full build-out (Phases 1-8) cost estimates was 40,000 MTU [44,000 short tons]. The time frame associated with both the proposed action (Phase 1) and full build-out (Phases 1-8) was the same: 40 years. The proposed CISF estimated costs for both the proposed action (Phase 1) and full build-out (Phases 1-8) included two scenarios: a low operation cost estimate (Scenario A) and a high operation cost estimate (Scenario B). The No-Action alternative costs for both the proposed action (Phase 1) and full build-out (Phases 1-8) also included two scenarios: no additional reactors decommissioned (Scenario 1) and additional reactors decommissioned (Scenario 2).

EIS Table 8.5-1 compares the proposed action (Phase 1) costs to the associated No-Action alternative costs. For the proposed action (Phase 1), the No-Action alternative cost estimates for Scenario 1 (no additional reactors decommissioned) and Scenario 2 (additional reactors decommissioned) were the same because this schedule for the mix of active and decommissioned sites over the 40-year license term were the same for the 9 sites under consideration. For the proposed action (Phase 1), this resulted in the net values also being the same for Scenarios 1 and 2. In all cases, the No-Action alternative costs exceed the proposed action (Phase 1) costs (i.e., a net benefit for the proposed CISF).

EIS Table 8.5-2 compares the full build-out (Phases 1-8) costs to the associated No-Action alternative costs. In all cases, the No-Action alternative costs exceed the full build-out (Phases 1-8) costs (i.e., a net benefit for the proposed CISF).

Table 8.5-1 Proposed Action (Phase 1) Net Values (2019 Dollars), Which Compares the Costs of the Proposed CISF to the No-Action Alternative

Discount Rate	Proposed Action (Phase 1)	No-Action Alternative		Net Value	
	Scenario A	Scenario 1	Scenario 2	Scenario 1	Scenario 2
0	1,116,832,032	4,094,224,177	4,094,224,177	2,977,392,145	2,977,392,145
3	755,112,738	2,304,739,510	2,304,739,510	1,549,626,772	1,549,626,772
7	567,985,869	1,300,039,782	1,300,039,782	732,053,913	732,053,913
Rate	**Scenario B**	**Scenario 1**	**Scenario 2**	**Scenario 1**	**Scenario 2**
0	1,400,591,736	4,094,224,177	4,094,224,177	2,693,632,441	2,693,632,441
3	920,053,410	2,304,739,510	2,304,739,510	1,384,686,100	1,384,686,100
7	663,840,032	1,300,039,782	1,300,039,782	636,199,750	636,199,750

Source: EIS Tables 8.3-3 and 8.4-1.

Table 8.5-2 Full Build-out (Phases 1-8) Net Values (2019 Dollars), Which Compares the Costs of the Proposed CISF to the No-Action Alternative					
Discount Rate	**Full Build-out (Phases 1-8)**	**No-Action Alternative**		**Net Value**	
	Scenario A	**Scenario 1**	**Scenario 2**	**Scenario 1**	**Scenario 2**
0	3,862,764,382	5,580,774,563	10,771,948,925	1,718,010,181	6,909,184,543
3	2,173,459,770	3,178,471,120	5,691,371,029	1,005,011,350	3,517,911,259
7	1,288,536,263	1,796,346,757	2,857,723,708	507,810,494	1,569,187,445
Discount Rate	**Full Build-out (Phases 1-8)**	**No-Action Alternative**		**Net Values**	
	Scenario B	**Scenario 1**	**Scenario 2**	**Scenario 1**	**Scenario 2**
0	4,170,338,236	5,580,774,563	10,771,948,925	1,410,436,327	6,601,610,689
3	2,348,012,784	3,178,471,120	5,691,371,029	830,458,336	3,343,358,245
7	1,387,784,858	1,796,346,757	2,857,723,708	408,561,899	1,469,938,850
Source: EIS Tables 8.3-3 and 8.4-1					

The proposed CISF and No-Action alternative also share or have in common other SNF transportation cost factors. A key difference between the proposed CISF and the No-Action alternative concerning these other common cost factors is the time these activities occur. For example, infrastructure improvements at or near generation sites would be needed for some generation sites (e.g., decommissioned sites) that no longer have the ability to transport SNF from the current storage location to the national rail route. This cost was not quantified in this EIS, because it (i) would be difficult to establish, (ii) would vary based on the individual generation sites, and (iii) would be a common need for both the proposed CISF and the No-Action alternative.

It is also possible that transporting SNF across the country would require infrastructure improvements along the national rail route. This could be the case for both the proposed CISF and the No-Action alternative. However, because the routes for transportation have not yet been established, the need for (and hypothetical cost of) infrastructure upgrades is speculative and beyond the scope of the EIS.

Another cost factor shared by the proposed CISF and the No-Action alternative is emergency preparedness along the SNF transportation route. States are recognized as responsible for protecting public health and safety during radiological transportation accidents. Federal agencies are prepared to monitor transportation accidents and provide assistance if requested by States to do so. Nationwide, there are many shipments of radioactive material each year for which the States already provide capable emergency response, and a discussion about funding for emergency response is in EIS Section 4.11.

8.6 References

10 CFR 51.71. Code of Federal Regulations, Title 10, *Energy*, § 51.71, “Draft environmental impact statement - contents.” Washington, DC: U.S. Government Publishing Office.

DOE. “Final Supplemental 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-0250F-S1. ADAMS Accession No. ML081750191 Package. Washington, DC: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. 2008. <https://www.nrc.gov/docs/ML0817/ML081750191.html>

ISP. “WCS Consolidated Interim Spent Fuel Storage Facility Environmental Report, Docket No. 72-1050, Revision 3.” ADAMS Accession No. ML20052E144. Andrews, Texas: Interim Storage Partners LLC. 2020.

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NRC. NUREG–1748, “Environmental Review Guidance for Licensing Actions Associated With NMSS Programs.” ADAMS Accession No. ML032450279. Washington, DC: U.S. Nuclear Regulatory Commission. August 2003.

OMB. “Circular A-4: Regulatory Analysis.” NRC000060. ADAMS Accession No. ML11231A834. Washington, DC: Office of Management and Budget. 2003.

9 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

This chapter summarizes the potential environmental impacts of the proposed action (Phase 1), full build-out (Phases 1-8), and the No-Action alternative. The potential impacts of the proposed action (Phase 1) and full build-out (Phases 1-8) are discussed in terms of (i) unavoidable adverse environmental impacts, (ii) irreversible and irretrievable commitments of resources, (iii) short-term impacts and uses of the environment, and (iv) long-term impacts and the maintenance and enhancement of productivity. The information is presented for each of the 13 resource areas the proposed consolidated interim storage facility (CISF) project may affect. This information addresses the impacts during each phase of the project (i.e., construction, operations, and decommissioning). The NRC staff's preliminary recommendation regarding the proposed action is found in EIS Section 2.5.

9.1 Potential Environmental Impacts

The potential environmental impacts from the proposed CISF project are summarized in Environmental Impact Statement (EIS) Table 9.1-1.

The following terms are defined in NUREG–1748 (NRC, 2003).

- Unavoidable adverse environmental impacts: applies to impacts that cannot be avoided and for which no practical means of mitigation are available.
- Irreversible: involves commitments of environmental resources that cannot be restored.
- Irretrievable: applies to material resources and will involve commitments of materials that, when used, cannot be recycled or restored for other uses by practical means.
- Short-term: represents the period from construction to the end of the decommissioning activities and, therefore, generally affects the present quality of life for the public.
- Long-term: represents the period of time following the termination of the U.S. Nuclear Regulatory Commission (NRC) license, with the potential to affect the quality of life for future generations.

As discussed in EIS Chapter 4, the significance of potential environmental impacts is categorized as follows:

SMALL: The environmental effects are not detectable or are so minor that they would neither destabilize nor noticeably alter any important attribute of the resource.

MODERATE: The environmental effects would be sufficient to alter noticeably but not to destabilize important attributes of the resource.

LARGE: The environmental effects would be clearly noticeable and are sufficient to destabilize important attributes of the resource.

Section 9.2 describes the proposed action, and Section 9.3 describes the No-Action alternative.

Table 9.1-1 Summary of Environmental Impacts of the Proposed CISF Project

Impact Category	Unavoidable Adverse Environmental Impacts	Irreversible and Irretrievable Commitment of Resources	Short-Term Impacts and Uses of the Environment	Long-Term Impacts and the Maintenance and Enhancement of Productivity
Land Use	For the proposed action (Phase 1) there would be a SMALL impact to land use. During construction, the total amount of land affected by earthmoving activities to construct the storage pads, facilities, and associated infrastructure would be approximately 130 ha [320 ac] with an additional 3.4 ha [9 ac] of land used for the rail sidetrack, site access road, and construction laydown areas. The disturbed land would be fenced off from livestock grazing for the license term.	No impact. There would be no irreversible and irretrievable commitment of land resources from implementing the proposed CISF project. The duration of the project would be the 40-year license term, after which time the land could be reclaimed and made available for other WCS uses.	There would be a SMALL impact to land use from implementing the proposed project. The proposed CISF project would cause temporary alteration of rangeland and short-term restricted access to adjacent lands. Approximately 130 ha [320 ac] of land would be controlled and unavailable for other uses; oil and gas exploration could coexist in the vicinity of the proposed project area.	There would be no long-term impact to land resources from implementing the proposed CISF project. The land would be available for other uses following license termination and decommissioning.
Transportation	During the construction, operation, and decommissioning stages of the proposed action (Phase 1) and at full build-out (Phases 1-8), there would be a SMALL increase in local traffic counts associated with project-related traffic on	No impact. There would be no irreversible and irretrievable commitment of resources, except for fuel resources vehicles consume, and equipment operation, heating, commuter traffic, and regional transport. Use of transportation corridors	During the construction, operation, and decommissioning stages of the proposed action (Phase 1) and at full build-out (Phases 1-8), there would be a SMALL increase in local traffic	There would be no long-term impacts to transportation following license termination.

Table 9.1-1 Summary of Environmental Impacts of the Proposed CISF Project

Impact Category	Unavoidable Adverse Environmental Impacts	Irreversible and Irretrievable Commitment of Resources	Short-Term Impacts and Uses of the Environment	Long-Term Impacts and the Maintenance and Enhancement of Productivity
	Texas State Route 176 and other roadways from the proposed CISF project. The potential radiological and nonradiological impacts from operational SNF shipments to and from the proposed CISF under incident-free and accident conditions would be SMALL. Impacts to traffic would be minor from decommissioning the proposed CISF for full build-out (Phases 1-8) because containment of SNF would limit the potential for radiological contamination and cleanup activities.	would return to pre-project usage.	counts associated with project-related traffic on Texas State Route 176 and other roadways from the proposed CISF project. The potential radiological and nonradiological impacts from operational SNF shipments to and from the proposed CISF under incident-free and accident conditions would be SMALL. Impacts to traffic would be minor from decommissioning the proposed CISF for full build-out (Phases 1-8) because containment of SNF would limit the potential for radiological contamination and cleanup activities.	

Table 9.1-1 Summary of Environmental Impacts of the Proposed CISF Project

Impact Category	Unavoidable Adverse Environmental Impacts	Irreversible and Irretrievable Commitment of Resources	Short-Term Impacts and Uses of the Environment	Long-Term Impacts and the Maintenance and Enhancement of Productivity
Geology and Soils	There would be a SMALL impact on geology and soils for the proposed action (Phase 1) and full build-out (Phases 1-8). The construction, operation, and decommissioning stages would disturb surface soils during construction of the proposed facility and infrastructure.	Soil layers would be irreversibly disturbed by the proposed CISF project; however, topsoil would be replaced during decommissioning; therefore, the potential impact would be SMALL. Reseeding and recontouring would mitigate the impact to topsoil of disturbed areas.	There would be a SMALL impact to geology and soils. Topsoil would be replaced during the reclamation of disturbed areas and reseeding processes.	There would be no long-term impacts to geology and soils following license termination and decommissioning.

Table 9.1-1 Summary of Environmental Impacts of the Proposed CISF Project

Impact Category	Unavoidable Adverse Environmental Impacts	Irreversible and Irretrievable Commitment of Resources	Short-Term Impacts and Uses of the Environment	Long-Term Impacts and the Maintenance and Enhancement of Productivity
Surface Waters and Wetlands	There would be a SMALL impact to surface water or wetlands from the proposed project for the proposed action (Phase 1) and full build-out (Phases 1-8). Surface water is primarily limited to ephemeral features. The applicant would use erosion-control mitigation measures such as grading and contouring and implementation of a stormwater pollution management plan to ensure surface water runoff from disturbed areas met Texas Pollutant Discharge Elimination System (TPDES) permit limits.	There would be no irreversible and irretrievable commitment of either surface water or wetlands from implementing the proposed CISF project. There are no wetlands in the area, and no drainage would be significantly altered by the proposed CISF project.	There would be a SMALL impact to surface waters. The proposed CISF project does not produce effluents, and water runoff would be regulated by the TPDES permit.	No impact. The proposed project would discharge stormwater runoff into nearby surface depressions and, under flood conditions, to Ranch House Draw. These features are ephemeral and do not drain to other surface water features in the area.

Table 9.1-1 Summary of Environmental Impacts of the Proposed CISF Project

Impact Category	Unavoidable Adverse Environmental Impacts	Irreversible and Irretrievable Commitment of Resources	Short-Term Impacts and Uses of the Environment	Long-Term Impacts and the Maintenance and Enhancement of Productivity
Groundwater	There would be a SMALL impact on groundwater from the proposed project because of consumptive use of groundwater for the proposed action (Phase 1) and full build-out (Phases 1-8). The proposed CISF would have no effluents; therefore, groundwater quality would not be impacted.	There would be a SMALL impact on groundwater resources because of consumptive use. The proposed CISF would have no effluents; therefore, groundwater quality would not be impacted.	Short-term impacts to groundwater would include water use via a pipeline extending from the existing WCS facility to the proposed facility. Water use would decrease after construction was complete. These impacts would be SMALL.	No long-term impacts to groundwater resources are expected. Consumptive water use would cease after license termination and decommissioning. The proposed CISF would have no effluents; therefore, groundwater quality would not be impacted.

Table 9.1-1 Summary of Environmental Impacts of the Proposed CISF Project

Impact Category	Unavoidable Adverse Environmental Impacts	Irreversible and Irretrievable Commitment of Resources	Short-Term Impacts and Uses of the Environment	Long-Term Impacts and the Maintenance and Enhancement of Productivity
Ecological Resources	There would be SMALL impacts to wildlife and MODERATE impacts to vegetation at the proposed CISF. Construction, operation and decommissioning of the proposed CISF project would result in short-term loss of vegetation. The short-term loss of vegetation could stimulate the introduction and spread of undesirable and invasive, nonnative species, and displacement of wildlife species.	Vegetative communities directly impacted by earthmoving activities and wildlife injuries and mortalities would be irreversible. However, the implementation of mitigation measures, such as the use of fencing to limit wildlife movement and the use of speed limits would reduce potential impacts to wildlife.	During any stage of the proposed CISF project, SMALL direct impacts to ecological resources could include injuries and fatalities to wildlife caused by either collisions with project-related traffic or habitat damage because of the removal of topsoil. Wildlife could be temporarily displaced by increased noise and traffic during operations. The applicant has committed to implement mitigation measures to reduce the potential impact for wildlife species. Some of the vegetative communities that exist within the proposed CISF project could take years to be reestablished, resulting in MODERATE short-term impacts.	Vegetation and wildlife species could experience SMALL long-term impacts if the composition and abundance of both plant and wildlife species in the proposed project area is restored.

Table 9.1-1 Summary of Environmental Impacts of the Proposed CISF Project

Impact Category	Unavoidable Adverse Environmental Impacts	Irreversible and Irretrievable Commitment of Resources	Short-Term Impacts and Uses of the Environment	Long-Term Impacts and the Maintenance and Enhancement of Productivity
Meteorology, Climatology, and Air Quality	There would be a SMALL impact to air quality. During all stages, the generation of air effluents results in the degradation of air quality. The NRC staff considers these impacts minor, primarily because of the low air effluent levels the proposed CISF would generate.	There would be no irreversible or irretrievable commitment of air resources from the proposed CISF project.	There would be a SMALL impact. Fugitive dust and combustion emissions generated primarily from the construction stage has the potential to result in short-term, intermittent impacts in and around the proposed CISF project area. The effect would be localized and temporary. Use of mitigation measures, such as applying water for dust suppression, would limit fugitive dust emissions.	No impact. There would be no long-term effect on air quality either from the proposed project or following license termination.

Table 9.1-1 Summary of Environmental Impacts of the Proposed CISF Project

Impact Category	Unavoidable Adverse Environmental Impacts	Irreversible and Irretrievable Commitment of Resources	Short-Term Impacts and Uses of the Environment	Long-Term Impacts and the Maintenance and Enhancement of Productivity
Noise	There would be a SMALL impact for the proposed action (Phase 1) and full build-out (Phases 1-8). Any noise impacts to onsite and offsite receptors would be short term, intermittent, and mitigated by sound-abatement controls on operating equipment and use of personal hearing protection by workers in high-nose areas.	No impact. There would be no irreversible and irretrievable commitment of resources from implementing the proposed CISF project.	There would be a SMALL impact because of expected noise levels generated during construction and decommissioning activities, most notably in proximity to operating equipment, such as heavy trucks, bulldozers, or excavators. However, noise impacts would be short-term, intermittent, and mitigated by sound-abatement controls on operating equipment and use of personal hearing protection by workers in high-noise areas.	No impact. There would be no noise impact following license termination.

Table 9.1-1 Summary of Environmental Impacts of the Proposed CISF Project

Impact Category	Unavoidable Adverse Environmental Impacts	Irreversible and Irretrievable Commitment of Resources	Short-Term Impacts and Uses of the Environment	Long-Term Impacts and the Maintenance and Enhancement of Productivity
Historic and Cultural Resources	Historic properties would not be affected by the NRC-licensed facility. Impacts on historic and cultural resources during the construction stage would be SMALL for the proposed action (Phase 1) and SMALL for full build-out (Phases 1-8). ISP has an inadvertent discovery plan regarding the discovery of previously undocumented human remains or other items of archeological significance during the project lifetime. These procedures would entail the stoppage of work and the notification of appropriate parties (Federal, Tribal, and State agencies)	If historic and cultural sites are discovered as part of an inadvertent discovery plan but cannot be avoided, or the impacts to these sites cannot be mitigated, this could result in an irreversible and irretrievable loss of cultural resources.	There would be a SMALL impact on historic and cultural resources during the construction stage. If any unidentified historic or cultural resources are encountered, work would stop, and appropriate authorities would be notified per the inadvertent discovery plan.	No impact. If no historic and cultural sites are discovered, there would be no potential impact following license termination.

Table 9.1-1 Summary of Environmental Impacts of the Proposed CISF Project

Impact Category	Unavoidable Adverse Environmental Impacts	Irreversible and Irretrievable Commitment of Resources	Short-Term Impacts and Uses of the Environment	Long-Term Impacts and the Maintenance and Enhancement of Productivity
Visual and Scenic Resources	There will be a SMALL impact on the visual landscape for the proposed action (Phase 1) and full build-out (Phases 1-8). Visual impacts from earthmoving activities that generate fugitive dust would be short term. Mitigation measures would be implemented to reduce fugitive dust. In addition, disturbed areas would be revegetated with native plants as soon as practicable, and debris would be removed after construction activities.	No impact. There would be no irreversible and irretrievable commitment of visual and scenic resources from implementing the proposed CISF project.	There would be a SMALL short-term impact to the visual landscape from the proposed CISF project. The activities would be consistent with the Bureau of Land Management Visual Resource Management designation of the area and the existing natural resource exploration and industrial activities in the area.	No impact. There would be no impact on the visual landscape following license termination and decommissioning.

Table 9.1-1 Summary of Environmental Impacts of the Proposed CISF Project

Impact Category	Unavoidable Adverse Environmental Impacts	Irreversible and Irretrievable Commitment of Resources	Short-Term Impacts and Uses of the Environment	Long-Term Impacts and the Maintenance and Enhancement of Productivity
Socioeconomics	The proposed action (Phase 1) and full build-out (Phases 1-8) would have a SMALL to MODERATE impact on population growth, a SMALL to MODERATE and beneficial impact on local finances because of increased taxes and revenues, and a SMALL impact on employment, housing, school enrollment, and utilities and public services because of the influx of workers and their families from construction.	No impact. There would be no irreversible and irretrievable commitment of socioeconomics resources from implementing the proposed CISF project.	The proposed action (Phase 1) and full build-out (Phases 1-8) would have a SMALL impact on local communities.	Following license termination, workers who supported activities at the proposed CISF project would need to find other employment. There would be a loss of revenue to nearby communities.

Table 9.1-1 Summary of Environmental Impacts of the Proposed CISF Project

Impact Category	Unavoidable Adverse Environmental Impacts	Irreversible and Irretrievable Commitment of Resources	Short-Term Impacts and Uses of the Environment	Long-Term Impacts and the Maintenance and Enhancement of Productivity
Environmental Justice	There would be no disproportionately high and adverse impacts to minority or low-income populations from the construction, operation, and decommissioning of the proposed CISF project both for Phase 1 (the proposed action) and Phases 1-8 (full build-out). While certain Indian Tribes may have a heightened interest in cultural resources the proposed CISF project could potentially affect, the impacts to Indian Tribes in this and other areas is not expected to be disproportionately high or adverse.	No impact. There would be no disproportionately high and adverse impacts to minority or low-income populations from implementing the proposed CISF project.	There would be no disproportionately high and adverse impacts to minority or low-income populations from any of the proposed CISF project.	There would be no long-term environmental justice impacts following license termination and decommissioning. While certain Indian Tribes may have a heightened interest in cultural resources the proposed CISF project could potentially affect, the impacts to Indian Tribes in this and other areas is not expected to be disproportionately high or adverse.

Table 9.1-1 Summary of Environmental Impacts of the Proposed CISF Project

Impact Category	Unavoidable Adverse Environmental Impacts	Irreversible and Irretrievable Commitment of Resources	Short-Term Impacts and Uses of the Environment	Long-Term Impacts and the Maintenance and Enhancement of Productivity
Public and Occupational Health	There would be a SMALL impact on public and occupational health for the proposed action (Phase 1) and full build-out (Phases 1-8). Construction and decommissioning would involve typical occupational hazards associated with construction projects that would not affect the public health. ISP's compliance with Federal and State occupational safety regulations would limit the potential impacts to workers. During operations, based on the facility design and ISP's compliance with the required radiological safety program, the radiological health and safety impacts would be SMALL for workers and the public.	No impact. There would be no irreversible and irretrievable commitment of public and occupational health resources from implementing the proposed CISF project.	There would be a SMALL impact on public and occupational health for the proposed action (Phase 1) and full build-out (Phases 1-8). Construction and decommissioning would involve typical occupational hazards associated with construction projects that would not affect the public health. ISP's compliance with Federal and State occupational safety regulations would limit the potential impacts to workers. During operations, based on the facility design and ISP's compliance with the required radiological safety program, the radiological health and safety impacts would be SMALL for workers and the public.	There would be no long-term impact to public and occupational health following license termination.

Table 9.1-1 Summary of Environmental Impacts of the Proposed CISF Project

Impact Category	Unavoidable Adverse Environmental Impacts	Irreversible and Irretrievable Commitment of Resources	Short-Term Impacts and Uses of the Environment	Long-Term Impacts and the Maintenance and Enhancement of Productivity
Waste Management	There would be a SMALL impact on waste management for the proposed action (Phase 1) and full build-out (Phases 1-8) for construction and operation, and SMALL for decommissioning. Hazardous solid waste, sanitary liquid wastes, nonhazardous solid waste, and LLRW the proposed CISF project would generate would be handled and disposed of appropriately and in accordance with all applicable New Mexico Environment Department (NMED) and/or Texas Council on Environmental Quality (TCEQ) permits. The proposed CISF project would result in SMALL impacts on available disposal capacity because of available capacity at permitted facilities.	The energy consumed during the proposed CISF project stages, the construction materials used that could not be reused or recycled, and the space used to properly handle and dispose of all waste streams would represent an irretrievable commitment of resources, resulting in a SMALL impact.	During all stages of the proposed CISF, hazards associated with handling and transport of wastes would represent a short-term and SMALL impact.	No impact. There would be no long-term impact to waste management following license termination and decommissioning.

9.2 Proposed Action

The proposed action (Phase 1) is the issuance, under the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 72, of an NRC license authorizing the construction and operation of the proposed CISF at the Waste Control Specialists (WCS) site in Andrews County, Texas. Initially, Interim Storage Partners, LLC (ISP) requests authorization to store 5,000 metric tons of uranium (MTUs) [5,500 short tons] that would originate from shutdown or decommissioned commercial nuclear reactor facilities in the United States (ISP, 2018). ISP plans to subsequently request amendments to the license (if granted) to store an additional 5,000 MTUs [5,500 short tons] for each of seven expansion phases of the proposed CISF (a total of eight phases) to be completed over the course of 20 years, to expand the facility to eventually store up to 40,000 MTUs [44,000 short tons] of spent nuclear fuel (SNF) (ISP, 2018). ISP has requested that NRC license the proposed CISF to operate for a period of 40 years (ISP, 2018). ISP stated that it may seek to renew the license and anticipates that the SNF would be stored at the CISF for 60 to 100 years (ISP, 2020). Renewal of the license beyond an initial 40 years would require ISP to submit to NRC a license renewal request, which would be subject to an NRC safety and environmental review at that time.

At the NRC staff's discretion, this EIS evaluates the potential environmental impacts from the proposed action (Phase 1) and the potential seven phases of the CISF expansion. The NRC staff has considered these expansion phases in its description of the affected environment and impact determinations in this EIS. Future expansion phases would require license amendment requests for which NEPA environmental reviews would be conducted. The NRC staff would use the bounding analysis documented in this EIS to facilitate the NEPA reviews for the subsequent expansion license amendments if the NRC staff determines that the bounding analysis is applicable. The EIS refers to the proposed action as Phase 1, and evaluations of the potential full build-out include Phases 1-8. The NRC staff conducted this analysis as a matter of discretion because ISP provided the analysis of the environmental impacts of the future anticipated expansion of the proposed facility as part of its license application (ISP, 2018,2020). For the bounding analysis, the NRC staff assumes the storage of up to 40,000 MTUs [44,000 short tons] of SNF. During operation, the proposed CISF would receive SNF from decommissioned reactor sites, as well as from operating reactors prior to decommissioning. The CISF would serve as an interim storage facility before a permanent geologic repository is available.

The NRC has previously licensed a consolidated spent fuel storage installation, and NRC regulations continue to allow for licensing private away-from-reactor interim spent fuel installations under 10 CFR Part 72. For more information on the NRC's regulation of spent fuel transportation, see https://www.nrc.gov/waste/spent-fuel-transp.html.

9.3 No-Action Alternative

Under the No-Action alternative, the NRC would not approve ISP's license application for the proposed CISF in Andrews County, Texas. The No-Action alternative would result in ISP not constructing nor operating the proposed CISF. No concrete storage pad or infrastructure (rail sidetrack and cask-handling building) for transporting and transferring SNF to the proposed CISF would be constructed. Additionally, the NRC staff assumes that the SNF ISP considers in its license application to be destined for the proposed CISF would remain at commercial reactor or storage sites (in either dry or wet storage), be stored in accordance with NRC regulations, and be subject to NRC oversight and inspection. Site-specific impacts at each of these storage sites would be expected to continue as detailed in generic (NRC, 2013, 2005) or site-specific environmental analyses. In accordance with current U.S. policy, the NRC staff also assumes that the SNF would be transported to a permanent geologic repository, when such a facility becomes available.

9.4 References

10 CFR Part 72. Code of Federal Regulations, Title 10, *Energy*, Part 72. "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste." Washington, DC: U.S. Government Publishing Office.

ISP. "WCS Consolidated Interim Spent Fuel Storage Facility Environmental Report, Docket No. 72-1050, Revision 3." ADAMS Accession No. ML20052E144. Andrews, Texas: Interim Storage Partners LLC. 2020.

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NRC. NUREG–1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants." ADAMS Accession No. ML13106A241. Washington, DC: U.S. Nuclear Regulatory Commission. 2013.

NRC. "Environmental Assessment and Finding of No Significant Impact for the Storage of Spent Nuclear Fuel in NRC-Approved Storage Casks at Nuclear Power Reactor Sites." ADAMS Accession No. ML051230231. Washington, DC: U.S. Nuclear Regulatory Commission. 2005.

NRC. NUREG–1748, "Environmental Review Guidance for Licensing Actions Associated With NMSS Programs." Washington, DC: U.S. Nuclear Regulatory Commission. August 2003.

10 LIST OF PREPARERS

This section documents all individuals who were involved with the preparation of this final Environmental Impact Statement (EIS). Contributors include staff from the U.S. Nuclear Regulatory Commission (NRC) and consultants. Each individual's role, education, and experience are outlined next.

U.S. Nuclear Regulatory Commission Contributors

James Park: Environmental Project Manager; Contracting Officer's Representative (COR)
B.S., Geology, Virginia Polytechnical Institute and State University, 1986
M.S., Structural Geology & Rock Mechanics, University of London, England, 1989
Years of Experience: 25

Diana Diaz-Toro: Environmental Project Manager; Assistant COR
B.S., Chemical Engineering, University of Puerto Rico, 2001
M.B.A., Business Administration, American University, 2007
Years of Experience: 17

Center for Nuclear Waste Regulatory Analyses (CNWRA®) Contributors

Nathan B. Hall: Waste Management
B.S., Fire Protection Engineering, University of Maryland, 2006
M.B.A., Business Administration, Johns Hopkins University, 2012
Years of Experience: 13

Taylor Holt: Water Resources, Cumulative Impacts
B.S., Biological and Agricultural Engineering, Texas A&M University 2014.
M.E., Biological and Agricultural Engineering, Texas A&M University 2017
Years of Experience: 5

Lane Howard: Principal Investigator, National Environmental Policy Act (NEPA) Reviewer
B.S., Civil Engineering, Texas A&M University 1988.
M.S., Nuclear Engineering, Texas A&M University 1995.
Years of Experience: 30

Miriam Juckett: Senior Program Manager, NEPA Reviewer, Public Outreach
B.S., Chemistry, University of Texas at San Antonio, 2003
M.S., Environmental Sciences, University of Texas at San Antonio, 2006
Years of Experience: 16

Patrick LaPlante: Transportation, Public and Occupational Health
B.S., Environmental Studies, Western Washington University, 1988
M.S., Biostatistics and Epidemiology, Georgetown University, 1994
Years of Experience: 31

Amy Hester Minor: Ecological Resources, Socioeconomics, Environmental Justice
B.A., Environmental Studies, University of Kansas, 1998
Years of Experience: 20

Marla Morales: Land Use, Geology and Soils
B.A., Geology, Vanderbilt University, 2001
M.S., Geology, University of Texas at San Antonio, 2007
Years of Experience: 18

James Prikryl: Noise, Visual and Scenic, Groundwater Resources
B.S., Geology, University of Texas at Austin, 1984
M.A., Geology, University of Texas at Austin, 1989
Years of Experience: 30

Bradley Werling: Meteorology, Climatology, Air Quality, Cost Benefit
B.A., Engineering Physics, Westmont College, Santa Barbara, 1985
B.S., Chemistry, Southwest Texas State University, 1999
M.S., Environmental Science, University of Texas at San Antonio, 2000
Years of Experience: 26

CNWRA Consultants and Subcontractors

Hope Luhman: National Historic Preservation Act Section 106 Support
B.A., Anthropology, Muhlenberg College, 1980
M.A., Social Relations, Lehigh University, 1982
M.A., Anthropology, Bryn Mawr College, 1988
Ph.D., Anthropology, Bryn Mawr College, 1991
Years of Experience: 32

Andrew Wilkins: Cultural and Historic Resources
B.A., Historic Preservation, University of Mary Washington, 2006
M.A., Historical Archaeology, University of Massachusetts Boston, 2009
Ph.D., Anthropology, University of Tennessee, 2017
Years of Experience: 13

11 DISTRIBUTION LIST

The U.S. Nuclear Regulatory Commission (NRC) is providing copies of this Environmental Impact Statement (EIS) to the organizations and individuals listed as follows. The NRC will provide copies to other interested organizations and individuals upon request.

Federal Agency Officials

U.S. Senator for Texas
John Cornyn
1500 Broadway, Suite 1230
Lubbock, TX 79401

U.S. Senator for Texas
Ted Cruz
9901 IH-10W, Suite 950
San Antonio, TX 78230

U.S. Senator for New Mexico
Tom Udall
102 W. Hagerman Street
Suite A
Carlsbad, NM 88220

U.S. Senator for New Mexico
Martin Heinrich
200 East 4th St., Ste 300
Roswell, NM 88201

Christina Williams
U.S. Fish and Wildlife Service
Austin Ecological Services Field Office
10711 Burnet Road
Suite 200
Austin, TX 78758

Mel Massaro
U.S. Department of Transportation
Federal Railroad Administration
Office of Safety
526 Mountain Ave
Altoona, PA 16602

U.S. Department of Agriculture (USDA)-Natural Resource Conservation Service (NRCS)
USDA-NRCS Andrews Field Office
103 NE Avenue L Suite B
Andrews, TX 79714

U.S. Environmental Protection Agency – Region 6
1201 Elm Street, Suite 500
Dallas, TX 75270

Tribal Government Officials

Apache Tribe of Oklahoma
Bobby Komardley, Chairman
PO Box 1220
Anadarko, OK 73005

Comanche Nation
William Nelson, Chairman
PO Box 908
Lawton, OK 73502

Jim Arterberry, THPO
Marina Callahan, THPO
PO Box 908
Lawton, OK 73502

Kiowa Tribe of Oklahoma
Matthew M. Komalty, Chairman
P.O. Box 369
Carnegie, OK 73015

Kellie J. Poolaw, acting THPO
PO Box 50
Carnegie, OK 73015

Lipan Apache Tribe of Texas
Bernard F. Barcena, Jr., Chairman
P.O. Box 5218
McAllen, TX 78502

Mescalero Apache Tribe
Arthur “Butch” Blazer, President
PO Box 227
Mescalero, NM 88340

Holly Houghton, THPO
PO Box 227
Mescalero, NM 88340

Texas Band of Yaqui Indians
Iz Sotelo Ramirez, Governor
P.O. Box 12076
Lubbock, TX 79452

Tonkawa Tribe of Oklahoma
Russel Martin, President
1 Rush Buffalo Road
Tonkawa, OK 74653

Wichita and Affiliated Tribes
Terri Parton, President
P.O. Box 729
Anadarka, OK 73005

Ysleta del Sur Pueblo
Carlos Hisa, Governor
PO Box 17579
117 S. Old Pueblo Rd.
El Paso, TX 79907

State Agency Officials

Texas Commission on Environmental Quality (TCEQ)
P.O. Box 13087
Austin, TX 78711

TCEQ Region 7 Field Office
9900 W IH-20, Suite 100
Midland, TX 79706

Secretary of New Mexico Environment Department
Harold L. Runnels Building
1190 St. Francis Drive, Suite N4050
Santa Fe, NM 87505

Texas Parks and Wildlife Department
Richard Hanson
4200 Smith School Road
Austin, TX 78744

Texas State Historic Preservation Officer
P.O. Box 12276
Austin, TX 78711-2276

Ron Kellermueller
New Mexico Department of Game and Fish
One Wildlife Way
PO Box 25112
Santa Fe, NM 87507

New Mexico State Historic Preservation Officer
New Mexico Historic Preservation Division
New Mexico Department of Cultural Affairs
Bataan Memorial Building
407 Galisteo Street, Suite 236
Santa Fe, NM 87501

<u>Local Agency Officials</u>

Stephen Aldridge
Mayor of Jal
P.O. Drawer 340
309 Main St.
Jal, NM 88252

Flora Braly
Mayor of Andrews
111 Logsdon
Andrews, TX 79714

Andrews County Commissioners
Andrews County Courthouse
201 N. Main
Andrews, TX 79714

David B. Cutbirth
Mayor of Monahans
112 W. 2nd St.
Monahans, TX

John Belcher
Mayor of Seminole
302 S. Main Street
Seminole, TX 79360

Gaines County Commissioners
Gaines County Courthouse
101 S. Main Street
Seminole, TX 79360

Billy Hobbs
Mayor of Eunice
1106 Ave. J
P.O. Box 147
Eunice, NM 88231

Sam Cobb
Mayor of Hobbs
City Hall
200 E. Broadway
Hobbs, NM 88240

Lea County Commissioners
City Hall
200 E. Broadway Street
Hobbs, NM 88240

Jerry L. Phillips
Mayor of Kermit
110 S. Tornillo Street
Kermit, TX 79745

Winkler County Commissioners
100 E. Winkler Street
Kermit, TX 79745

Mayor of Lovington
City Hall
214 S. Love
Lovington, NM 88260

Soil and Water Conservation District of Andrews, TX
103 NE Ave. L, Suite B
Andrews, TX 79714

Other Organizations and Individuals

Robby Rogers
Andrews Economic Development Board
111 Logsdon
Andrews, TX 79714

Steve Vierck,
Economic Development Corporation of Lea County
200 E. Broadway St., Suite A201
Hobbs, NM 88240

Andrews County Library
109 NM 1st Street
Andrews, TX 79714

Gaines County Library
704 Hobbs Hwy
Seminole, TX 79360

Hobbs Public Library
509 N Shipp St.
Hobbs, NM 88240

Winkler County Library
307 S Poplar Street
Kermit, TX 79745

Eunice Public Library
1003 Ave. N
Eunice, NM 88231

Yoakum County Library
205 W. 4th Street
Denver City, TX 79323

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APPENDIX A

CONSULTATION CORRESPONDENCE

APPENDIX A—CONSULTATION CORRESPONDENCE

The Endangered Species Act of 1973, as amended, and the National Historic Preservation Act of 1966 require that Federal agencies consult with applicable State and Federal agencies and groups prior to taking action that may affect threatened and endangered species, essential fish habitat, or historic and archaeological resources. This appendix contains consultation documentation related to these Federal acts.

Table A-1 Chronology of Consultation Correspondence

Author	Recipient	Date of Letter	ADAMS Accession Number
U.S. Nuclear Regulatory Commission (C.G. Erlanger)	Ysleta del Sur Pueblo Tribe (C. Hisa)	February 1, 2017	ML16344A076
U.S. Nuclear Regulatory Commission (C. Roman)	U.S. Fish and Wildlife Service (A. Zerrenner)	February 3, 2017	ML17010A368
U.S. Nuclear Regulatory Commission (C.G. Erlanger)	Apache Tribe of Oklahoma (B. Komardly) Mescalero Apache Tribe (D. Breuninger) Kiowa Indian Tribe of Oklahoma (M.M. Komalty) Comanche Tribe (W. Nelson, Sr.)	March 24, 2017	ML17067A383 ML17067A370 ML17067A379 ML17067A389
Ysleta del Sur Pueblo Tribe (J. Loera)	U.S. Nuclear Regulatory Commission (C.G. Erlanger)	March 13, 2017	ML17075A228
Comanche Nation (T.E. Villicana)	U.S. Nuclear Regulatory Commission (J. Park)	June 29, 2017	ML17192A330
U.S. Nuclear Regulatory Commission (M.F. King)	Advisory Council on Historic Preservation (J.M. Fowler)	May 6, 2019	ML18334A009
U.S. Nuclear Regulatory Commission (M.F. King)	Texas Historical Commission (M. Wolfe)	May 6, 2019	ML18334A008
U.S. Nuclear Regulatory Commission (M.F. King)	New Mexico Historic Preservation Division (J. Pappas)	May 6, 2019	ML18334A007
U.S. Nuclear Regulatory Commission (M.F. King)	Lipan Apache Tribe of Texas (B. Barcena, Jr.) Texas Band of Yaqui Indians (I. Soleto Ramirez)	May 6, 2019	ML19113A262 ML19113A263

Table A-1 Chronology of Consultation Correspondence			
Author	**Recipient**	**Date of Letter**	**ADAMS Accession Number**
U.S. Nuclear Regulatory Commission (M.F. King)	Mescalero Apache Tribe (A. Blazer)	May 7, 2019	ML18345A031
	Apache Tribe of Oklahoma (B. Komardly)		ML18345A030
	Kiowa Tribe of Oklahoma (M.M. Komalty)		ML18345A029
	Yselta del Sur Pueblo Tribe (M. Silvas)		ML18345A102
	Comanche Tribe (W. Nelson, Sr.)		ML18345A072
New Mexico Historic Preservation Division (M.M. Ensey)	U.S. Nuclear Regulatory Commission (J. Park)	May 28, 2019	ML19150A360
U.S. Nuclear Regulatory Commission (M.F. King)	Tonkawa Tribe of Oklahoma (R. Martin)		ML18347A566
	Wichita and Affiliated Tribes (T. Parton)		ML18347A568
Texas Historical Commission (M. Wolfe)	U.S. Nuclear Regulatory Commission (J. Park)	May 30, 2019	ML19231A076
Texas Band of Yaqui Indians (I. Ramirez)	U.S. Nuclear Regulatory Commission (J. Park)	June 11, 2019	ML19203A307

APPENDIX B

SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

APPENDIX B—SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

B.1 Population Growth and Employment

This section provides further information about the U.S. Nuclear Regulatory Commission (NRC) staff's socioeconomics analysis with respect to population growth in the region of influence (ROI) and provides an explanation of the NRC staff's determinations and assessment of ISP's employment and cost estimates.

The NRC staff explains in EIS Sections 3.11.1.1 and 5.11 that population growth is unpredictable in the socioeconomic ROI; however, ISP's environmental report (ER) contains a socioeconomic impact analysis for the proposed CISF that provides population growth estimates of the counties within the ROI that is summarized in Table B–1 (ISP, 2020).

Table B–1 Population Growth Estimates for the Counties Within the Region of Influence Between the Years 2020 and 2040

Year	Andrews County, Texas	Gaines County, Texas	Lea County, New Mexico
2020	19,089	21,316	78,407
2030	22,847	25,746	93,712
2040	26,246	30,997	110,661
Change 2020-2040 (percent)	37.49	45.42	41.14

Source: ISP, 2020

ISP's socioeconomic impact assessment uses IMPLAN, a web-based modeling application that is like the BEA RIMS II model described later in Section B.2. The IMPLAN model provides input and output data for a select region to help assess potential economic effects of proposed projects. ISP's socioeconomic impact assessment is provided in Appendix A of the ER (ISP, 2020). The NRC staff evaluated ISP's socioeconomic assessment and made assumptions about ISP's proposal to determine the potential socioeconomic impacts for this EIS.

ISP estimates in ER Sections 4.2.2 and 4.14 (ISP, 2020) that up to 50 construction workers and up to 60 operation workers would be hired for the proposed project (Phase 1). For this EIS, the NRC staff considered that the peak number of employees for the proposed action (Phase 1) would include 45 to 60 operations employees (ISP, 2020; EIS Section 4.3.1.2), and that an operations workforce of up to 60 workers would overlap with up to 50 construction workers from the construction stage of the proposed project (Phase 1). Therefore, the NRC staff determined that the peak-year employment would be 110 full-time workers (EIS Section 4.11.1.1). However, ISP's socioeconomic impact assessment in ER Appendix A, Table 2-3, estimates that the direct effect on employment from construction of the proposed project (Phase 1) would be 555.3 person-years (ISP, 2020). The NRC staff considered many factors in comparing ISP's worker estimates in the ER text to the worker estimates in the socioeconomic impact assessment in ER Appendix A. However, the NRC staff used the following analysis to determine that the peak-year employment assumption of 110 full-time workers is appropriate to support the potential socioeconomic impacts described in EIS Section 4.11, and that ISP's November 2019 (Rev 5) socioeconomic impact assessment in their ER (ISP, 2020) Appendix A, Section 2.3, reflects employment estimates for construction of full build-out (Phases 1-8).

- ISP's socioeconomic impact assessment in ER Appendix A, Section 2.3, provides employment estimates for the construction of the proposed project (Phase 1), and states that Phases 2-8 are not modeled (ISP, 2020, Appx A Section 2.3). However, the December 2015 versions of ISP's application provided employment estimates that were about 7 times smaller in scale compared to the most recent update (ISP, 2020).

- ISP uses IMPLAN 2017 data to model the socioeconomic impacts from the proposed project (Phase 1) and Phases 2-8. IMPLAN relies on 2017 The North American Industry Classification System (NAICS) sectors to classify types of businesses for the purpose of analyzing the U.S. business economy (ISP, 2020; USCB, 2020). ISP estimates that the business sector identified as 53 "Construction of New Manufacturing Structures" would be most affected by the construction of the proposed project (Phase 1) (ISP, 2020, Appx A Table 2-4). The IMPLAN model accounts for several business sectors that would be affected by the construction of the proposed project; however, for simplicity, and because the NRC staff does not possess all of the assumptions and data that went into the IMPLAN model, the NRC staff uses the Construction of New Manufacturing Structures sector to further evaluate ISP's worker estimates.

- IMPLAN provides a spreadsheet to convert person-years into full-time equivalents (FTE) (IMPLAN, 2020). When 555.3 person-years (ISP's estimate of employment needed for the construction of the CISF) is applied to the conversion spreadsheet under sector 53 for "Construction of New Manufacturing Structures, the result is 537 FTE.

- ER Section 4.14 indicates that construction workers would operate 60 percent of one 2.5-year period that would be needed to construct one phase of the proposed CISF. To convert 60 percent of a 2.5-year period, the NRC staff multiplied the number of months in 2.5 years (30 months) by 0.60 to obtain the result of 18 months. If all 8 phases were constructed, based on ISP's estimates, construction workers would work a combined total of 144 months (i.e., 18 months × 8 phases), or 12 years.

- Dividing 537 FTE by 12 years provides a result of 44.75 FTE per year during construction activities of Phases 1-8 of the proposed CISF. The 44.75 FTE is comparable to ISP's estimate in ER Section 4.14 that a workforce of up to 50 construction workers would be needed to complete the construction stage of each proposed CISF phase.

- ISP estimates that, based on the IMPLAN model, 2,973.8 person-years of nonconstruction employment would be needed during the operations phase over a 40-year license term (ISP, 2020, Appendix A Table 2-6). Converting the person-years from the IMPLAN model under the Waste Management and Remediation Services sector results in 2,867 FTE. Over a 40-year license term, 2,867 FTE would result in 71.6 operations jobs per year, which is comparable to ISP's estimate in ER Section 4.2.2 that a workforce of up to 60 operations workers would be needed each year during the operations stage of the proposed CISF.

- Adding the estimated annual construction workers (44.75) to the estimated annual operations workers (71.6) equals 116.35, which is about 5 percent higher than the NRC staff assumption of 110 construction and operations workers during peak employment that would occur with concurrent construction and operations stages.

The NRC staff used similar steps described in this bulleted list to assess ISP's estimates for indirect and induced jobs that would be created from the proposed CISF project.

B.2 Worker Characterization Methodology

This section provides additional explanation of the methodology used in the socioeconomic analysis described in EIS Section 4.11.

An NRC staff study, Migration and Residential Location of Workers at Nuclear Power Plant Construction Sites, NUREG/CR–2002 (Malhotra, 1981) evaluated behaviors and characteristics of nuclear construction projects and provides a methodology for estimating in-migrating workforce sizes and residential distribution patterns at nuclear sites. The information provided in NUREG/CR–2002 regarding the estimated migration of a workforce was reaffirmed in NRC's most recent EIS for an application to obtain a combined operating license (NRC, 2016) and in NRC's EIS for the International Isotope Fluorine Products (IIFP, or FEP/DUP) site (NRC, 2012). Therefore, the NRC staff considers that the methodology for evaluating behaviors and characteristics of nuclear construction projects described in NUREG/CR–2002 is appropriate to use in this EIS. In addition to the previously mentioned NRC documents, the NRC staff analysis conducted for the Private Fuel Storage (PFS) EIS (NRC, 2001) also contributed to the worker characteristics presented in EIS Table 4.11-2.

The following considerations serve as an example of how the NRC staff derived the information in EIS Section 4.11, including EIS Table 4.11-2. Specifically, the following steps were taken to determine the range of construction workers (10 percent to 30 percent) that may move into the socioeconomic ROI presented in EIS Table 4.11-2:

Step 1: The NRC staff began with ISP's estimate of the number of construction workers that would be employed at any given time during the proposed CISF license term (Phase 1), which is equal to 50 construction workers (first row of EIS Table 4.11-2).

Step 2: The NRC staff noted the estimated percentage of construction workers that, based on previous NRC socioeconomic analyses, would move into the region. An inclusive range of 10 to 30 percent was determined for this EIS (second row of EIS Table 4.11-2) (Malhotra, 1981; NRC, 2001, 2012).

Step 3: The range of construction workers for this EIS that NRC concluded may move into the region during peak employment with concurrent construction and operations stages of the proposed action (Phase 1) was determined (5-15 workers) by calculating 10 percent of 50 construction workers (5 workers), and 30 percent of 50 construction workers (15 workers) (fourth row of EIS Table 4.11-2).

The U.S. Department of Commerce Bureau of Economic Analysis (BEA), Economic and Statistics Division uses an economic model called RIMS II. The NRC staff applied the BEA's RIMS II Type II multipliers for this EIS analysis as explained in EIS Section 4.11.1.1. The BEA RIMS II multipliers used for the socioeconomic region of influence are available from the BEA in four tables, with two tables for Type I multipliers and two for Type II multipliers. Type I multipliers include only inter-industry direct and indirect impacts. The Type II multipliers account for these same direct and indirect impacts as well as for induced impacts that are associated with employee purchases. Type II multipliers are needed for this EIS analysis as explained in EIS Section 4.11.1.1.

Further clarification is provided regarding the employment multipliers for this EIS analysis. The estimated workers that would move into the region would create indirect jobs as described in EIS Section 4.11.1. In this analysis, the NRC staff used the BEA direct-effect employment multiplier for the “Construction” classification to estimate the number of jobs that would be created as a result of construction workers moving into the region, and the “professional, scientific, and technical services” classification to estimate the number of jobs that would be created as a result of nonconstruction workers moving into the region.

When the number of estimated ISP workers that would move into the geographic region that the NRC staff analyzed is multiplied by the direct-effect employment multiplier provided in the BEA RIMS II Table 2.5, the result is the total change of jobs in the region, including the workers that would move into the region. By subtracting one from the direct-effect employment multiplier before multiplying by the number of estimated ISP workers that would move into the region, only the indirect number of jobs is captured. This explains why the multipliers provided in the BEA RIMS II Table 2.5 for the proposed project differ from the multiplier that NRC provides in EIS Table 4.11-2 to determine indirect jobs. The direct-effect employment multipliers used for this project are provided in EIS Table B–2.

Table B–2 Direct-Effect Employment Multipliers (Type II Table 2.5) for the Proposed CISF

Aggregate Industry	Direct-Effect Employment Multiplier	Direct-Effect Employment Multiplier (indirect portion only)
Construction	1.5333	0.5333
Professional, scientific, and technical services	1.4793	0.4793
Source: BEA, 2019		

B.3 Economic Effects from the Proposed CISF

Final demand multipliers are used to provide an estimate of the total economic impact across all industries in the region. The final demand multipliers used to describe the economic impact in the region in EIS Section 4.11.1.1 are shown in Table B–3 followed by a brief description of the three types of final-demand multipliers that the NRC staff used to estimate economic impacts in the region.

Table B–3 Final-Demand Multipliers (Type II Table 2.5) for the Proposed CISF

Aggregate Industry	Final-Demand Total Output	Final-Demand Value Added	Final-Demand Earnings
Construction (Applied to ISP expenditures during the construction stage)	1.4252	0.7744	0.4661
Professional, scientific, and technical services (Applied to ISP expenditures during the operations stage)	1.39232	0.8579	0.5850
Source: BEA, 2019			

- **Total Output**: Output is the base multiplier from which all other multipliers are derived. The output multiplier describes the total output generated as a result of $1 spent in a particular industry. In this case, for every dollar that ISP spends in the ROI to construct the proposed CISF, there is $1.4252 worth of economic activity in the ROI—the original dollar ISP spent and an additional $0.4252.

- **Value added**: The value-added multiplier is a portion of the total output that provides an estimate of the additional value added to the economy as a result of the activity in an industry (i.e., the economic value added to the ROI from the construction of the proposed CISF). Earnings are a part of value added. The rest of value added consists of taxes on production and imports and gross operating surplus, which is a profits-like measure similar to gross domestic product.

- **Earnings**: The earnings multiplier measures the total increase in worker income in the local economy resulting from the increase in income workers receive in a particular industry (i.e., the increase of all workers in the ROI from the wages that ISP pays their workers).

ISP stated in request for additional information (RAI) responses (ISP, 2019) that the assumptions associated with the schedule (e.g., the timing for transporting SNF to the proposed CISF) used for estimating project costs may differ from the assumptions used for assessing the impacts of the proposed action (Phase 1) and full build-out (Phases 1-8) evaluated in this EIS. ISP estimates that the initial construction costs for the proposed action (Phase 1) in the first 2.5 years would be $148.3 million, and that the construction costs for Phase 1 over a 40-year period would be $350.8 million (ISP, 2020, Table 7.4-3 and Appx A Section 2.3; EIS Section 4.11.1.1). The NRC staff multiplied $148.3 and $350.8 million by the BEA multiplier of 1.4252 for the construction industry in the ROI (EIS Table B-3) to determine the potential effect on the economy from ISP's estimated construction costs. For this calculation, the NRC staff assumes that ISP's estimate of $112,071,620 does not include the initial costs that ISP would pay for construction costs ($148.3 and $350.8 million), because $112,071,620 is less than the estimated costs, not more. Therefore, NRC used the indirect portion of the RIMS multiplier, 0.4252, for the following assessment of ISP's estimate for the economic activity that would be generated within the ROI from construction costs for the proposed action (Phase 1) (not including the money ISP spent).

  - Multiplying 0.4252 × $148.3M = $63,057,160 in total output (not including the money ISP spent)

  - Multiplying 0.4252 × $350.8M = $149,166,099 in total output (not including the money ISP spent)

  - ISP estimated an output of $112M is between RIMS estimated total output of $63,057,160 and $149,166,099 (not including the money ISP spent)

The NRC staff used the same method to assess ISP's estimate for the economic activity that would be generated from operations costs for the proposed action (Phase 1), including the money ISP spent (i.e. multiplying the estimated cost of operations by 1.39232 from EIS Table B–3).

B.3 Environmental Justice Supporting Data

This section provides additional information about the methodology and material that the NRC staff used to determine environmental justice populations and to assess the potential for disproportionately high and adverse human health or environmental effects on minority and low-income populations resulting from the proposed construction, operation, and decommissioning of the proposed CISF.

On February 11, 1994, the President signed Executive Order 12898 (59 FR 76290), “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” which directs all Federal agencies to develop strategies that consider environmental justice in their programs, policies, and activities. Environmental justice is described in the Executive Order as “identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.” On December 10, 1997, the Council on Environmental Quality (CEQ) issued Environmental Justice Guidance under the National Environmental Policy Act (NEPA) (CEQ, 1997). The NRC staff has provided general guidelines on the evaluation of environmental analyses in “Environmental Review Guidance for Licensing Actions Associated with NMSS (Nuclear Material Safety and Safeguards) Programs” (NUREG–1748) (NRC, 2003), and issued a final policy statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions (69 FR 52040) and environmental justice procedures to be followed in NEPA documents prepared by the NRC’s Office of Nuclear Material Safety and Safeguards (NMSS). NRC’s NMSS environmental justice guidance, as found in Appendix C to NUREG–1748 (NRC, 2003), recommends that the area for assessment for a facility in a rural area be a circle with a radius of approximately 6.4 km [4 mi] whose centroid is the facility being considered. However, the guidance also states that the scale should be commensurate with the potential impact area. Therefore, the NRC staff determined that, for this project, an environmental justice assessment area with an 80-km [50-mi] radius would be appropriate to be inclusive of (i) locations where people could live and work in the vicinity of the proposed project and (ii) other sources of radiation or chemical exposure. As such, the States of New Mexico and Texas, and each county with land area within the 80-km [50-mi] radius from the center of the proposed CISF project, are considered in the comparative analysis in EIS Sections 3.11.1 and 4.11.1.

Table B–4 presents the detailed census data for the environmental justice review and provides the minority and low-income population data for each census block group within 80 kilometers [50 miles] of the center of the proposed ISP CISF site (USCB, 2017). The State percentages of minority and low-income block groups and the threshold that the NRC staff considered in this EIS are also provided in Table B–4. The following information was used in the environmental justice analysis described in Chapter 3 and Chapter 4 of this EIS.

- Land Use – The proposed CISF is currently unfenced and undeveloped land, except for a gravel road; however, because it is unfenced within the WCS site, it is currently available for cattle grazing. At full build-out (Phases 1-8), the proposed project would disturb approximately 130 ha [320 acres] of land, which would include the contractor parking and laydown area and utility infrastructure construction. Construction would not conflict with any existing Federal, State, local, or Indian Tribe land use plans, grazing rights, recreation, or planned development in the area. The NRC staff concluded in EIS Section 4.2.1 that the land-use impacts resulting from the proposed action (Phase 1) and full build-out (Phases 1-8), including the rail sidetrack, would be SMALL.

- Transportation – Impacts such as increases in traffic, potential changes to traffic safety, and increased degradation of roads would result from the use of roads for shipping equipment, supplies, and produced wastes, as well as because of commuting workers during the lifecycle of the proposed CISF project. The NRC staff concluded in

EIS Section 4.3.1 that the impacts resulting from the proposed action (Phase 1) and full build-out (Phases 1-8) on transportation, including potential radiological health impacts to the public from incident-free transportation of SNF to and from the proposed CISF, would be SMALL.

- Soils – The largest potential for impacts from the proposed action (Phase 1) and Phases 2-8 would result from clearing and grading of soil to a depth of about 3 m [10 ft] below grade, which loosens soil and increases the potential for wind and water erosion (ISP, 2020). Mitigation measures, Texas Pollutant Discharge Elimination System (TPDES) permit requirements, and spill prevention and cleanup plans would be implemented by the applicant to limit soil loss, avoid soil contamination, and minimize stormwater runoff impacts. The NRC staff concluded in EIS Section 4.4.1 that the impacts resulting from the proposed action (Phase 1) and full build-out (Phases 1-8), including the rail sidetrack, on soils would be SMALL.

- Groundwater Quality – The NRC staff concluded that groundwater is not expected to be encountered during construction of the SNF pads, because shallow groundwater is discontinuous and other groundwater is at sufficient depth {over 18 m [60 ft]} below the 3 m [10 ft] excavation depth. ISP's required TPDES permit would set limits on the amounts of pollutants entering ephemeral drainages or surface depressions that may be hydraulically connected to shallow Antlers Formation groundwater. To minimize and prevent spills, ISP would maintain construction equipment in good repair without visible leaks of oil, grease, or hydraulic fluids, and berm all above-ground diesel storage tanks (ISP, 2020). The TPDES permit and associated SWPPP and SPCC Plan would specify additional mitigation measures and BMPs to prevent and clean up spills. Therefore, the NRC staff concluded in EIS Section 4.5.2.1 that the impacts from the proposed action (Phase 1) and full build-out (Phases 1-8), including the rail sidetrack, on groundwater would be SMALL.

- Groundwater Quantity – Potable water for domestic use and livestock watering in the vicinity of the proposed project area is obtained from the Antlers Formation or the Ogallala. Consumptive potable water use of Ogallala Aquifer water for the proposed action (Phase 1) and Phases 2-8 would be supplied by the City of Eunice Water and Sewer Department, which would support the water demands of all CISF facilities. Water use during the construction stage of Phase 1 of the proposed CISF would be approximately 9.46 million liters a year [2.5 million gallons a year], reducing to approximately 7.57 million liters a year [2 million gallons a year] during the construction of Phases 2-8 (ISP, 2020). To reduce consumptive water use during all phases, ISP would use water-conservation practices, including using low-flow toilets, sinks, and showerheads; planting low-water consumption landscaping; monitoring and controlling dust-suppressing water sprays; and using mops and self-contained cleaning machines for localized floor cleaning (ISP, 2020). Therefore, the NRC staff concluded in EIS Section 4.5.2.1 that impacts from the proposed action (Phase 1) and full build-out (Phases 1-8), including the rail sidetrack, on groundwater would be SMALL.

- Ecology – The proposed action (Phase 1) and Phases 2-8 would disturb up to 130 ha [320 ac] of land and displace local wildlife. No impacts to rare or unique habitats, Federally threatened or endangered species, or commercially or recreationally valuable species would result from construction activities at the proposed CISF project. The NRC staff concluded in EIS Section 4.6.1 that potential impacts to ecological resources from the proposed action (Phase 1) and Phases 2-8, including the rail sidetrack, would be

SMALL to MODERATE because (i) there is ample undeveloped land surrounding the proposed project area, which have native vegetation and habitats suitable for native species; (ii) there is abundant suitable habitat in the vicinity of the project to support displaced animals; (iii) there are no rare or unique communities, habitats, or wildlife within the proposed CISF project area; (iv) the impacts from full build-out (Phases 1-8) of the proposed CISF to vegetation would be expected to contribute to the change in vegetation species' composition, abundance, and distribution within and adjacent to the proposed CISF project (i.e., ecosystem function); and (v) the establishment of mature, native plant communities may require decades.

- Air Quality – EIS Section 4.7.1 reports that peak-year emissions, which represent the highest emission levels associated with the proposed CISF project for each individual pollutant in any one year and therefore also represent the greatest potential impact to air quality. The NRC staff concludes in EIS Section 4.7.1 that due to the existing air quality, the proximity of emission sources to receptors, and the proposed CISF project emission levels during the peak-year emissions, including the rail sidetrack, for Phase 1 would be SMALL. The proposed CISF project emission levels for the peak-year impact level determination for Phases 2-8 are comparable to those for the peak year proposed action (Phase 1) impact level determination; therefore, the NRC staff concludes that the potential impacts to air quality during the peak year for proposed action (Phase 1) and full build-out (Phases 1-8), including the rail sidetrack, would be SMALL.

- Socioeconomics – The NRC staff evaluated peak employment in EIS Section 4.11.1, including construction and operation of proposed action (Phase 1) and provided an explanation of a maximum number of workers (i.e., 110) the proposed project would employ. The NRC staff estimated that up to 133 new residents would move into the socioeconomic 3-county ROI, including workers and their families, which would represent an increase of less 0.1 percent in employment and about 0.12 percent population growth. The proposed action (Phase 1) and Phases 2-8 would generate between 1.2 and 4.2 percent in local revenues. The NRC staff concluded in EIS Section 4.11.1 that there would be SMALL impacts on employment, housing, community services, and public utilities within the ROI from the proposed action (Phase 1) and full build-out (Phases 1-8), and in some cases, would have a SMALL to MODERATE impact on population growth and local finances.

- Public Health – A potential consideration under environmental justice is the possibility that, while the potential impact on the physical environment from the proposed CISF would not be large, the impact on a minority or low-income community is disproportionately adverse because the group: (i) is being currently affected by other facilities or environmental problems that leave them disproportionately vulnerable to adverse environmental effects of the facility in question; (ii) has been disproportionately affected by past projects or environmental practices, leaving them more vulnerable now; or (iii) has language barriers, geographical immobility, or inherently poorer access to health care or other response mechanisms than the majority population, again leaving them more vulnerable to any environmental or socioeconomic impact from the proposed project. For this proposed CISF, the expected radiological and nonradiological health impact from the proposed action (Phase 1) and full build-out (Phases 1-8) is SMALL for the general public for either normal operations or credible accidents (EIS Section 4.15); thus, the enhanced vulnerability concern does not apply, because the proposed CISF adds very little risk.

No credible accident scenarios for the proposed CISF were identified with potentially significant releases of radionuclides to the environment that could result in significant effects to any offsite populations (EIS Section 4.15). The overall environmental impact of the accidents at the proposed CISF during the license term is SMALL because safety-related structures, systems, and components are designed to function during and after these accidents. Thus, there is no mechanism for disproportionate environmental effects through accidents on minority residents near the proposed CISF.

Table B–4 Census Block Groups Within 80 Kilometers [50 Miles] of the Proposed CISF Project

County/Tract	Block Group	Individuals Below Poverty Level (%)	Families Below Poverty Level (%)	African American (%)	American Indian and Alaskan Native (%)	Asian (%)	Native Hawaiian or Other Pacific Islander (%)	Some Other Race (%)	Two or More Races (%)	Hispanic Ethnicity (%)
State of New Mexico		20.6	15.6	1.8	8.7	1.3	0.0	0.2	1.6	48.2
Threshold for Environmental Justice Concerns		40.6	35.6	21.8	28.7	21.3	20.0	20.2	21.6	48.2
Eddy County, NM										
Census Tract 7	4	10.3	0.0	2.7	0.0	0.0	0.0	0.9	0.8	39.9
Census Tract 8	1	15.6	12.5	0.0	3.1	0.0	0.0	0.0	2.6	34.8
Census Tract 9	1	2.0	0.5	0.0	0.0	0.0	0.0	0.0	1.9	49.9
Lea County, NM										
Census Tract 1	1	18.2	12.4	3.8	0.6	0.0	0.0	3.5	0.0	86.3
Census Tract 1	2	27.7	20.9	0.0	0.0	0.0	2.2	0.0	0.0	71.8
Census Tract 1	3	25.3	22.7	3.0	0.0	0.0	0.0	8.2	3.3	60.0
Census Tract 2	1	18.9	24.4	0.0	0.0	0.0	0.0	0.0	0.0	57.0
Census Tract 2	2	33.8	30.9	0.0	1.2	0.0	0.0	0.0	1.4	76.3
Census Tract 2	3	18.0	16.1	1.2	2.8	0.0	0.0	0.0	10.0	71.1
Census Tract 3	1	44.0	38.3	31.4	0.0	0.0	0.0	0.0	0.0	67.1
Census Tract 3	2	30.0	13.6	2.4	0.0	0.0	0.0	0.0	0.0	88.1
Census Tract 3	3	30.8	28.1	12.6	0.0	0.0	0.0	0.0	0.0	84.1
Census Tract 3	4	9.2	10.7	1.4	0.0	0.0	0.0	0.0	1.9	71.4
Census Tract 4	1	34.9	32.4	34.7	0.0	0.0	0.0	0.0	0.0	54.2
Census Tract 4	2	26.6	23.2	3.0	1.5	0.0	0.0	0.0	0.0	75.2
Census Tract 4	3	26.1	30.4	6.1	0.0	0.0	0.0	0.0	0.0	93.9
Census Tract 5.02	1	48.8	37.9	14.6	1.7	0.0	0.0	0.0	1.9	48.5
Census Tract 5.02	2	17.5	8.1	1.9	0.0	0.0	0.0	0.0	0.0	63.5
Census Tract 5.02	3	8.1	6.7	0.0	0.0	0.0	0.0	0.0	0.0	60.7
Census Tract 5.02	4	6.8	0.0	15.6	2.7	0.0	0.0	0.0	3.3	55.7
Census Tract 5.02	5	17.5	13.0	0.0	0.0	0.0	0.0	0.0	2.1	47.9
Census Tract 5.02	6	37.0	37.5	0.0	0.0	0.0	0.0	0.0	0.0	42.6
Census Tract 5.03	1	3.5	4.9	4.2	0.0	0.0	0.0	0.0	3.8	47.8
Census Tract 5.03	2	11.3	4.2	11.8	0.0	0.0	0.0	0.0	1.8	14.0
Census Tract 5.03	3	8.5	10.2	0.0	1.0	0.0	0.0	0.0	0.0	33.5
Census Tract 5.04	1	0.7	0.0	5.7	0.0	1.1	0.0	1.4	2.1	14.0

Table B–4 Census Block Groups Within 80 Kilometers [50 Miles] of the Proposed CISF Project

County/Tract	Block Group	Individuals Below Poverty Level (%)	Families Below Poverty Level (%)	African American (%)	American Indian and Alaskan Native (%)	Asian (%)	Native Hawaiian or Other Pacific Islander (%)	Some Other Race (%)	Two or More Races (%)	Hispanic Ethnicity (%)
Census Tract 5.04	2	7.4	4.0	0.0	5.6	0.0	0.0	0.0	3.1	23.4
Census Tract 5.04	3	10.4	13.0	4.1	0.0	0.0	0.0	0.0	21.3	28.1
Census Tract 6	1	12.5	7.6	0.0	0.0	0.0	0.0	0.0	0.0	58.6
Census Tract 6	2	23.1	17.1	0.0	0.0	0.0	0.0	0.0	0.0	43.8
Census Tract 6	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.4
Census Tract 6	4	3.4	0.0	0.6	1.3	0.0	0.0	0.0	0.0	55.0
Census Tract 6	5	54.7	54.6	0.0	0.0	0.0	0.0	0.0	0.0	91.7
Census Tract 6	6	10.6	6.3	15.0	0.0	0.0	0.0	0.0	0.0	76.6
Census Tract 6	7	20.5	19.5	0.3	0.0	0.0	0.0	0.0	0.0	51.3
Census Tract 7.01	1	13.7	7.6	1.1	0.0	1.9	0.0	0.0	0.0	35.7
Census Tract 7.01	2	8.8	5.3	0.0	0.0	0.0	0.0	0.0	0.0	25.8
Census Tract 7.02	1	3.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	78.5
Census Tract 7.02	2	20.5	21.5	4.4	5.0	0.0	0.0	0.0	0.8	45.4
Census Tract 7.03	1	7.1	5.1	5.4	0.0	0.0	0.0	0.0	4.2	43.8
Census Tract 7.04	1	4.1	1.8	0.0	0.2	0.0	0.0	0.0	2.9	42.3
Census Tract 8	1	11.1	10.5	0.0	0.0	0.0	0.0	0.0	0.0	43.9
Census Tract 8	2	16.4	11.3	0.0	0.0	0.0	0.0	0.0	0.0	33.7
Census Tract 8	3	34.7	31.0	0.0	0.6	0.0	0.0	0.0	0.0	83.5
Census Tract 8	4	5.3	4.7	0.0	0.0	0.0	0.0	0.0	0.0	45.7
Census Tract 9	1	7.5	3.9	0.0	0.0	1.1	0.0	0.0	0.0	57.8
Census Tract 9	2	12.6	7.5	0.0	0.0	0.0	0.0	0.0	1.0	57.3
Census Tract 9	3	8.1	11.8	0.0	1.3	0.0	0.0	0.0	2.3	49.3
Census Tract 10.03	1	13.3	11.3	3.0	0.0	0.0	0.0	1.4	0.5	71.4
Census Tract 10.03	2	10.1	4.4	0.0	0.0	0.0	0.0	0.0	0.0	59.5
Census Tract 10.03	3	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.7	75.7
Census Tract 10.03	4	24.5	22.6	0.0	0.0	0.0	0.0	0.0	6.5	57.7

Table B–4 Census Block Groups Within 80 Kilometers [50 Miles] of the Proposed CISF Project

County/Tract	Block Group	Individuals Below Poverty Level (%)	Families Below Poverty Level (%)	African American (%)	American Indian and Alaskan Native (%)	Asian (%)	Native Hawaiian or Other Pacific Islander (%)	Some Other Race (%)	Two or More Races (%)	Hispanic Ethnicity (%)
Census Tract 10.04	1	12.2	8.2	0.0	0.0	0.0	0.0	0.0	0.0	81.8
Census Tract 10.04	2	11.1	9.2	0.0	0.0	0.0	0.0	0.0	0.0	77.4
Census Tract 10.04	3	16.9	6.7	5.1	0.0	0.0	0.0	0.0	0.0	64.1
Census Tract 10.05	1	7.1	10.8	0.9	0.0	0.0	0.0	0.0	0.0	45.5
Census Tract 10.05	2	19.8	26.1	0.0	0.0	0.0	0.0	0.0	0.0	36.1
Census Tract 10.05	3	24.1	18.6	0.0	1.0	0.0	0.0	0.5	0.0	83.2
Census Tract 11	1	9.5	8.5	0.0	1.5	0.0	0.0	0.0	0.8	46.9
Census Tract 11	3	24.5	19.1	0.0	0.0	0.0	0.0	0.0	0.7	43.9
Census Tract 11	4	2.8	3.0	0.0	0.0	0.0	0.0	0.0	0.0	51.4
Census Tract 11	5	3.3	2.4	0.0	0.0	0.0	0.0	0.0	0.0	64.7
State of Texas		16.0	12.4	11.7	0.2	4.5	0.1	0.1	1.6	38.9
Threshold for Environmental Justice Concerns		36.0	32.4	31.7	20.2	24.5	20.1	20.1	21.6	38.9
Andrews County, TX										
Census Tract 9501	1	6.0	4.8	0.3	0.7	1.6	0.0	0.0	0.6	36.7
Census Tract 9502	1	32.2	30.0	6.1	0.0	0.0	0.0	0.0	0.0	66.5
Census Tract 9502	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	51.3
Census Tract 9502	3	16.8	17.0	0.0	0.0	0.0	0.0	0.0	1.7	62.4
Census Tract 9502	4	8.0	8.9	0.0	0.0	0.0	1.5	0.0	0.0	41.1
Census Tract 9502	5	6.3	5.0	0.0	0.0	0.0	0.0	0.0	0.0	37.4

Table B–4 Census Block Groups Within 80 Kilometers [50 Miles] of the Proposed CISF Project

County/Tract	Block Group	Individuals Below Poverty Level (%)	Families Below Poverty Level (%)	African American (%)	American Indian and Alaskan Native (%)	Asian (%)	Native Hawaiian or Other Pacific Islander (%)	Some Other Race (%)	Two or More Races (%)	Hispanic Ethnicity (%)
Census Tract 9502	6	13.5	0.0	3.3	0.0	0.0	0.0	0.0	0.0	38.1
Census Tract 9503	1	20.8	27.1	1.4	0.0	0.0	0.0	0.0	0.0	72.7
Census Tract 9503	2	10.1	4.6	0.4	0.0	0.0	0.0	0.0	12.9	55.0
Census Tract 9503	3	6.4	11.5	0.0	0.0	0.0	0.0	0.0	0.0	92.6
Census Tract 9504	1	3.8	2.3	2.7	0.0	0.0	0.0	0.0	0.0	48.3
Ector County, TX										
Census Tract 22	1	7.8	5.2	0.9	0.0	0.0	0.0	0.0	0.6	52.9
Census Tract 27	2	10.8	8.9	0.0	0.0	0.0	0.0	0.0	0.8	62.9
Census Tract 27	4	47.8	50.0	0.0	0.0	0.0	0.0	0.0	0.0	81.6
Census Tract 30	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.2
Census Tract 30	2	3.6	0.0	8.0	0.5	1.2	0.0	0.0	4.1	16.7
Gaines County, TX										
Census Tract 9501	1	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	84.8
Census Tract 9501	2	5.3	3.8	0.5	0.0	0.0	0.0	0.0	0.8	36.0
Census Tract 9501	3	24.6	12.6	9.1	0.0	0.0	0.0	0.0	0.0	76.5
Census Tract 9501	4	16.6	17.1	0.0	0.0	0.0	0.0	0.0	0.0	88.7
Census Tract 9501	5	23.4	14.5	0.6	0.0	0.0	0.0	0.0	0.0	81.2
Census Tract 9502	1	16.8	10.6	0.0	0.0	0.0	0.0	0.0	0.0	17.2
Census Tract 9502	2	7.9	7.2	1.4	0.2	0.0	0.2	0.0	0.0	24.0

Table B–4 Census Block Groups Within 80 Kilometers [50 Miles] of the Proposed CISF Project										
County/Tract	**Block Group**	**Individuals Below Poverty Level (%)**	**Families Below Poverty Level (%)**	**African American (%)**	**American Indian and Alaskan Native (%)**	**Asian (%)**	**Native Hawaiian or Other Pacific Islander (%)**	**Some Other Race (%)**	**Two or More Races (%)**	**Hispanic Ethnicity (%)**
Census Tract 9502	3	10.9	14.2	0.6	0.0	0.0	0.0	0.0	0.0	16.3
Census Tract 9503	1	9.4	7.5	4.9	0.0	0.2	0.0	0.0	0.0	69.7
Census Tract 9503	2	2.0	0.0	4.1	0.0	0.0	0.0	0.0	0.6	40.9
Census Tract 9503	3	5.0	7.1	0.0	2.0	0.0	0.0	0.0	0.0	35.5
Census Tract 9503	4	4.7	2.9	0.0	0.0	3.0	0.0	0.0	0.0	58.1
Census Tract 9503	5	15.0	12.2	9.1	0.0	2.4	0.0	1.5	0.2	41.5
Loving County, TX										
Census Tract 9501	1	17.1	0.0	0.0	5.4	0.0	0.0	0.0	4.1	16.2
Martin County, TX										
Census Tract 9501	1	4.8	4.1	0.0	0.5	0.0	0.3	0.0	0.2	26.9
Terry County, TX										
Census Tract 9501	3	14.1	15.7	1.2	0.0	0.0	0.0	0.0	3.4	28.6
Winkler County, TX										
Census Tract 9502	1	4.8	6.2	0.0	0.0	0.0	0.0	0.0	2.0	71.1
Census Tract 9502	2	15.1	19.4	0.0	0.0	0.0	0.0	0.0	0.0	45.5
Census Tract 9502	3	25.0	12.6	2.2	0.0	0.0	0.0	0.0	0.0	58.6
Census Tract 9503	1	23.8	14.6	9.1	0.0	0.0	0.0	0.0	0.0	76.4
Census Tract 9503	2	29.4	35.2	0.0	9.4	0.0	0.0	0.0	0.0	58.0

Table B–4 Census Block Groups Within 80 Kilometers [50 Miles] of the Proposed CISF Project

County/Tract	Block Group	Individuals Below Poverty Level (%)	Families Below Poverty Level (%)	African American (%)	American Indian and Alaskan Native (%)	Asian (%)	Native Hawaiian or Other Pacific Islander (%)	Some Other Race (%)	Two or More Races (%)	Hispanic Ethnicity (%)
Census Tract 9503	3	7.3	6.0	0.0	0.0	0.0	0.0	0.0	0.0	51.0
Census Tract 9503	4	25.8	27.3	0.0	0.0	0.0	0.0	0.0	0.7	55.4
Census Tract 9504	1	1.2	0.0	3.5	0.7	0.0	0.0	0.0	1.4	47.2
Census Tract 9504	2	22.7	20.9	0.6	0.0	0.0	0.0	0.0	0.0	44.6
Yoakum County, TX										
Census Tract 9501	1	9.8	6.4	0.0	0.0	0.2	0.0	0.0	0.0	54.8
Census Tract 9502	1	14.5	16.8	0.0	0.0	0.0	0.0	0.0	0.0	90.1
Census Tract 9502	2	14.4	15.1	0.0	0.0	0.0	0.0	0.0	3.0	71.3
Census Tract 9502	3	13.4	6.4	0.0	1.1	0.0	0.0	0.0	0.0	59.5
Census Tract 9502	4	18.3	20.7	0.0	0.0	0.0	0.0	0.0	0.0	60.9
Census Tract 9502	5	5.4	6.8	0.0	0.0	0.0	0.0	0.0	7.7	52.5

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APPENDIX C

COST-BENEFIT ANALYSIS

APPENDIX C—COST-BENEFIT ANALYSIS

This appendix presents the details associated with the estimated costs the NRC staff generated for the Consolidated Interim Storage Facility (CISF) Interim Storage Partners (ISP) proposed for both the proposed action (Phase 1) and full build-out (Phases 1-8), as well as the No-Action alternative. A description of the proposed project, the proposed action, and the No-Action alternative are available in EIS Chapters 1 and 2. As described in EIS Section 8.2, the quantified cost estimates for the proposed CISF and No-Action alternative are discounted. Discounting costs requires information on when activities occur (i.e., the project years when the activities occur). EIS Appendix C, Section C.1 describes the project schedule the NRC staff used for discounting the estimated costs. The discounting calculation also required the NRC staff to estimate costs for the various activities. In this EIS, the staff expressed costs in 2019 constant dollars so that these costs were comparable at a single point in time. EIS Appendix C, Section C.2 describes methodology the NRC staff used to convert costs in 2019 constant dollars. EIS Appendix C, Section C.3 provides the details on how the NRC staff estimated the costs of the proposed CISF presented in EIS Table 8-1 using the information in this appendix. EIS Appendix C, Section C.4 provides the details on how the NRC staff estimated the costs of the No-Action alternative presented in EIS Table 8-3 using the information contained in this appendix. EIS Appendix C, Section C.5 contains references.

C.1 Project Schedule Used for Discounting Calculations

EIS Appendix C, Table C–1 contains the proposed CISF project schedule for both the proposed action (Phase 1) and full build-out (Phases 1-8) the NRC staff used when discounting the estimated costs (i.e., this table identifies the project years when various costs occur). As the applicant stated (ISP, 2019), the assumptions associated with the schedule (e.g., the timing for transporting SNF to the proposed CISF) used for the cost-benefit analyses represent expectations or plans for these activities and may differ from the assumptions used for assessing the impacts of the proposed action (Phase 1) and full build-out (Phases 1-8) in EIS Chapter 4. The applicant provided the schedule for all the activities in EIS Table C–1, except for SNF transportation from the proposed CISF to a repository and the proposed CISF decommissioning, which the NRC staff provided as assumptions in the analysis. For the proposed action (Phase 1), the NRC staff assumed that the SNF transportation from the proposed CISF to a repository would take the same amount of time it took to transport the SNF from the generation sites to the proposed CISF. For full build-out (Phases 1-8), the NRC staff assumed that the SNF transportation from the proposed CISF to a repository starts after the last SNF is received from a generation site [i.e., a nuclear power plant or Independent Spent Fuel Storage Facility (ISFSI)] and continues until the end of the proposed CISF license term. For proposed CISF decommissioning, the NRC staff assumed this activity would take 1 year for both the proposed action (Phase 1) and full build-out (Phases 1-8).

Under the No-Action alterative, SNF would continue to be stored at the generation sites. Two activities are included in the quantified cost estimate in this EIS for the No-Action alternative: (i) operations and maintenance for storing SNF at the generation sites and (ii) SNF transportation from the generation sites to a repository. Generation site operations and maintenance would occur during all 40 years of the proposed CISF license term. For the purpose of discounting the cost estimate in this EIS, the NRC staff assumed that the schedule for transporting SNF from the generation sites to a repository would be the same as the schedule for transporting SNF from the proposed CISF to a repository described in EIS Appendix C, Table C–1.

Table C–1 Project Years When Costs Occur for the Proposed CISF for Both the Proposed Action (Phase 1) and Full Build-out (Phases 1-8)		
Types of Costs	**Project Years when Activity Occurs***	
	Proposed Action (Phase 1)	**Full Build-out (Phases 1-8)**
Design, Engineering, Licensing and Startup Professional Servicers Costs	1-2	1-2
Proposed CISF Infrastructure Costs	1-2 and 21	1-2 and 21
Fuel Storage Facility Costs	1-6, 8-9, 11, and 21	1-5, 8, 10-14, and 17-31
Concrete Overpacks Costs	2-6, 8 and 9	3-5, 8, 10-14, and 17-30
Transportation Infrastructure Costs	1-2	1-3
Administrative Operating Costs	1-40	1-40
Other Transportation and Licensing Fees	1-40	1-40
Annual Operating Costs	1-40	1-40
SNF Transportation from Proposed CISF to Repository Costs	39-40	31-40
Proposed CISF Decommissioning Costs	41	41

*The applicant specified the project years when the following costs occur: Proposed CISF construction, SNF transportation from the generation site to the proposed CISF, and proposed CISF operations and maintenance. For the purpose of discounting the cost estimates, the NRC staff specified when the following activities occur: SNF transportation from the proposed CISF to a repository and proposed CISF decommissioning.
Source: Modified from ISP, 2020

As described in EIS Section 8.3.2.1, the cost estimates generated from these project schedules would be considered bounding from a discounting perspective since (i) these are the baseline schedules without any delays and (ii) delaying activities results in lower estimates for today's costs (i.e., lower present values).

C.2 Estimated Activity Costs Expressed in Constant 2019 Dollars

For this EIS, the NRC staff expressed estimated costs for the various activities in constant 2019 dollars. The applicant expressed the proposed CISF estimated costs for the activities specified in EIS Table C–1 in 2018 dollars. The NRC staff calculated the value for the constant 2019 dollars for these costs by following the Bureau of Labor Statistics (BLS) inflation calculator method (BLS, 2019), which uses the annual average Consumer Price Index (CPI) for a given year. The BLS CPI inflation calculator uses the following formula (hereafter called Equation 1):

$$2019\ Constant\ Dollars = \left(\frac{Current\ Month\ 2019\ CPI}{Annual\ Average\ CPI\ from\ Year\ X}\right) Cost\ in\ Year\ X \qquad \text{Eq. 1}$$

The November 2019 CPI was 257.208 and the annual average CPI from 2018 was 251.107. The NRC staff recognizes that this single CPI value may not fully capture the changes in costs for various construction, operation, and transportation activities; however, using the CPI provides the NRC staff with a method for developing more comparable estimates than using nonadjusted figures from disparate years.

EIS Table C-2 describes how the NRC staff consolidated the ten activities in EIS Table C-1 into five cost estimate categories. As described in this table, the NRC staff divided the costs for the "other transportation and licensing fees" activity from EIS Table C-1 into two different cost estimate categories in EIS Table C-2: "SNF Transportation from Generation Site to Proposed CISF" and "Proposed CISF Operations." The applicant assumed that the proposed CISF operation and maintenance costs would be the same regardless of how much SNF was stored at the proposed CISF (i.e., the estimated annual costs for this activity would be the same no matter how many phases were active during an individual year). The NRC staff generated two overall cost estimates for the proposed CISF based on two different scenarios: a lower proposed CISF operations estimate (Scenario A), which is based on the lower cost estimate for a generic ISFSI, and a higher proposed CISF operations estimate (Scenario B), which is based on the project-specific costs estimated for the proposed CISF. The lower ISFSI operation cost estimate of $4,500,000 the applicant identified (ISP, 2020) was expressed in 2012 dollars. The NRC staff converted this value to 2019 constant dollars using Equation 1, a November 2019 CPI value of 257.208 and an annual average CPI for 2012 of 229.594 (BLS, 2019). The NRC staff assumed that the cost for transporting the SNF from the generation sites to the proposed CISF would be the same as the cost for transporting the SNF from the proposed CISF to the repository. For the SNF transportation to the repository, the NRC staff assumed that this cost would be evenly distributed over the last 2 years of the proposed CISF license term for the proposed action (Phase 1) and the last 10 years of the license term for full build-out (Phases 1-8) (i.e., starting when the last SNF is received from the generation sites until the end of the proposed CISF license term).

Table C–2 Activities Included in the Various Cost Estimate Categories

Cost Estimate Categories	Activities
Proposed CISF Construction	• Design, Engineering, Licensing and Startup Professional Servicers • Proposed CISF Infrastructure • Fuel Storage Facility • Concrete Overpacks
SNF Transportation from Generation Site to Proposed CISF	• Transportation infrastructure • The transportation portion of the activity "other transportation and licensing fees"
Proposed CISF Operations	• Annual Operating Costs • The other license fees of the activity "other transportation and licensing fees"
SNF Transportation from Proposed CISF to Repository	• Transportation infrastructure • The transportation portion of the activity "other transportation and licensing fees"
Proposed CISF Decommissioning	• Proposed CISF Decommissioning

The estimated costs for the No-Action alternative are based on two activities, the cost for operating and maintaining the ISFSIs at the generation sites and the cost for transporting the SNF from the generation sites to a geologic repository. The cost for operating an ISFSI varies based on whether it is associated with an operating reactor. The applicant specified an operation cost of $1,060,703 (2018 constant dollars) for an ISFSI at an active site and $10,607,030 (2018 constant dollars) for one at a decommissioned site (ISP, 2020). The NRC staff converted these values to 2019 constant dollars, as previously described. For the purpose of discounting the cost estimate in this EIS, the NRC staff assumed that schedule and cost for transporting SNF from the generation sites to a repository would be the same as the schedule and cost for transporting the SNF from the proposed CISF to a repository.

C.3 Generating the Estimated Costs for the Proposed CISF

This section provides details on how the NRC staff generated estimated costs for the proposed CISF in EIS Table 8.3-3. The NRC staff calculated the costs for the proposed CISF for four cases in EIS Table 8.3-3: Proposed Action (Phase 1) Scenario A (low operations cost estimate); Proposed Action (Phase 1) Scenario B (high operations cost estimate); full build-out (Phases 1-8) Scenario A (low operations cost estimate); and full build-out (Phases 1-8) Scenario B (high operations cost estimate).

First, the NRC staff calculated the undiscounted costs for each case using the following steps:

- Creating tables that specify the costs for the various cost categories (EIS Table C–2) for each project year based on the activities that occur in each project year (EIS Table C–1) and the estimated costs for these activities expressed in 2019 constant dollars (EIS Section C.2).

- Generating the total costs for each category by adding up the costs of each category over the entire proposed CISF license term.

- Generating the total project costs for each case by adding up the costs of all categories for that case.

EIS Tables C–3, C–4, C–5, and C–6 contain the undiscounted cost estimates for proposed action (Phase 1) Scenario A; proposed action (Phase 1) Scenario B; full build-out (Phases 1-8) Scenario A; and full build-out (Phases 1-8) Scenario B, respectively. The NRC staff used information in these four tables to complete the undiscounted costs in EIS Table 8.3-3.

Table C–3 Undiscounted Cost Estimates in 2019 Constant Dollars for Proposed Action (Phase 1) Scenario A (i.e., Lower Proposed CISF Operations Cost Estimate)

Project Year	Proposed CISF Construction	SNF Transportation to Proposed CISF	Proposed CISF Operations	SNF Transportation to Repository	Proposed CISF Decommissioning	Total Cost
1	76,552,618	73,711,378	5,041,229	0	0	155,305,226
2	65,910,317	142,837,839	5,041,229	0	0	213,789,386
3	11,737,391	2,547,465	5,041,229	0	0	19,326,086
4	40,629,430	7,642,396	5,041,229	0	0	53,313,056
5	40,629,430	7,642,396	5,041,229	0	0	53,313,056
6	40,629,430	7,642,396	5,041,229	0	0	53,313,056
7	0	0	5,041,229	0	0	5,041,229
8	40,629,430	7,642,396	5,041,229	0	0	53,313,056
9	9,028,762	1,698,310	5,041,229	0	0	15,768,302

Table C–3 Undiscounted Cost Estimates in 2019 Constant Dollars for Proposed Action (Phase 1) Scenario A (i.e., Lower Proposed CISF Operations Cost Estimate)						
Project Year	**Proposed CISF Construction**	**SNF Transportation to Proposed CISF**	**Proposed CISF Operations**	**SNF Transportation to Repository**	**Proposed CISF Decommissioning**	**Total Cost**
10	0	0	5,041,229	0	0	5,041,229
11	3,606,215	0	5,041,229	0	0	8,647,444
12	0	0	5,041,229	0	0	5,041,229
13	0	0	5,041,229	0	0	5,041,229
14	0	0	5,041,229	0	0	5,041,229
15	0	0	5,041,229	0	0	5,041,229
16	0	0	5,041,229	0	0	5,041,229
17	0	0	5,041,229	0	0	5,041,229
18	0	0	5,041,229	0	0	5,041,229
19	0	0	5,041,229	0	0	5,041,229
20	0	0	5,041,229	0	0	5,041,229
21	17,854,730	0	5,041,229	0	0	22,895,959
22	0	0	5,041,229	0	0	5,041,229
23	0	0	5,041,229	0	0	5,041,229
24	0	0	5,041,229	0	0	5,041,229
25	0	0	5,041,229	0	0	5,041,229
26	0	0	5,041,229	0	0	5,041,229
27	0	0	5,041,229	0	0	5,041,229
28	0	0	5,041,229	0	0	5,041,229
29	0	0	5,041,229	0	0	5,041,229
30	0	0	5,041,229	0	0	5,041,229
31	3,606,215	0	5,041,229	0	0	8,647,444
32	0	0	5,041,229	0	0	5,041,229
33	0	0	5,041,229	0	0	5,041,229
34	0	0	5,041,229	0	0	5,041,229
35	0	0	5,041,229	0	0	5,041,229
36	0	0	5,041,229	0	0	5,041,229
37	0	0	5,041,229	0	0	5,041,229
38	0	0	5,041,229	0	0	5,041,229
39	0	0	5,041,229	125,682,289	0	130,723,519
40	0	0	5,041,229	125,682,289	0	130,723,519
41	0	0	0	0	56,740,382	56,740,382
Total	350,813,969	251,364,578	201,649,172	251,364,578	56,740,382	1,111,932,680
Source: Modified from ISP, 2020						

Table C–4 Undiscounted Cost Estimates in 2019 Constant Dollars for Proposed Action (Phase 1) Scenario B (i.e., Higher Proposed CISF Operations Cost Estimate)						
Project Year	**Proposed CISF Construction**	**SNF Transportation to Proposed CISF**	**Proposed CISF Operations**	**SNF Transportation to Repository**	**Proposed CISF Decommissioning**	**Total Cost**
1	76,552,618	73,711,378	12,170,532	0	0	162,434,529
2	65,910,317	142,837,839	12,170,532	0	0	220,918,689
3	11,737,391	2,547,465	12,437,087	0	0	26,721,943
4	40,629,430	7,642,396	13,204,163	0	0	61,475,990
5	40,629,430	7,642,396	12,970,196	0	0	61,242,023
6	40,629,430	7,642,396	12,970,196	0	0	61,242,023
7	0	0	12,170,532	0	0	12,170,532
8	40,629,430	7,642,396	12,502,264	0	0	60,774,091
9	9,028,762	1,698,310	12,426,224	0	0	23,153,297
10	0	0	12,170,532	0	0	12,170,532
11	3,606,215	0	12,170,532	0	0	15,776,747

Table C–4	**Undiscounted Cost Estimates in 2019 Constant Dollars for Proposed Action (Phase 1) Scenario B (i.e., Higher Proposed CISF Operations Cost Estimate)**					
Project Year	**Proposed CISF Construction**	**SNF Transportation to Proposed CISF**	**Proposed CISF Operations**	**SNF Transportation to Repository**	**Proposed CISF Decommissioning**	**Total Cost**
12	0	0	12,170,532	0	0	12,170,532
13	0	0	12,170,532	0	0	12,170,532
14	0	0	12,170,532	0	0	12,170,532
15	0	0	12,170,532	0	0	12,170,532
16	0	0	12,170,532	0	0	12,170,532
17	0	0	12,170,532	0	0	12,170,532
18	0	0	12,170,532	0	0	12,170,532
19	0	0	12,170,532	0	0	12,170,532
20	0	0	12,170,532	0	0	12,170,532
21	17,854,730	0	12,170,532	0	0	30,025,262
22	0	0	12,170,532	0	0	12,170,532
23	0	0	12,170,532	0	0	12,170,532
24	0	0	12,170,532	0	0	12,170,532
25	0	0	12,170,532	0	0	12,170,532
26	0	0	12,170,532	0	0	12,170,532
27	0	0	12,170,532	0	0	12,170,532
28	0	0	12,170,532	0	0	12,170,532
29	0	0	12,170,532	0	0	12,170,532
30	0	0	12,170,532	0	0	12,170,532
31	3,606,215	0	12,170,532	0	0	15,776,747
32	0	0	12,170,532	0	0	12,170,532
33	0	0	12,170,532	0	0	12,170,532
34	0	0	12,170,532	0	0	12,170,532
35	0	0	12,170,532	0	0	12,170,532
36	0	0	12,170,532	0	0	12,170,532
37	0	0	12,170,532	0	0	12,170,532
38	0	0	12,170,532	0	0	12,170,532
39	0	0	12,170,532	125,682,289	0	137,852,821
40	0	0	12,170,532	125,682,289	0	137,852,821
41	0	0	0	0	56,740,382	56,740,382
Total	350,813,969	251,364,578	490,308,228	251,364,578	56,740,382	1,400,591,736
Source: Modified from ISP, 2020						

Table C–5	**Undiscounted Cost Estimates in 2019 Constant Dollars for Full Build-out (Phases 1-8) Scenario A (i.e., Lower Proposed CISF Operations Cost Estimate)**					
Project Year	**Proposed CISF Construction**	**SNF Transportation to Proposed CISF**	**Proposed CISF Operations**	**SNF Transportation to Repository**	**Proposed CISF Decommissioning**	**Total Cost**
1	76,552,618	73,711,378	5,041,229	0	0	155,305,226
2	65,910,317	224,660,997	5,041,229	0	0	295,612,544
3	11,285,953	196,805,573	5,041,229	0	0	213,132,756
4	45,143,811	8,491,551	5,041,229	0	0	58,676,592
5	77,195,917	14,435,637	5,041,229	0	0	96,672,783
6	0	0	5,041,229	0	0	5,041,229
7	0	0	5,041,229	0	0	5,041,229
8	49,658,192	9,340,707	5,041,229	0	0	64,040,128
9	0	0	5,041,229	0	0	5,041,229
10	49,658,192	9,340,707	5,041,229	0	0	64,040,128
11	93,893,836	16,983,102	5,041,229	0	0	115,918,168
12	58,686,954	11,039,017	5,041,229	0	0	74,767,199
13	49,658,192	9,340,707	5,041,229	0	0	64,040,128

Table C–5	Undiscounted Cost Estimates in 2019 Constant Dollars for Full Build-out (Phases 1-8) Scenario A (i.e., Lower Proposed CISF Operations Cost Estimate)					
Project Year	Proposed CISF Construction	SNF Transportation to Proposed CISF	Proposed CISF Operations	SNF Transportation to Repository	Proposed CISF Decommissioning	Total Cost
14	49,658,192	9,340,707	5,041,229	0	0	64,040,128
15	0	0	5,041,229	0	0	5,041,229
16	0	0	5,041,229	0	0	5,041,229
17	49,658,192	9,340,707	5,041,229	0	0	64,040,128
18	90,287,622	16,983,102	5,041,229	0	0	112,311,953
19	9,028,762	1,698,310	5,041,229	0	0	15,768,302
20	49,658,192	9,340,707	5,041,229	0	0	64,040,128
21	108,142,352	16,983,102	5,041,229	0	0	130,166,683
22	90,287,622	16,983,102	5,041,229	0	0	112,311,953
23	67,715,717	12,737,327	5,041,229	0	0	85,494,273
24	90,287,622	16,983,102	5,041,229	0	0	112,311,953
25	90,287,622	16,983,102	5,041,229	0	0	112,311,953
26	90,287,622	16,983,102	5,041,229	0	0	112,311,953
27	90,287,622	16,983,102	5,041,229	0	0	112,311,953
28	90,287,622	16,983,102	5,041,229	0	0	112,311,953
29	90,287,622	16,983,102	5,041,229	0	0	112,311,953
30	54,172,573	10,189,862	5,041,229	0	0	69,403,664
31	3,606,215	0	5,041,229	77,964,491	0	86,611,935
32	0	0	5,041,229	77,964,491	0	83,005,720
33	0	0	5,041,229	77,964,491	0	83,005,720
34	0	0	5,041,229	77,964,491	0	83,005,720
35	0	0	5,041,229	77,964,491	0	83,005,720
36	0	0	5,041,229	77,964,491	0	83,005,720
37	0	0	5,041,229	77,964,491	0	83,005,720
38	0	0	5,041,229	77,964,491	0	83,005,720
39	0	0	5,041,229	77,964,491	0	83,005,720
40	0	0	5,041,229	77,964,491	0	83,005,720
41	0	0	0	0	405,340,890	405,340,890
Total	1,691,585,151	779,644,910	201,649,172	779,644,907	405,340,890	3,857,865,030
Source: Modified from ISP, 2020						

Table C–6	Undiscounted Cost Estimates in 2019 Constant Dollars for Full Build-out (Phases 1-8) Scenario B (i.e., Higher Proposed CISF Operations Cost Estimate)					
Project Year	Proposed CISF Construction	SNF Transportation to Proposed CISF	Proposed CISF Operations	SNF Transportation to Repository	Proposed CISF Decommissioning	Total Cost
1	76,552,618	73,711,378	12,170,532	0	0	162,434,529
2	65,910,317	224,660,997	12,170,532	0	0	302,741,846
3	11,285,953	196,805,573	12,431,687	0	0	220,523,213
4	45,143,811	8,491,551	12,513,127	0	0	66,148,489
5	77,195,917	14,435,637	13,291,064	0	0	104,922,618
6	0	0	13,340,365	0	0	13,340,365
7	0	0	12,170,532	0	0	12,170,532
8	49,658,192	9,340,707	12,290,023	0	0	71,288,921
9	0	0	12,404,499	0	0	12,404,499
10	49,658,192	9,340,707	12,290,023	0	0	71,288,921
11	93,893,836	16,983,102	12,621,753	0	0	123,498,692
12	58,686,954	11,039,017	12,779,680	0	0	82,505,650
13	49,658,192	9,340,707	12,757,955	0	0	71,756,854
14	49,658,192	9,340,707	12,523,989	0	0	71,522,888
15	0	0	12,404,499	0	0	12,404,499

Table C–6 Undiscounted Cost Estimates in 2019 Constant Dollars for Full Build-out (Phases 1-8) Scenario B (i.e., Higher Proposed CISF Operations Cost Estimate)						
Project Year	**Proposed CISF Construction**	**SNF Transportation to Proposed CISF**	**Proposed CISF Operations**	**SNF Transportation to Repository**	**Proposed CISF Decommissioning**	**Total Cost**
16	0	0	12,170,532	0	0	12,170,532
17	49,658,192	9,340,707	12,290,023	0	0	71,288,921
18	90,287,622	16,983,102	12,621,753	0	0	119,892,477
19	9,028,762	1,698,310	12,660,190	0	0	23,387,262
20	49,658,192	9,340,707	12,523,989	0	0	71,522,888
21	108,142,352	16,983,102	12,621,753	0	0	137,747,207
22	90,287,622	16,983,102	12,855,719	0	0	120,126,442
23	67,715,717	12,737,327	13,035,372	0	0	93,488,416
24	90,287,622	16,983,102	12,855,719	0	0	120,126,442
25	90,287,622	16,983,102	12,855,719	0	0	120,126,442
26	90,287,622	16,983,102	13,089,686	0	0	120,360,409
27	90,287,622	16,983,102	13,089,686	0	0	120,360,409
28	90,287,622	16,983,102	13,089,686	0	0	120,360,409
29	90,287,622	16,983,102	13,089,686	0	0	120,360,409
30	54,172,573	10,189,862	12,768,818	0	0	77,131,252
31	3,606,215	0	12,638,465	77,964,491	0	94,209,170
32	0	0	12,170,532	77,964,491	0	90,135,023
33	0	0	12,170,532	77,964,491	0	90,135,023
34	0	0	12,170,532	77,964,491	0	90,135,023
35	0	0	12,170,532	77,964,491	0	90,135,023
36	0	0	12,170,532	77,964,491	0	90,135,023
37	0	0	12,170,532	77,964,491	0	90,135,023
38	0	0	12,170,532	77,964,491	0	90,135,023
39	0	0	12,170,532	77,964,491	0	90,135,023
40	0	0	12,170,532	77,964,491	0	90,135,023
41	0	0	12,170,532	0	405,340,890	417,511,423
Total	1,691,585,151	779,644,910	514,122,378	779,644,907	405,340,890	4,170,338,236
Source: Modified from ISP, 2020						

Next, the NRC staff calculated the discounted costs at both 3 and 7 percent for the four cases in EIS Table 8.3-3: proposed action (Phase 1) Scenario A (low operations cost estimate); proposed action (Phase 1) Scenario B (high operations cost estimate); full build-out (Phases 1-8) Scenario A (low operations cost estimate); and full build-out (Phases 1-8) Scenario B (high operations cost estimate). The NRC calculated the discounted costs for each case using the following formula (hereafter called Equation 2):

$$\mathrm{PV} = \frac{Cost}{(1+\ i)T} \qquad \text{Eq. 2}$$

where

PV = present values
Cost = annual cost in 2019 constant dollars
i = discount rate (0.03 or 0.07)
T = project year (1-40)

The last column in EIS Tables C–3 to C–6 provides the cost input for Equation 2 (i.e., “Cost”), and the first column in these tables provides the project year input for this equation (i.e., “T”). Consistent with the Office of Management and Budget guidance (OMB, 2003), this cost-benefit analysis uses discount rates of three percent (i.e., i = 0.03 for Equation 2) and 7 percent (i.e., I = 0.07 for Equation 2). Based on these inputs, the NRC staff calculated the proposed CISF estimated cost at a 3 percent discount rate in EIS Table C–7 and at the 7 percent discount rate in EIS Table C–8. The NRC staff used information in these two tables to complete the discounted costs in EIS Table 8.3-3.

Table C–7 Proposed CISF Estimated Cost in 2019 Dollars Discounted at 3 Percent

Project Year	Proposed Action (Phase 1) Scenario A	Proposed Action (Phase 1) Scenario B	Full Build-out (Phases 1-8) Scenario A	Full Build-out (Phases 1-8) Scenario B
1	150,781,772	157,703,426	150,781,772	157,703,426
2	201,517,001	208,237,052	278,643,174	285,363,226
3	17,686,106	24,454,363	195,046,664	201,809,979
4	47,367,960	54,620,621	52,133,392	58,772,076
5	45,988,310	52,827,907	83,390,792	90,507,172
6	44,648,845	51,289,230	4,221,950	11,172,346
7	4,098,981	9,895,756	4,098,981	9,895,756
8	42,085,819	47,975,628	50,553,869	56,276,133
9	12,085,090	17,745,074	3,863,682	9,507,016
10	3,751,148	9,056,019	47,651,870	53,045,653
11	6,247,098	11,397,458	83,741,751	89,218,082
12	3,535,817	8,536,166	52,440,209	57,867,803
13	3,432,832	8,287,540	43,608,211	48,862,926
14	3,332,846	8,046,156	42,338,069	47,285,055
15	3,235,773	7,811,802	3,235,773	7,961,976
16	3,141,527	7,584,273	3,141,527	7,584,273
17	3,050,027	7,363,372	38,745,331	43,130,970
18	2,961,191	7,148,905	65,971,435	70,424,194
19	2,874,943	6,940,684	8,992,442	13,337,429
20	2,791,206	6,738,529	35,457,466	39,600,489
21	12,307,706	16,140,058	69,971,006	74,045,911
22	2,630,980	6,351,710	58,614,766	62,693,089
23	2,554,349	6,166,708	43,319,243	47,369,809
24	2,479,951	5,987,095	55,250,039	59,094,250
25	2,407,719	5,812,714	53,640,814	57,373,058
26	2,337,591	5,643,412	52,078,460	55,810,487
27	2,269,506	5,479,040	50,561,612	54,184,939
28	2,203,404	5,319,457	49,088,944	52,606,737
29	2,139,227	5,164,521	47,659,169	51,074,502
30	2,076,920	5,014,098	28,593,391	31,777,055
31	3,458,866	6,310,496	34,643,661	37,682,457
32	1,957,696	4,726,268	32,234,195	35,002,767
33	1,900,676	4,588,610	31,295,335	33,983,269
34	1,845,316	4,454,961	30,383,820	32,993,465
35	1,791,569	4,325,205	29,498,855	32,032,491
36	1,739,388	4,199,228	28,639,665	31,099,506
37	1,688,726	4,076,921	27,805,500	30,193,695
38	1,639,540	3,958,175	26,995,631	29,314,267

Table C–7 Proposed CISF Estimated Cost in 2019 Dollars Discounted at 3 Percent				
Project Year	Proposed Action (Phase 1) Scenario A	Proposed Action (Phase 1) Scenario B	Full Build-out (Phases 1-8) Scenario A	Full Build-out (Phases 1-8) Scenario B
39	41,276,415	43,527,517	26,209,350	28,460,453
40	40,074,189	42,259,725	25,445,971	27,631,508
41	16,887,526	16,887,526	120,640,799	124,263,090
Total	752,281,552	920,053,410	2,170,628,585	2,348,012,784
Source: EIS Tables C–3 to C–6				

Table C–8 Proposed CISF Estimated Cost in 2019 Dollars Discounted at 7 Percent				
Project Year	Proposed Action (Phase 1) Scenario A	Proposed Action (Phase 1) Scenario B	Full Build-out (Phases 1-8) Scenario A	Full Build-out (Phases 1-8) Scenario A
1	145,145,071	151,807,971	145,145,071	151,807,971
2	186,731,929	192,958,939	258,199,444	264,426,453
3	15,775,843	21,813,066	173,979,816	180,012,631
4	40,672,275	46,899,738	44,764,091	50,464,365
5	38,011,472	43,664,716	68,926,358	74,808,377
6	35,524,740	40,808,146	3,359,184	8,889,248
7	3,139,424	7,579,196	3,139,424	7,579,196
8	31,028,684	35,371,074	37,271,938	41,490,801
9	8,576,911	12,593,859	2,742,095	6,747,226
10	2,562,705	6,186,881	32,554,754	36,239,673
11	4,108,338	7,495,419	55,071,886	58,673,339
12	2,238,366	5,403,862	33,197,531	36,633,496
13	2,091,931	5,050,338	26,574,376	29,776,543
14	1,955,076	4,719,942	24,835,866	27,737,809
15	1,827,173	4,411,161	1,827,173	4,495,961
16	1,707,639	4,122,580	1,707,639	4,122,580
17	1,595,924	3,852,879	20,273,465	22,568,247
18	1,491,518	3,600,821	33,229,054	35,471,858
19	1,393,942	3,365,254	4,360,067	6,466,773
20	1,302,749	3,145,097	16,549,186	18,482,873
21	5,529,674	7,251,494	31,436,957	33,267,753
22	1,137,872	2,747,049	25,350,286	27,114,120
23	1,063,432	2,567,336	18,034,750	19,721,090
24	993,861	2,399,379	22,141,922	23,682,522
25	928,842	2,242,411	20,693,385	22,133,198
26	868,077	2,095,711	19,339,612	20,725,520
27	811,287	1,958,608	18,074,404	19,369,645
28	758,212	1,830,475	16,891,966	18,102,472
29	708,609	1,710,724	15,786,884	16,918,198
30	662,252	1,598,808	9,117,359	10,132,510
31	1,061,673	1,936,959	10,633,608	11,566,343
32	578,436	1,396,461	9,524,170	10,342,194
33	540,595	1,305,103	8,901,093	9,665,602

Table C–8 Proposed CISF Estimated Cost in 2019 Dollars Discounted at 7 Percent				
Project Year	Proposed Action (Phase 1) Scenario A	Proposed Action (Phase 1) Scenario B	Full Build-out (Phases 1-8) Scenario A	Full Build-out (Phases 1-8) Scenario A
34	505,229	1,219,723	8,318,779	9,033,273
35	472,176	1,139,928	7,774,560	8,442,311
36	441,286	1,065,353	7,265,944	7,890,010
37	412,417	995,657	6,790,602	7,373,842
38	385,437	930,521	6,346,357	6,891,441
39	9,340,850	9,850,274	5,931,174	6,440,599
40	8,729,766	9,205,864	5,543,154	6,019,251
41	3,541,256	3,541,256	25,297,962	26,057,544
Total	566,352,951	663,840,032	1,286,903,345	1,387,784,858
Source: EIS Tables C–3 to C–6				

C.4 Generating the Estimated Costs for the No-Action Alternative

This section provides details on how the NRC staff generated estimated costs for the No-Action alternative in EIS Section 8.4. The NRC staff calculated the costs for the proposed CISF for four cases in EIS Table 8.4-1: proposed action (Phase 1) Scenario 1 (no additional reactors shut down); proposed action (Phase 1) Scenario 2 (additional reactors shut down); full build-out (Phases 1-8) Scenario 1 (no additional reactors shut down); and full build-out (Phases 1-8) Scenario 2 (additional reactors shut down). The applicant assumed that the No-Action alternative costs relevant to the proposed action (Phase 1) were based on storing 5,000 MTU [5,500 short tons] of SNF at 9 reactor sites over a 40-year period. For full build-out (Phases 1-8), the No-Action alternative costs were based on storing 40,000 MTU [44,000 short tons] of SNF at 36 reactor sites over a 40-year period. When determining the number of reactor sites categorized in the active and decommissioned categories for the cost-benefit analysis, the applicant considered the types of SNF storage systems the applicant proposes to store at the proposed CISF (EIS Section 2.2.1.2). The applicant assumed that at project year 1 of the proposed CISF, eight reactor sties were already decommissioned, and two reactor sites were in process of being decommissioned. For the nine reactor sites associated with the proposed action (Phase 1), this means at project year 1, eight sites were already decommissioned, and one site was in process of being decommissioned. For the 36 reactor sites associated with the full build-out (Phases 1-8), this means at project year one, 8 sites were already decommissioned, 2 sites were in process of being decommissioned, and 26 sites were operating. The applicant provided the schedule for when the additional reactors would shut down for Scenario 2 (ISP, 2020). The estimated operation costs at the generation sites (EIS Section 8.4.2.1) vary depending on whether the reactor is operating or shut down.

First, the NRC staff calculated the undiscounted costs for each case using the following steps:

- Creating a table that identifies the number of ISFSIs associated with active and decommissioned sites for the proposed action (Phase 1) (both Scenarios 1 and 2) and full build-out (Phases 1-8) (both Scenarios 1 and 2).
- Creating tables that provide the costs for each project year with the ISFSI operational costs based on the previous bullet point (i.e., active sites vs decommissioned sites).

- Generating the total costs for each activity by adding up the costs of each activity over the entire proposed CISF time frame
- Generating the total project costs for each case by adding up the costs of all activities for that case.

EIS Table C–9 identifies the number of ISFSIs associated with active and decommissioned sites for the proposed action (Phase 1) (both Scenarios 1 and 2) and full build-out (Phases 1-8) (both Scenarios 1 and 2). EIS Tables C–10 and C–11 contain the undiscounted proposed action (Phase 1) cost estimates for Scenarios 1 and 2, respectively. EIS Tables C-12 and C-13 contain the undiscounted full build-out (Phases 1-8) costs for Scenarios 1 and 2, respectively. For full build-out (Phases 1-8), the NRC staff assumed the SNF transportation campaign lasts 10 years. The cost for storing SNF at the generation site is eliminated, because the SNF is relocated to the repository. To account for this, the NRC staff reduced the generation site operation costs by 10 percent each year in EIS Tables C–12 and C–13, which evenly drops the cost for this activity over the 10-year period. Similarly, since the proposed action (Phase 1) SNF transportation campaign lasts 2 years, the cost for storing SNF at the generation sites was reduced by half for project year 40. The NRC staff used information in these tables to complete the undiscounted costs in EIS Table 8.4-1.

Table C–9 Number of ISFSIs Associated with Active and Decommissioned Sites for the Proposed Action (Phase 1) (Both Scenarios 1 and 2) and Full Build-out (Phases 1-8) (Both Scenarios 1 and 2)

Project Year	Scenario 1				Scenario 2			
	Proposed Action (Phase 1)		Full Build-out (Phases 1-8)		Proposed Action (Phase 1)		Full Build-out (Phases 1-8)	
	Active	Decom	Active	Decom	Active	Decom	Active	Decom
1	1	8	28	8	1	8	28	8
2	1	8	28	8	1	8	28	8
3	0	9	27	9	0	9	27	9
4	0	9	27	9	0	9	27	9
5	0	9	26	10	0	9	26	10
6	0	9	26	10	0	9	24	12
7	0	9	26	10	0	9	23	13
8	0	9	26	10	0	9	22	14
9	0	9	26	10	0	9	21	15
10	0	9	26	10	0	9	21	15
11	0	9	26	10	0	9	21	15
12	0	9	26	10	0	9	20	16
13	0	9	26	10	0	9	18	18
14	0	9	26	10	0	9	18	18
15	0	9	26	10	0	9	17	19
16	0	9	26	10	0	9	15	21
17	0	9	26	10	0	9	13	23
18	0	9	26	10	0	9	12	24
19	0	9	26	10	0	9	10	26
20	0	9	26	10	0	9	6	30
21	0	9	26	10	0	9	5	35
22	0	9	26	10	0	9	5	35
23	0	9	26	10	0	9	0	36

Table C–9 Number of ISFSIs Associated with Active and Decommissioned Sites for the Proposed Action (Phase 1) (Both Scenarios 1 and 2) and Full Build-out (Phases 1-8) (Both Scenarios 1 and 2)								
Project Year	Scenario 1				Scenario 2			
	Proposed Action (Phase 1)		Full Build-out (Phases 1-8)		Proposed Action (Phase 1)		Full Build-out (Phases 1-8)	
	Active	Decom	Active	Decom	Active	Decom	Active	Decom
24	0	9	26	10	0	9	0	36
25	0	9	26	10	0	9	0	36
26	0	9	26	10	0	9	0	36
27	0	9	26	10	0	9	0	36
28	0	9	26	10	0	9	0	36
29	0	9	26	10	0	9	0	36
30	0	9	26	10	0	9	0	36
31	0	9	26	10	0	9	0	36
32	0	9	26	10	0	9	0	36
33	0	9	26	10	0	9	0	36
34	0	9	26	10	0	9	0	36
35	0	9	26	10	0	9	0	36
36	0	9	26	10	0	9	0	36
37	0	9	26	10	0	9	0	36
38	0	9	26	10	0	9	0	36
39	0	9	26	10	0	9	0	36
40	0	9	26	10	0	9	0	36
Source: Modified from ISP, 2020								

Table C–10 The No-Action Alternative Undiscounted Cost Estimates (2019 Dollars) for the Proposed Action (Phase 1) – Scenario 1				
Project Year	Operations Cost (Active Sites)	Operations Cost (Decom Sites)	SNF Transportation Cost	Total Cost
1	1,086,474	86,917,944	0	88,004,418
2	1,086,474	86,917,944	0	88,004,418
3	0	97,782,687	0	97,782,687
4	0	97,782,687	0	97,782,687
5	0	97,782,687	0	97,782,687
6	0	97,782,687	0	97,782,687
7	0	97,782,687	0	97,782,687
8	0	97,782,687	0	97,782,687
9	0	97,782,687	0	97,782,687
10	0	97,782,687	0	97,782,687
11	0	97,782,687	0	97,782,687
12	0	97,782,687	0	97,782,687
13	0	97,782,687	0	97,782,687
14	0	97,782,687	0	97,782,687
15	0	97,782,687	0	97,782,687
16	0	97,782,687	0	97,782,687
17	0	97,782,687	0	97,782,687

Table C–10 The No-Action Alternative Undiscounted Cost Estimates (2019 Dollars) for the Proposed Action (Phase 1) – Scenario 1				
Project Year	**Operations Cost (Active Sites)**	**Operations Cost (Decom Sites)**	**SNF Transportation Cost**	**Total Cost**
18	0	97,782,687	0	97,782,687
19	0	97,782,687	0	97,782,687
20	0	97,782,687	0	97,782,687
21	0	97,782,687	0	97,782,687
22	0	97,782,687	0	97,782,687
23	0	97,782,687	0	97,782,687
24	0	97,782,687	0	97,782,687
25	0	97,782,687	0	97,782,687
26	0	97,782,687	0	97,782,687
27	0	97,782,687	0	97,782,687
28	0	97,782,687	0	97,782,687
29	0	97,782,687	0	97,782,687
30	0	97,782,687	0	97,782,687
31	0	97,782,687	0	97,782,687
32	0	97,782,687	0	97,782,687
33	0	97,782,687	0	97,782,687
34	0	97,782,687	0	97,782,687
35	0	97,782,687	0	97,782,687
36	0	97,782,687	0	97,782,687
37	0	97,782,687	0	97,782,687
38	0	97,782,687	0	97,782,687
39	0	97,782,687	125,682,289	223,464,976
40	0	48,891,344	125,682,289	174,573,633
Total	2,172,948	3,840,686,651	251,364,578	4,094,224,177
Source: Modified from ISP 2020				

Table C–11 The No-Action Alternative Undiscounted Cost Estimates (2019 Dollars) for Proposed Action (Phase 1) – Scenario 2				
Project Year	**Operations Cost (Active Sites)**	**Operations Cost (Decom Sites)**	**SNF Transportation Cost**	**Total Cost**
1	1,086,474	86,917,944	0	88,004,418
2	1,086,474	86,917,944	0	88,004,418
3	0	97,782,687	0	97,782,687
4	0	97,782,687	0	97,782,687
5	0	97,782,687	0	97,782,687
6	0	97,782,687	0	97,782,687
7	0	97,782,687	0	97,782,687
8	0	97,782,687	0	97,782,687
9	0	97,782,687	0	97,782,687
10	0	97,782,687	0	97,782,687
11	0	97,782,687	0	97,782,687
12	0	97,782,687	0	97,782,687

Table C–11 The No-Action Alternative Undiscounted Cost Estimates (2019 Dollars) for Proposed Action (Phase 1) – Scenario 2				
Project Year	Operations Cost (Active Sites)	Operations Cost (Decom Sites)	SNF Transportation Cost	Total Cost
13	0	97,782,687	0	97,782,687
14	0	97,782,687	0	97,782,687
15	0	97,782,687	0	97,782,687
16	0	97,782,687	0	97,782,687
17	0	97,782,687	0	97,782,687
18	0	97,782,687	0	97,782,687
19	0	97,782,687	0	97,782,687
20	0	97,782,687	0	97,782,687
21	0	97,782,687	0	97,782,687
22	0	97,782,687	0	97,782,687
23	0	97,782,687	0	97,782,687
24	0	97,782,687	0	97,782,687
25	0	97,782,687	0	97,782,687
26	0	97,782,687	0	97,782,687
27	0	97,782,687	0	97,782,687
28	0	97,782,687	0	97,782,687
29	0	97,782,687	0	97,782,687
30	0	97,782,687	0	97,782,687
31	0	97,782,687	0	97,782,687
32	0	97,782,687	0	97,782,687
33	0	97,782,687	0	97,782,687
34	0	97,782,687	0	97,782,687
35	0	97,782,687	0	97,782,687
36	0	97,782,687	0	97,782,687
37	0	97,782,687	0	97,782,687
38	0	97,782,687	0	97,782,687
39	0	97,782,687	125,682,289	223,464,976
40	0	48,891,344	125,682,289	174,573,633
Total	2,172,948	3,840,686,651	251,364,578	4,094,224,177
Source: Modified from ISP 2020				

Table C–12 The No-Action Alternative Undiscounted Cost Estimates (2019 Dollars) for Full Build-out (Phases 1-8) – Scenario 1				
Project Year	Operations Cost (Active Sites)	Operations Cost (Decom Sites)	SNF Transportation Cost	Total Cost
1	30,421,272	86,917,944	0	117,339,216
2	30,421,272	86,917,944	0	117,339,216
3	29,334,798	97,782,687	0	127,117,485
4	29,334,798	97,782,687	0	127,117,485
5	28,248,324	108,647,430	0	136,895,754
6	28,248,324	108,647,430	0	136,895,754
7	28,248,324	108,647,430	0	136,895,754

Table C–12 The No-Action Alternative Undiscounted Cost Estimates (2019 Dollars) for Full Build-out (Phases 1-8) – Scenario 1				
Project Year	**Operations Cost (Active Sites)**	**Operations Cost (Decom Sites)**	**SNF Transportation Cost**	**Total Cost**
8	28,248,324	108,647,430	0	136,895,754
9	28,248,324	108,647,430	0	136,895,754
10	28,248,324	108,647,430	0	136,895,754
11	28,248,324	108,647,430	0	136,895,754
12	28,248,324	108,647,430	0	136,895,754
13	28,248,324	108,647,430	0	136,895,754
14	28,248,324	108,647,430	0	136,895,754
15	28,248,324	108,647,430	0	136,895,754
16	28,248,324	108,647,430	0	136,895,754
17	28,248,324	108,647,430	0	136,895,754
18	28,248,324	108,647,430	0	136,895,754
19	28,248,324	108,647,430	0	136,895,754
20	28,248,324	108,647,430	0	136,895,754
21	28,248,324	108,647,430	0	136,895,754
22	28,248,324	108,647,430	0	136,895,754
23	28,248,324	108,647,430	0	136,895,754
24	28,248,324	108,647,430	0	136,895,754
25	28,248,324	108,647,430	0	136,895,754
26	28,248,324	108,647,430	0	136,895,754
27	28,248,324	108,647,430	0	136,895,754
28	28,248,324	108,647,430	0	136,895,754
29	28,248,324	108,647,430	0	136,895,754
30	28,248,324	108,647,430	0	136,895,754
31	28,248,324	108,647,430	77,964,491	214,860,245
32	25,423,492	97,782,687	77,964,491	201,170,670
33	22,598,659	86,917,944	77,964,491	187,481,094
34	19,773,827	76,053,201	77,964,491	173,791,519
35	16,948,994	65,188,458	77,964,491	160,101,943
36	14,124,162	54,323,715	77,964,491	146,412,368
37	11,299,330	43,458,972	77,964,491	132,722,793
38	8,474,497	32,594,229	77,964,491	119,033,217
39	5,649,665	21,729,486	77,964,491	105,343,642
40	2,824,832	10,864,743	77,964,491	91,654,066
Total	1,009,334,346	3,791,795,307	779,644,910	5,580,774,563
Source: Modified from ISP 2020				

Table C–13 The No-Action Alternative Undiscounted Cost Estimates (2019 Dollars) for Full Build-out (Phases 1-8) – Scenario 2				
Project Year	**Operations Cost (Active Sites)**	**Operations Cost (Decom Sites)**	**SNF Transportation Cost**	**Total Cost**
1	30,421,272	86,917,944	0	117,339,216
2	30,421,272	86,917,944	0	117,339,216

Table C–13 The No-Action Alternative Undiscounted Cost Estimates (2019 Dollars) for Full Build-out (Phases 1-8) – Scenario 2				
Project Year	Operations Cost (Active Sites)	Operations Cost (Decom Sites)	SNF Transportation Cost	Total Cost
3	29,334,798	97,782,687	0	127,117,485
4	29,334,798	97,782,687	0	127,117,485
5	28,248,324	108,647,430	0	136,895,754
6	26,075,376	130,376,916	0	156,452,292
7	24,988,902	141,241,659	0	166,230,561
8	23,902,428	152,106,402	0	176,008,830
9	22,815,954	162,971,145	0	185,787,099
10	22,815,954	162,971,145	0	185,787,099
11	22,815,954	162,971,145	0	185,787,099
12	21,729,480	173,835,888	0	195,565,368
13	19,556,532	195,565,374	0	215,121,906
14	19,556,532	195,565,374	0	215,121,906
15	18,470,058	206,430,117	0	224,900,175
16	16,297,110	228,159,603	0	244,456,713
17	14,124,162	249,889,089	0	264,013,251
18	13,037,688	260,753,832	0	273,791,520
19	10,864,740	282,483,318	0	293,348,058
20	6,518,844	325,942,290	0	332,461,134
21	5,432,370	380,266,005	0	385,698,375
22	5,432,370	380,266,005	0	385,698,375
23	0	391,130,748	0	391,130,748
24	0	391,130,748	0	391,130,748
25	0	391,130,748	0	391,130,748
26	0	391,130,748	0	391,130,748
27	0	391,130,748	0	391,130,748
28	0	391,130,748	0	391,130,748
29	0	391,130,748	0	391,130,748
30	0	391,130,748	0	391,130,748
31	0	391,130,748	77,964,491	469,095,239
32	0	352,017,673	77,964,491	429,982,164
33	0	312,904,598	77,964,491	390,869,089
34	0	273,791,524	77,964,491	351,756,015
35	0	234,678,449	77,964,491	312,642,940
36	0	195,565,374	77,964,491	273,529,865
37	0	156,452,299	77,964,491	234,416,790
38	0	117,339,224	77,964,491	195,303,715
39	0	78,226,150	77,964,491	156,190,641
40	0	39,113,075	77,964,491	117,077,566
Total	442,194,918	9,550,109,097	779,644,910	10,771,948,925
Source: Modified from ISP 2020				

Next, the NRC staff calculated the discounted costs at both three and seven percent for the four cases in EIS Table 8.4-1 using Equation 2. The total cost columns in Tables C–10 to C–13 provide the cost input for Equation 2, and the first column in these tables provides the project year input for this equation. Consistent with the Office of Management and Budget guidance (OMB, 2003), this cost-benefit analysis uses discount rates of 3 percent (i.e., i = 0.03 for Equation 2) and 7 percent (i.e., I = 0.07 for Equation 2). Based on these inputs, the NRC staff calculated the No-Action alternative estimated cost at a 3 percent discount rate in EIS Table C–14 and at the 7 percent discount rate in EIS Table C–15. The NRC staff used information in these two tables to complete the discounted costs in EIS Table 8.4-1.

Table C–14 No-Action Alternative Estimated Cost (2019 Dollars) Discounted at 3 Percent

Project Year	Proposed Action (Phase 1) Scenario 1	Proposed Action (Phase 1) Scenario 2	Full Build-out (Phases 1-8) Scenario 1	Full Build-out (Phase 1-8) Scenario 2
1	85,441,183	85,441,183	113,921,569	113,921,569
2	82,952,604	82,952,604	110,603,465	110,603,465
3	89,485,010	89,485,010	116,330,506	116,330,506
4	86,878,651	86,878,651	112,942,239	112,942,239
5	84,348,205	84,348,205	118,087,480	118,087,480
6	81,891,461	81,891,461	114,648,039	131,026,331
7	79,506,273	79,506,273	111,308,776	135,160,658
8	77,190,556	77,190,556	108,066,772	138,942,996
9	74,942,287	74,942,287	104,919,196	142,390,341
10	72,759,502	72,759,502	101,863,298	138,243,050
11	70,640,294	70,640,294	98,896,405	134,216,553
12	68,582,809	68,582,809	96,015,928	137,165,614
13	66,585,252	66,585,252	93,219,347	146,487,550
14	64,645,875	64,645,875	90,504,221	142,220,922
15	62,762,986	62,762,986	87,868,175	144,354,864
16	60,934,938	60,934,938	85,308,908	152,337,342
17	59,160,134	59,160,134	82,824,183	159,732,359
18	57,437,023	57,437,023	80,411,828	160,823,662
19	55,764,100	55,764,100	78,069,736	167,292,298
20	54,139,903	54,139,903	75,795,860	184,075,669
21	52,563,013	52,563,013	73,588,213	207,331,882
22	51,032,051	51,032,051	71,444,867	201,293,090
23	49,545,681	49,545,681	69,363,949	198,182,723
24	48,102,603	48,102,603	67,343,640	192,410,410
25	46,701,556	46,701,556	65,382,175	186,806,224
26	45,341,316	45,341,316	63,477,839	181,365,266
27	44,020,696	44,020,696	61,628,970	176,082,782
28	42,738,539	42,738,539	59,833,952	170,954,157
29	41,493,728	41,493,728	58,091,215	165,974,910
30	40,285,172	40,285,172	56,399,238	161,140,689
31	39,111,818	39,111,818	85,941,336	187,632,065
32	37,972,639	37,972,639	78,122,021	166,977,998
33	36,866,639	36,866,639	70,685,293	147,367,906
34	35,792,854	35,792,854	63,615,499	128,758,495
35	34,750,344	34,750,344	56,897,573	111,108,110
36	33,738,198	33,738,198	50,517,014	94,376,673

Table C–14 No-Action Alternative Estimated Cost (2019 Dollars) Discounted at 3 Percent				
Project Year	**Proposed Action (Phase 1) Scenario 1**	**Proposed Action (Phase 1) Scenario 2**	**Full Build-out (Phases 1-8) Scenario 1**	**Full Build-out (Phase 1-8) Scenario 2**
37	32,755,532	32,755,532	44,459,871	78,525,625
38	31,801,487	31,801,487	38,712,715	63,517,876
39	70,559,859	70,559,859	33,262,628	49,317,749
40	53,516,741	53,516,741	28,097,181	35,890,929
TOTAL	2,304,739,510	2,304,739,510	3,178,471,120	5,691,371,029
Source: EIS Tables C–10 to C–13				

Table C–15 No-Action Alternative Estimated Cost (2019 Dollars) Discounted at 7 Percent				
Project Year	**Proposed Action (Phase 1) Scenario 1**	**Proposed Action (Phase 1) Scenario 2**	**Full Build-out (Phases 1-8) Scenario 1**	**Full Build-out (Phases 1-8) Scenario 2**
1	82,247,120	82,247,120	109,662,819	109,662,819
2	76,866,467	76,866,467	102,488,616	102,488,616
3	79,819,800	79,819,800	103,765,733	103,765,733
4	74,597,944	74,597,944	96,977,321	96,977,321
5	69,717,704	69,717,704	97,604,781	97,604,781
6	65,156,733	65,156,733	91,219,421	104,250,768
7	60,894,143	60,894,143	85,251,795	103,520,039
8	56,910,414	56,910,414	79,674,575	102,438,742
9	53,187,303	53,187,303	74,462,220	101,055,872
10	49,707,760	49,707,760	69,590,860	94,444,740
11	46,455,850	46,455,850	65,038,187	88,266,112
12	43,416,682	43,416,682	60,783,352	86,833,362
13	40,576,339	40,576,339	56,806,871	89,267,943
14	37,921,812	37,921,812	53,090,534	83,427,984
15	35,440,946	35,440,946	49,617,321	81,514,173
16	33,122,379	33,122,379	46,371,328	82,805,946
17	30,955,495	30,955,495	43,337,690	83,579,834
18	28,930,369	28,930,369	40,502,514	81,005,031
19	27,037,728	27,037,728	37,852,817	81,113,183
20	25,268,904	25,268,904	35,376,464	85,914,275
21	23,615,799	23,615,799	33,062,116	93,151,205
22	22,070,840	22,070,840	30,899,174	87,057,201
23	20,626,953	20,626,953	28,877,733	82,507,812
24	19,277,526	19,277,526	26,988,535	77,110,105
25	18,016,380	18,016,380	25,222,930	72,065,519
26	16,837,738	16,837,738	23,572,832	67,350,952
27	15,736,204	15,736,204	22,030,684	62,944,815
28	14,706,732	14,706,732	20,589,424	58,826,930
29	13,744,610	13,744,610	19,242,453	54,978,439

Table C–15 No-Action Alternative Estimated Cost (2019 Dollars) Discounted at 7 Percent				
Project Year	**Proposed Action (Phase 1) Scenario 1**	**Proposed Action (Phase 1) Scenario 2**	**Full Build-out (Phases 1-8) Scenario 1**	**Full Build-out (Phases 1-8) Scenario 2**
30	12,845,430	12,845,430	17,983,601	51,381,719
31	12,005,074	12,005,074	26,379,038	57,592,233
32	11,219,696	11,219,696	23,082,549	49,336,638
33	10,485,697	10,485,697	20,104,479	41,914,729
34	9,799,717	9,799,717	17,417,272	35,252,757
35	9,158,614	9,158,614	14,995,619	29,283,057
36	8,559,452	8,559,452	12,816,274	23,943,562
37	7,999,488	7,999,488	10,857,897	19,177,365
38	7,476,157	7,476,157	9,100,906	14,932,308
39	15,967,692	15,967,692	7,527,331	11,160,603
40	11,658,094	11,658,094	6,120,693	7,818,484
TOTAL	1,300,039,782	1,300,039,782	1,796,346,757	2,857,723,708
Source: EIS Tables C-10 to C-13				

C.5 References

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(See instructions on the reverse)

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10. SUPPLEMENTARY NOTES

11. ABSTRACT (200 words or less)

The U.S. Nuclear Regulatory Commission (NRC) has prepared this draft environmental impact statement (DEIS) as part of its environmental review of the Interim Storage Partners (ISP) license application to construct and operate a consolidated interim storage facility (CISF) for spent nuclear fuel (SNF) and Greater-Than Class waste, along with a small quantity of mixed oxide fuel. The proposed CISF would be located at the Waste Control Specialists site in Andrews County, Texas. The proposed action is the issuance of an NRC license authorizing the initial phase (Phase 1) of the project to store up to 5,000 metric tons of uranium (MTUs) for a license period of 40 years. ISP plans to subsequently request amendments to the license to store an additional 5,000 MTUs for each of seven expansion phases of the proposed CISF (a total of eight phases), to be completed over the course of 20 years, and to expand the facility to eventually store up to 40,000 MTUs. ISP's expansion of the proposed project (i.e., Phases 2-8) is not part of the proposed action currently pending before the agency. However, as a matter of discretion, the NRC staff considered these expansion phases in its description of the affected environment and impact determinations in this DEIS, where appropriate, when the environmental impacts of the potential future expansion can be determined so as to conduct a bounding analysis for the proposed CISF project.

12. KEY WORDS/DESCRIPTORS (List words or phrases that will assist researchers in locating the report.)

environment, environmental impact, cumulative, impacts, consolidated interim storage, spent fuel, storage facility, Interim Storage Partners, CISF, interim

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