AREVA

10 CFR 70.5

July 7, 2009

AES-O-NRC-09-00079-0

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

AREVA Enrichment Services LLC
Eagle Rock Enrichment Facility
NRC Docket No: 70-7015

Subject: Response to Information Needs Identified by the U.S. Nuclear Regulatory Commission for the AREVA Enrichment Services Eagle Rock Enrichment Facility - Environmental Report

On April 23, 2009, AREVA Enrichment Services LLC (AES) submitted a revised License Application to the U.S. Nuclear Regulatory Commission (NRC) to construct and operate the Eagle Rock Enrichment Facility (EREF) in Bonneville County, Idaho. In support of preparation of the EREF Draft Environmental Impact Statement, supplemental information is being provided in response to discussions between AES and the NRC on May 28, 2009, the NRC visit to the EREF site on June 3 and 4, 2009, and discussions between AES and the NRC on June 19, 2009. This letter submits the supplemental information to respond to the NRC information needs.

The AES responses include a description of each information need; the AES response; associated markups of the EREF License Application; specific materials (such as studies, reports, calculations, etc.); and associated commitments.

Some AES responses contain proprietary information that AES is requesting be withheld from public disclosure in accordance with 10 CFR 2.390. In accordance with 10 CFR 2.390(b), an affidavit supporting our request to withhold the following proprietary information is provided in Enclosure 1:

1. Volume II, Cultural Resource Documentation, from the Class III Cultural Resource Inventory of the Proposed Eagle Rock Enrichment Facility, conducted by Western Cultural Resource Management, Inc., dated November 21, 2008, is provided on the proprietary compact disc included with this submittal.

2. The input deck files for MCNP – Direct Dose files are provided on the proprietary compact disc included with this submittal.

AREVA ENRICHMENT SERVICES LLC

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NMSS01

3. Data regarding the waste materials shipped from the proposed EREF during construction. A hard-copy of this material is provided in Enclosure 3 to this submittal.

4. Data regarding the number of personnel onsite during construction and the rate of consumption of water per person per day during construction. A hard-copy of this material is provided in Enclosure 3 to this submittal.

If you have any questions, please contact Mr. Stan Day at 508-573-6550.

Respectfully,

George C. Harper

George Harper
Vice President of Engineering and EPC Project Manager

References:

1) S. Shakir (AES) Letter to the U.S. Nuclear Regulatory Commission, Revision 1 to License Application for the Eagle Rock Enrichment Facility, dated April 23, 2009.

Enclosures:

1) Affidavit of George Harper
2) AES Responses to NRC Information Needs, including Non-Proprietary Attachments referenced in the AES Responses
3) Attachments referenced in the AES Responses with Proprietary Commercial Information to be withheld in accordance with 10 CFR 2.390
4) Compact Disc with Proprietary Commercial Information to be withheld in accordance with 10 CFR 2.390
5) Compact Disc with Non-Proprietary Information

Commitments:

The regulatory commitments are identified in the AES Responses to the NRC Information Needs.

CC:
Breeda Reilly, U.S. NRC Senior Project Manager
Gloria Kulesa, U.S. NRC Senior Project Manager

ENCLOSURE 1

AFFIDAVIT OF GEORGE HARPER

a) I am the Vice President of Engineering and EPC Project Manager for the AREVA Enrichment Services LLC (AES), and as such have the responsibility of reviewing the proprietary and confidential information sought to be withheld from public disclosure in connection with our application to construct and operate a uranium enrichment facility. I am authorized to apply for the withholding of such proprietary and confidential information from public disclosure on behalf of AES.

b) I am making this affidavit in conformance with the provisions of 10 CFR 2.390 of the regulations of the Nuclear Regulatory Commission (NRC), and in conjunction with AES's request for withholding, which is accompanied by this affidavit.

c) I have knowledge of the criteria used by AES in designating information as proprietary or confidential.

d) By this submittal, AES seeks to protect from disclosure certain proprietary and confidential information contained in the following documents:

   1. Volume II, Cultural Resource Documentation, from the Class III Cultural Resource Inventory of the Proposed Eagle Rock Enrichment Facility, conducted by Western Cultural Resource Management, Inc., dated November 21, 2008, is provided on the proprietary compact disc included with this submittal.

   2. The input deck files for MCNP – Direct Dose files are provided on the proprietary compact disc included with this submittal.

   3. Data regarding the waste materials shipped from the proposed EREF during construction. A hard-copy of this material is provided in Enclosure 3 to this submittal.

   4. Data regarding the number of personnel onsite during construction and the rate of consumption of water per person per day during construction. A hard-copy of this material is provided in Enclosure 3 to this submittal.

   This affidavit discusses the bases for withholding certain portions of this submittal, as indicated therein, from public disclosure.

e) Pursuant to the provisions of 10 CFR 2.390(b)(4), the following is furnished for consideration by the NRC in determining whether the proprietary information sought to be protected should be withheld from public disclosure.

   1. Item 1 in Section (d) above is sought to be withheld from public disclosure, because it indicates the location of possible historic sites exempt from public disclosure under Idaho State law. Under Idaho Code 9-340E(1), Records, maps or other records identifying the location of archaeological or geophysical sites or endangered species, if not already known to the general public, are exempt from public disclosure.

   2. For Items 2, 3, and 4 in Section (d), public disclosure of the proprietary information AES seeks to protect is likely to cause substantial harm to AES's competitive position within the meaning of 10 CFR 2.390(b)(4)(v). The proprietary information has substantial commercial value to AES.

3. Information for which protection from disclosure is sought has been held in confidence by AES. This information is proprietary to AES, and AES seeks to protect it as such. The information proprietary to AES is found in the documents listed in Section (d) above. Therefore, AES seeks to protect the separated information from public disclosure.

4. The information sought to be withheld is of a type that would customarily be held in confidence by AES. The information consists of commercial and financial information that provides a competitive advantage to AES.

5. The information sought to be withheld is being provided to the NRC in confidence, and, under the provisions of 10 CFR 2.390, it is to be received in confidence by the NRC.

6. The information sought to be withheld is not available in public sources, to the best of AES's knowledge and belief.

For all of the reasons discussed above, AES requests that the identified proprietary information be withheld from public disclosure.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on July 7, 2009.

George A. Harper

Mr. George Harper
Vice President and EPC Project Manager of AES LLC
Solomon Pond Park
400 Donald Lynch Blvd.
Marlborough, MA 01752

Maureen L. Lyons

Notary Public

1. GENERAL INFORMATION

1.1 Information Need:

Correct ER Figure 3.3-12. Currently, it identifies a Lava Tube that is actually a pressure ridge. The figure should match the text.

AES Response:

ER Figure 3.3-12, Photos of Significant Geological Features, will be revised to change the first photo caption from "a) SMALL COLLAPSED LAVA TUBE" to "a) PRESSURE RIDGE." The markup of ER Figure 3.3-12 is shown in Attachment 1.1.

EREF License Application Revision:

The EREF License Application will be revised as follows:

ER Figure 3.3-12, Photos of Significant Geological Features, will be revised to change the first photo caption from "a) SMALL COLLAPSED LAVA TUBE" to "a) PRESSURE RIDGE."

Attachments:

Attachment 1.1 provides the markup page for ER Figure 3.3-12 of the EREF license application.

Commitments:

Revise the EREF License Application to include this markup in Revision 2.

1.2 Information Need:

Need to update the ER to reflect that the mining rights regarding Uranium have expired.

AES Response:

The Federal government did reserve for itself certain mineral rights which were not subject to claim or patent by anyone under the General Mining Act of 1872. The reservations were for mineral rights located on two, 16-ha (40-ac) parcels within the proposed site pursuant to the Atomic Energy Act of 1946, as amended. The mineral rights so retained by the U.S. Government were subject to entry and exploitation by the U.S. only. The U.S. government reserved the right to enter, explore for and recover fissionable materials. AREVA contacted the Department of Interior office in Washington D.C. and the Idaho State office of the Bureau of Land Management (BLM) to determine the current status of these reservations. AREVA was advised that while the reservation may continue to appear in title searches to be a part of the land patent, in fact, these reservations were released, remised and quitclaimed to the person to whom the land was patented pursuant to Section 68 b. of the Atomic Energy Act of 1954, as amended. A review of the Atomic Energy Act confirms that the two mineral reservations associated with the property are no longer valid and have no force or effect in law.

EREF License Application Revision:

The EREF License Application will be revised as follows to incorporate this response:

Section 1.2.1, Section 2.1.2.1, Section 3.1.1, and Figure 3.2-1 of the ER will be modified as shown in Attachment 1.2.

Attachments:

Attachment 1.2 provides the markup pages for ER Section 1.2.1, ER Section 2.1.2.1, ER Section 3.1.1, and ER Figure 3.1-2 of the EREF License Application.

Commitments:

Revise the EREF License Application to include these markups in Revision 2.

1.3 Information Need:

Define the method for controlling the release of dirt and other matter onto Highway 20 during construction.

AES Response:

Referring to ER Section 5.2.4, Water Resources, in addition to washing construction vehicles with water, other methods for reducing mud from being tracked onto U.S. Highway 20 will include the construction of gravel pads at the Eagle Rock Enrichment Facility (EREF) entry/exit points along U.S. Highway 20 in accordance with the Idaho Department of Environmental Quality (IDEQ) Catalog of Stormwater Best Management Practices for Idaho Cities and Counties, Volume 2, Erosion and Sediment Controls (IDEQ, 2009). Periodic top dressing of clean stone will be applied to prevent reduced effectiveness of the stone voids "absorbing" the mud and dirt falling off or being washed off the vehicle tires prior to highway road entry. Any tire washing that is required, will be done on a stabilized stone area which will drain into a sediment trap. Prior to leaving the EREF site, vehicles will be inspected to prevent debris from entering the highway. Furthermore, as indicated in ER Section 4.2.5, Mitigation Measures, and ER Section 5.2.2, Transportation, open-bodied trucks will be covered. The installation of tarps over open beds will prevent debris from falling off or blowing out of vehicles onto the highway.

EREF License Application Revision:

The following sections of the EREF License Application will be revised to incorporate the above response:

ER Section 4.2.5, Mitigation Measures (page 4.2-7)
ER Section 5.2.2, Transportation (page 5.2-2)
ER Chapter 9.0, List of References (page 9.0-16)

Attachments:

Attachment 1.3 provides the markup pages for ER Section 4.2.5, ER Section 5.2.2, and ER Chapter 9.0.

Commitments:

Revise the EREF License Application to include these markups in Revision 2.

2. ACCIDENTS

2.1 NOT USED

3. AIR QUALITY AND METEOROLOGY

3.1 Information Need:

The air quality analysis in the ER addresses the construction and operations period individually. However, it does not address the period of time that construction and operations will overlap. Review the analysis and define why the current analysis is bounding, or provide a new analysis for the shared period of time. The analysis needs to address: fugitive dusts, vehicle emissions, plant emissions, and worker transportation.

AES Response:

A number of assumptions were made in the analyses of air quality impacts from construction and operations activities. These include assumptions that peak construction activity will occur all year and that all equipment will be in use continuously all day. For on-road vehicle emissions, it was assumed that no car pools would be in use. Emissions from the standby diesel generators were assumed to occur during construction as well as operations. Even with these assumptions, the impacts were deemed to be small from both construction and operations activities. Peak construction activity will not occur all year, especially during the period when parts of the facility are operational. Equipment will not be in continuous use all day, and it is expected that less equipment will be in use during the period when parts of the facility are operational. Car pools will be utilized. If the amount of disturbed land at one time is reduced then the impact from construction will decrease.

The air quality impacts during construction are categorized in the following ER Tables: Table 4.6-3, Results of Air Quality Impact AERMOD Dispersion Modeling for EREF Construction Site Preparation Activity; Table 4.6-4, Construction Emission Types; and Table 4.6-5, Offsite Vehicle Air Emissions During Construction. The air quality impacts during operations are categorized in the following ER Tables: Table 4.6-6, Standby Diesel Generator Air Emissions During Operations; and Table 4.6-7, Offsite Vehicle Emissions During Operations. A comparison of the air quality impacts during construction and operation is provided in Attachment 3.1-1. The comparison shows that the air quality impacts due to construction bound the air quality impacts due to operations. For example:

- The emissions due to site preparation activities modeled using AERMOD (ER Table 4.6-3) will be higher during the construction only phase than during the construction/partial operation phase, since fewer construction vehicles and less land area will be involved during the construction/partial operation phase.
- Fugitive dust emissions (ER Table 4.6-4) will be higher during the construction only phase than during the construction/partial operation phase, since fewer construction vehicles will be involved during the construction/partial operation phase.
- Emergency diesel generator emissions are assumed to be the same during both the construction only phase (ER Table 4.6-4) and the construction/partial operation phase (ER Table 4.6-6).
- Offsite vehicle emissions during construction (ER Table 4.6-5), which includes worker transportation vehicle emissions, will be higher than the emissions during the construction/partial operation phase (ER Table 4.6-7).

EREF License Application Revision:

ER Section 4.6.1 will be revised to add the following text: "A comparison of the air quality impacts during construction and operation indicates that the construction emissions are bounding."

Attachments:

Attachment 3.1-1 provides a comparison of the air quality impacts during construction and operation.

Attachment 3.1-2 provides the ER markup page for ER Section 4.6.1.

Commitments:

Revise the EREF License Application to include these markups in Revision 2.

3.2 Information Need:

Provide additional information regarding the methodology for dust suppression. Note, the analysis assumes that the affected areas will be sprayed with water twice a day.

AES Response:

Since the air dispersion modeling performed for the EREF was based on a twice-daily watering program for reducing dust emissions up to 90% during construction activities, dust suppression water sprays will be applied at least twice a day, when needed. There will be days that dust emissions are minimized due to natural weather conditions or reduced construction activities that cause dust. As discussed in ER Section 4.6.5, Mitigative Measures for Air Quality Impacts, additional construction best management practices (BMPs) for fugitive dust prevention and control will include the following:

- Applying gravel to the unpaved surface of haul roads,
- Imposing speed limits on unpaved haul roads,
- Applying an environmentally safe chemical soil stabilizer or chemical dust suppressant to the surface of the unpaved haul roads,
- Using water spray bars at drop and conveyor transfer points,
- Limiting the height and disturbance of stockpiles, and;
- Applying water to the surface of stockpiles.

EREF License Application Revision:

The following sections of the EREF License Application will be revised to incorporate the above response:

ER Section 4.1.1, Construction Impacts (p. 4.1-1)

ER Section 4.2.5, Mitigation Measures (p. 4.2-6)

ER Section 4.3, Geology and Soils Impacts (p. 4.3-2)

ER Section 4.4.7.1, Mitigations (p. 4.4-9)

ER Section 4.5.8, Construction Practices (p. 4.5-5)

ER Section 4.6.5, Mitigative Measures for Air Quality Impacts (p. 4.6-7)

ER Section 5.2.1, Land Use (p. 5.2-1)

ER Section 5.2.2, Transportation (p. 5.2-1)

ER Section 5.2.4, Water Resources (p. 5.2-3)

ER Section 5.2.5, Ecological Resources (p. 5.2-4)

ER Section 5.2.6, Air Quality (p. 5.2-5)

ER Section 8.5, Environmental Impacts of Construction (p. 8.5-2)

ER Section 8.8, Nonradiological Impacts (p. 8.8-1)

ER Appendix B, Section 3.4 Emission Source Data – Fugitive Dust (p. B-4)

Attachments:

Attachment 3.2 provides the markup pages for the above ER Sections and ER Appendix B of the EREF License Application.

Commitments:

Revise the EREF License Application to include these markups in Revision 2.

3.3 Information Need:

Provide additional information regarding how facility vehicles will be refueled during construction and operations - 1) on-site gas station; 2) temporary tank and fueling trucks during operations. The NRC was interested in volume throughputs and VOC release from these construction fueling activities.

AES Response:

During construction, three fuel trucks will be used for refueling other construction support vehicles and construction equipment as indicated in ER Section 4.6.1, Air Quality Impacts from Construction, and ER Appendix B, Section 3.4, Emission Source Data. Emission factors in the Environmental Protection Agency (EPA)'s MOBILE6.2 emission estimation model were used to estimate emissions of criteria pollutants and non-methane hydrocarbons (or volatile organic compounds (VOCs)) for the fuel trucks (Heavy Duty Trucks) and other construction support vehicles (Light Duty Trucks). Daily VOC releases are reported in ER Table 4.6-5, Offsite Vehicle Air Emissions During Construction, under the heading "NonMethane Hydrocarbons". By August 31, 2009, AES will provide the volume throughputs for construction fueling activities in a supplement to the EREF License Application.

During operation, an on-site, combined gasoline and diesel fueling station will provide fuel for operational support vehicles. Currently, the gasoline and diesel fueling station will be situated northeast of the Centrifuge Assembly Building. By August 31, 2009, AES will submit a supplement to the EREF License Application that will describe the on-site, combined gasoline and diesel fueling station (e.g., volume requirements for the tanks, spill prevention measures, separation requirements, fuel delivery system, fuel dispensing equipment), and address the impacts of incorporating this feature into the design of the EREF (e.g., defining the minimum required safe distances from the buildings that house UF_6, the Full Tails, Full Feed and Empty Cylinder Storage Pads, and the Full Product Cylinder Storage Pad and the Cylinder Transporter Path, and revising the chemical inventory tables).

EREF License Application Revision:

The response to this information need does not require any changes or additions to the EREF License Application documents.

The impacts on the EREF License Application associated with the addition of an on-site, combined gasoline and diesel fueling station have not yet been determined. By August 31, 2009, AES will submit a supplement to the License Application to incorporate the on-site, combined gasoline and diesel fueling station into the EREF License Application.

Attachments:

None

Commitments:

1. By August 31, 2009, AES will provide the volume throughputs for construction fueling activities in a supplement to the EREF License Application.

2. By August 31, 2009, AES will submit a supplement to the EREF License Application that will describe the on-site, combined gasoline and diesel fueling station (e.g., volume requirements for the tanks, spill prevention measures, separation requirements, fuel delivery system, fuel dispensing equipment), and address the impacts of incorporating this feature into the design of the EREF (e.g., defining the minimum required safe distances from the buildings that house UF_6, the Full Tails, Full Feed and Empty Cylinder Storage Pads, and the Full Product Cylinder Storage Pad and the Cylinder Transporter Path, and revising the chemical inventory tables).

3.4 Information Need: (AQ-3)

Provide input and output data files for the air dispersion models described in ER Appendix B (AERMOD, MOBILE6.2)

AES Response:

The input and output data files for the air dispersion models described in ER Appendix B are attached.

EREF License Application Revision:

This response does not require any changes or additions to the EREF License Application documents.

Attachments:

The AERMET input and output files are provided in the non-proprietary CD in a folder entitled AERMET: The pdf file names are: AEF1988 PFL, AEF1988 SFC, AEF1989 PFL, AEF1989 SFC, AEF1990 PFL, AEF1990 SFC, AEF1991 PFL, AEF1991 SFC, AEF1992 PFL, AEF1992 SFC, 5_Years PFL, 5_Years SFC

The AERMOD input and output files are provided in the non-proprietary CD in a folder entitled AERMOD: The pdf file names are: aef1988 adi, aef1988 ADO, aef1989 adi, aef1989 ADO, aef1990 adi, aef 1990 ADO, aes1991 adi, aef1991 ADO, aef1992 adi, aef1992 ADO, 5_Years adi, 5_Years ado

The AERSURFACE input and output files are provided in the non-proprietary CD in a folder entitled AERSURFACE: The pdf file names are: 5_Years_Aersurface inp, 5_Years_Aersurface log, aef1988_Aersurface inp, aef1988_Aersurface log, aef1989_Aersurface inp, aef1989_Aersurface log, aef1990_Aersurface inp, aef1990_Aersurface log, aef1991_Aersurface inp, aef1991_Aersurface log, aef1992_Aersurface inp, aef1992_Aersurface log, aef1988_Aersurface out, aef1989_Aersurface out, aef1990_Aersurface out, aef1991_Aersurface out, aef1992_Aersurface out, 5_Years_Aersurface out, 8318_75m.dem

MOBILE6.2 input and output files are provided in the non-proprietary CD in a folder entitled Mobile6.2: The file names are: Bonneville_mobile6_output_NEI_2005.xls, Offsite Vehicle Air Emissions During Construction1(Rev.1).xls, Offsite Vehicle Air Emissions During Operation1(Rev.1).xls, Onsite Support Vehicle Air Emissions During Construction1(Table B-1)(Rev.2).xls, and Construction Equipment Air Emissions1(Tables B-2 & B-3)(Rev.3b).xls

Commitments:

None

4. CUMULATIVE

4.1 Information Need:

Provide documentation to support the statement that there are no federal or private development plans within 10 miles of the proposed EREF facility. Indicate which agencies or other information sources that were consulted.

AES Response:

The Federal and local agencies contacted were the Idaho National Laboratory, U.S. Bureau of Land Management, Idaho Department of Transportation, Idaho Department of Lands, Idaho Falls Parks and Recreation Department, City of Idaho Falls, Bonneville County, Bingham County, Jefferson County, Blaine County, Butte County, Caribou County, Clark County, Custer County, Fremont County, Madison County, and Power County.

The information from the various Federal and local agencies was reviewed. As a result, AES concluded that there was no Federal or private development plans within 10 miles of the proposed EREF facility.

The notes from the telephone conversations with the various Federal and local agencies to determine plans for future development are available for review at one of AREVA's offices (Naperville, IL, Marlborough, MA or Bethesda, MD).

EREF License Application Revision:

The response to this issue does not require any changes or additions to be made to the EREF License Application.

Attachments:

None

Commitments:

None

5. ECOLOGY

5.1 Information Need:

Define the mitigation measures that will be put in place to protect migratory birds during the nesting season.

AES Response:

AES will take the following measures to protect migratory birds during the construction and decommissioning of the EREF:

- Clearing or removal of habitat (e.g., sagebrush), including buffer zones, will be performed outside of the breeding and nesting season for migratory birds.
- If additional areas are to be disturbed or impacted that have not been cleared outside of breeding and nesting season, surveys will be performed to identify active nests during breeding and nesting season for migratory birds. Activities in areas containing active nests for migratory birds will be avoided.
- AES will consult with the United States Fish and Wildlife Service to determine the appropriate actions to take a migratory bird, if needed.

EREF License Application Revision:

ER Section 1.3.1 will be revised to state that AES will consult with the United States Fish and Wildlife Service to establish the appropriate actions to take a migratory bird, if needed.

ER Sections 4.5.4, 4.5.5, 4.5.9, 4.5.10 and 5.2.5 will be revised to denote the above requirements.

Attachments:

Attachment 5.1 provides the markups of ER Sections 1.3.1, 4.5.4, 4.5.5, 4.5.9, 4.5.10, and 5.2.5.

Commitments:

Revise the EREF License Application to include these markups in Revision 2.

5.2 Information Need: (EC-3)

Provide a summary of contacts made with Idaho Fish and Game and BLM regarding threatened, endangered, rare, or sensitive species or habitats.

AES Response:

The following are summaries of contacts made with Idaho Fish and Game and BLM regarding threatened, endangered, rare, or sensitive species or habitats.

a. Sage grouse leks and pygmy rabbit survey locations and populations. S. M. Stoller Corporation (INL Contrator) Contact Report (6-10-2008 and 8-18-2008).

   Summary of conversation:

   The sensitive species locations (sage grouse leks and pygmy rabbits) on the Idaho National Laboratories (INL) properties were discussed. Maps showing sage grouse lek locations in 1980 and known active leks in 2008, and pygmy rabbit surveys –

conducted winter of 2006-2007 & 2007-2008 – showing sampling plots and active burrows were provided.

b. Sage grouse nearest lek. Idaho Fish & Game contact report: Wildlife Biologist, Idaho Department of Fish and Game (7-02-2008).

Summary of Conversation:

It was stated by the Wildlife Biologist, Idaho Department of Fish and Game that: "*There are no known sage-grouse leks in any section in* Township 3 North, Range 34 East. There is key sage-grouse habitat mapped in Sections 21 and 22 and to the north and west of the sections you are interested in. The nearest active leks are in Township 3 North, Range 33 East, Sections 2, 3, 9, and 10."

The closest known lek was approximately 4 miles (6.4 km) from the proposed EREF site in Section 2. The distance was measured from the western most edge of the proposed EREF property boundary to the eastern most edge of Section 2. If the distance is measured to the center point of the Section 2, the distance increases to 4.6 mi (7.4 km). The map provided by the IDFG (map) regarding known sage grouse leks near the proposed EREF site, is provided.

c. BLM Snake River, Idaho Falls, contact report, Biologist (6-4-2008 and 8-15-2008).

BLM working maps were viewed at BLM office (no copies available).

Summary of Conversation:

- Site is within southern portion of 'crucial winter-spring pronghorn range' area. No other crucial big game habitat; deer and elk likely use area.
- Site does not have good connectivity with other grouse habitat; just outside area identified as important sage grouse habitat target for protection or restoration.
- Site is within 10 miles of several leks: one lek 3 miles north of site; one lek 10 miles west of site (Tractor Flat) INL; three leks together with large bird numbers over 10 miles - INL.
- INL grazing on east side is a sheep allotment.
- INL conducts sage grouse and pygmy rabbit surveys on eastern portions of INL.
- BLM pygmy rabbit surveys conducted north of site north of Mud Lake (Crooked Creek and Medicine Creek in the 2004-2005).
  - Rabbits observed on virtually all survey areas
  - Winter is best time to observe rabbit sign
- Townsend big-earred bat caves south of site in lava flow area
  - Owl Cave (east of site) does not provide habitat (too cold)
- *Considerations*
  - Mitigation for fragmentation/loss of habitat
  - Fence strikes by grouse
  - Fencing (16 inches from ground to smooth bottom wire)

- Human presence, noise, & lighting impacts

EREF License Application Revision:

The response to this information need does not require any changes or additions to the EREF License Application documents.

Attachments:

None

Commitments:

None

6. GEOLOGY

6.1 NOT USED

7. HISTORIC AND CULTURAL RESOURCES

7.1 Information Need:

Provide Volume II of the Cultural Resources Documentation.

AES Response:

Volume II, Cultural Resource Documentation, from the Class III Cultural Resource Inventory of the Proposed Eagle Rock Enrichment Facility, conducted by Western Cultural Resource Management, Inc., dated November 21, 2008 is a proprietary document under 10 CFR 2.390(a)(3) in that it indicates the location of possible historic sites exempt from public disclosure under Idaho State law.

Under Idaho Code 9-340E(1), Records, maps or other records identifying the location of archaeological or geophysical sites or endangered species, if not already known to the general public, are exempt from public disclosure. The sites documented in this study are not already known to the general public. Therefore, Volume II of the Cultural Resources Documentation is enclosed as a proprietary document on the proprietary disc.

EREF License Application Revision:

The response to this issue does not require any changes or additions to be made to the EREF License Application.

Attachments:

None

Commitments:

None

7.2 Information Need: (HR-1)

Provide the National Register eligibility of the 7 cultural sites within one mile of the project area.

AES Response:

The seven cultural sites within one mile of the project area consist of the three Wasden Complex sites (10BV30, 10BV31 and 10BV32), a site close to these three sites (10BV47) that includes a fluted point, and three sites (10BV83, 10BV84 and 10BV87).

The Idaho State Historic Preservation Office (SHPO) indicated that the three Wasden Complex sites (10BV30, 10BV31 and 10BV32) and the fluted point site (10BV47) have all been determined eligible. The Idaho SHPO had no information regarding the eligibility status for the remaining three sites (10BV83, 10BV84 and 10BV87).

EREF License Application Revision:

The response to this information need does not require any changes or additions to the EREF License Application documents. This information is contained within Volume 1 of the Cultural Resource Inventory Report which was previously docketed with the EREF License Application.

Attachments:

None

Commitments:

None

7.3 Information Need: (HR-2)

Provide the procedure for addressing unexpected discoveries, or outline the activities that will be addressed.

AES Response:

The Unanticipated Discoveries Plan will be developed prior to the additional site characterization work that is scheduled to be initiated later in July 2009. This plan will describe the protocols to deal with unanticipated discoveries of human remains and/or cultural resource sites during the course of construction. The plan will comply with applicable Federal and State laws that implement Section 106 of the National Historic Preservation Act (NHPA) of 1966.

Although the Unanticipated Discoveries Plan for the EREF project has not yet been developed, the plan will describe procedures that the EREF project will follow to prepare for and deal with unanticipated discoveries. Such procedures are anticipated to include the suspension of ground disturbing construction activities in the immediate area of a discovery, notification of appropriate project personnel (i.e., the on-site AES representative, professional archaeologist) and authorities (e.g., the State Police, the Idaho SHPO, County Medical Examiner), evaluation of the discovery by a professional archaeologist, and avoidance protection.

EREF License Application Revision:

The response does not require any changes or additions to the EREF License Application documents.

Attachments:

None

Commitments:

The Unanticipated Discoveries Plan will be developed prior to the additional site characterization work that is scheduled to be initiated later in July 2009.

7.4 Information Need: (HR-3)

Provide either the mitigation strategy for MW004 or provide an outline of the activities that will be addressed.

AES Response:

AES has engaged the Idaho State Historic Preservation Officer (SHPO) to ensure that the EREF project is fully compliant with the requirements of Section 106 of the National Historic Preservation Act of 1966 (NHPA).

Pursuant to Section 106, AES has conducted an archaeological inventory on approximately 381 hectares (941 acres) of the proposed EREF site, which encompass the project's Area of Potential Effect (APE). In consultation with the SHPO, one of the

11 archaeological sites identified within the project APE (Site MW004) was recommended as eligible for listing in the National Register for Historic Places (NRHP). An official determination of eligibility for cultural resource Site MW004 by the SHPO is pending. To minimize the potential for indirect impacts to Site MW004, AES's anticipated mitigation strategy is outlined below. Mitigation associated with Site MW004 will be completed prior to initiation of pre-construction and/or construction activities associated with the EREF project that impact Site MW004, or the boundaries of Site MW004 will be marked along with a suitable buffer zone by our archaeologist so that pre-construction/construction activities do not impact this site.

AES will develop a Memorandum of Agreement (MOA) with the Idaho SHPO. The MOA will detail activities required as mitigation of adverse effects to Site MW004 and the means of protecting and safeguarding its cultural resources in the future. The MOA will include and/or reference a Data Recovery and Minimization Plan for archaeological resources. The Data Recovery and Minimization Plan will stipulate procedures for mitigating, through archaeological data recovery, adverse effects to archaeological resources that cannot be avoided by the project. The Plan will also take into consideration input from key stakeholders identified by the SHPO. Mitigation measures detailed in this plan will be developed in consultation with the Idaho SHPO. Note that no architectural resources associated with Site MW004 have been identified.

In addition, AES will develop, in consultation with the Idaho SHPO, a Preservation Plan to manage the cultural resources for Site MW004. The Preservation Plan will outline responsibilities for management of onsite cultural resources, and site processes and procedures for the preservation and treatment of these cultural resources. The Preservation Plan is intended for use by site personnel involved in project planning and environmental compliance to ensure compliance with historic preservation laws during future activities on site that may adversely affect both known and as yet unidentified cultural resources. AES will also develop an Unanticipated Discoveries Plan to define the actions to take in the event that unanticipated potential cultural resources are discovered during pre-construction or construction activities. Both the Preservation Plan and Unanticipated Discoveries Plan will facilitate continued compliance with the NHPA.

The MOA and associated mitigation and protection plans will constitute AES's plan to ensure that activities conducted prior to the issuance of the NRC's License Application, e.g., preconstruction activities that impact Site MW004, would not be undertaken without the approval of the Idaho SHPO in full accordance with the requirements of Section 106 of the NHPA.

<u>EREF License Application Revision</u>:

The above response does not require any changes or additions to the EREF License Application documents.

<u>Attachments</u>:

None

<u>Commitments</u>:

1. Mitigation associated with Site MW004 will be completed prior to initiation of pre-construction and/or construction activities associated with the EREF project that impact Site MW004, or Site MW004 will be marked along with a suitable buffer zone

by our archaeologist so that pre-construction/construction activities do not impact this site.

2. AES will develop a Memorandum of Agreement (MOA) with the Idaho SHPO. The MOA will detail activities required as mitigation of adverse effects to Site MW004 and the means of protecting and safeguarding its cultural resources in the future. The MOA will include and/or reference a Data Recovery and Minimization Plan for archaeological resources. The Data Recovery and Minimization Plan will stipulate procedures for mitigating, through archaeological data recovery, adverse effects to archaeological resources that cannot be avoided by the project.
3. In addition, AES will develop, in consultation with the Idaho SHPO, a Preservation Plan to manage the cultural resources for Site MW004. The Preservation Plan will outline responsibilities for management of onsite cultural resources, and site processes and procedures for the preservation and treatment of these cultural resources.
4. AES will also develop an Unanticipated Discoveries Plan to define the actions to take in the event that unanticipated potential cultural resources are discovered during pre-construction or construction activities.

8. HUMAN HEALTH – NON-RADIOLOGICAL

8.1 Information Need:

Define how 7.8 $\mu g/m^3$ of HF was derived in Section 3.11.4 and 4.12.

AES Response:

Section 3.11.4 of the ER states: "The annual expected average HF concentration emission from a 6 million SWU/yr centrifuge enrichment plant is estimated to be 7.8 $\mu g/m^3$ at the point of discharge (rooftop) without atmospheric dispersion taken into consideration." The annual average HF concentration emission is also provided in Section 4.12.1.1 of the ER.

This value was derived by the following equation: X = Y/Z, where
X = Annual expected average HF concentration emission
Y = Mass of HF Gas Released per year (i.e., 2 kg or 2E+09 $\mu g/yr$)
Z = GEVS discharge rate per year (i.e., 2.6E+08 m^3/yr)

The value of Y was conservatively estimated as twice the annual HF gaseous effluent from a 3 million SWU plant (i.e., less than 1 kg). The value of Z is an estimated Gaseous Effluent Ventilation System (GEVS) flow rate as presented in Table 3.12-3 of the Environmental Report. This value is consistent with the value presented in Table 3.12-3 of the Environmental Report for the National Enrichment Facility circa December 2003. The actual calculated value is 7.7 $\mu g/m^3$.

EREF License Application Revision:

The EREF License Application will be revised as follows to incorporate this response. ER Sections 3.11.4 and 4.12.1.1 will be revised to state that the annual expected average HF concentration emission from the EREF is expected to be 7.7 $\mu g/m^3$ at the point of discharge (rooftop) without atmospheric dispersion taken into consideration.

Attachments:

Attachment 8.1 provides the markup pages for ER Section 3.11.4 and ER Section 4.12.1.1.

Commitments:

Revise the EREF License Application to include these markups in Revision 2.

9. HUMAN HEALTH – RADIOLOGICAL

9.1 Information Need:

Provide a summary of the input parameters that were utilized in the accident analyses. Define that the material at risk (MAR) is defined in Table 2-14 of Appendix E of the ISA Summary.

AES Response:

The input parameters used in the accident analysis for the limiting seismic scenario are provided in Attachment 9.1-1.

The input parameters used in the accident analysis for the limiting fire scenario are provided in Attachment 9.1-2.

EREF License Application Revision:

The response does not require any changes or additions to be made to the EREF License Application.

Attachments:

Attachment 9.1-1 provides the input parameters used in the accident analysis for the limiting seismic scenario.

Attachment 9.1-2 provides the input parameters used in the accident analysis for the limiting fire scenario.

Commitments:

None

9.2 Information Need:

Define the file format and input parameters utilized in AEOLUS for the Normal Effluent and Accident χ/Q.

AES Response:

Accident consequences: dispersion models/computer codes, assumptions, inputs, outputs

Atmospheric dispersion factors were determined using the AEOLUS3 computer code for:

- A postulated radiological release from the building complex;
- A postulated release due to dropped or damaged cylinders on the cylinder storage pad;
- Determining compliance with environmental limits;
- A postulated accident at a blending donor station.

AEOLUS3 implements the guidance in NRC Regulatory Guide 1.145, Revision 1, "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants."

AEOLUS3 input files are presented in Attachment 9.2. Input requirements for AEOLUS3 are presented in Attachment 9.2.

For the postulated releases from the building complex and the cylinder pad, as well as for determining compliance with environmental limits, five years of meteorological data (2003-2007) that meet the guidelines of Regulatory Guide 1.23, Revision 1, received from the National Oceanic and Atmospheric Administration's (NOAA) Air Resources Laboratory Field Research Division (ARLFRD) were used as input to AEOLUS3. The meteorological data used in the calculation of atmospheric dispersion and deposition factors were collected at a monitoring station known as EBR/MFC located 18 kilometers (11 miles) west of the EREF site. Both the EREF site and the meteorological monitoring station are located in the Eastern Snake River Plain of Idaho and have the same climate; as such, the meteorological data collected at EBR/MFC are representative of meteorological conditions at the EREF site.

Atmospheric dispersion factors for a postulated accident at a blending donor station were determined using algorithms presented in Regulatory Guide 1.145 and default meteorological conditions (F stability class with a wind speed of 0.6 m/sec; D stability class with a wind speed of 2.0 m/sec).

See Attachment 9.2 (1A) for assumptions and design input used in the AEOLUS3 modeling.

Individual receptor and collective population doses: dispersion models/computer codes, assumptions, inputs, outputs

Atmospheric dispersion factors were determined using the AEOLUS3 computer code, which AREVA NP uses under a license agreement with ENTECH Engineering. AEOLUS3 implements the guidance in NRC Regulatory Guide 1.111, Revision 1, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors" for determination of normal effluent atmospheric dispersion factors.

Assumptions used for the atmospheric dispersion modeling are to be found in Attachment 9.2 (1A), Section 1.1.1.

The atmospheric dispersion factors presented in ER Section 4.6.2.3 are to be used in the determination of dose impact due to normal effluent releases from EREF; they are not to be used for accidental releases.

The AEOLUS3 computer code was used to determine the normal effluent atmospheric dispersion factors rather than the EPA AERMOD computer code since AEOLUS3 implements the guidance in NRC Regulatory Guide 1.111, Revision 1, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors" and AERMOD does not.

AEOLUS3 has been used in submittals to the NRC from operating nuclear plants (see ADAMS accession numbers ML032190646 and ML043650064 on the NRC web site). AREVA NP has used AEOLUS3 for four combined license applications (COLAs) to date.

Validation and verification documentation for the AEOLUS3 computer code are proprietary documents of ENTECH Engineering. These documents can be made available for review, but since the NRC performed an audit on AEOLUS3 in February 2009, the reviewer is encouraged to contact the Division of Site and Environmental Reviews in the NRC Office of New Reactors regarding AEOLUS3.

The following computer files are provided on the non-proprietary CD:

ebr10.out
ebr0307.met
EBR2003
EBR2004
EBR2005
EBR2006
EBR2007
EBR20032007

EREF License Application Revision:

The response does not require any changes or additions to the EREF License Application documents.

Attachments:

Attachment 9.2(1A) contains the ASSUMPTIONS AND DESIGN INPUT USED IN THE AEOLUS3 MODELING, Attachment 9.2(1B) contains the AEOLUS3 INPUT FILES, and Attachment 9.2(1C) contains the AEOLUS3 INPUT REQUIREMENTS

Commitments:

None

9.3 Information Need:

Provide input deck for MCNP – Direct Dose

AES Response:

The input deck files for MCNP – Direct Dose files are considered proprietary information to be withheld in accordance with 10 CFR 2.390. These files are provided on the Proprietary CD included with this submittal. Refer to the MCNP Input folder which contains the following files: mc-AEP-01.in, mc-AEP-02.in, n01.in, p01c.in.

EREF License Application Revision:

This response does not require any changes or additions to the EREF License Application documents.

Attachments:

The requested information is provided on the Proprietary CD included with this submittal. Refer to the MCNP Input folder which contains the following files: mc-AEP-01.in, mc-AEP-02.in, n01.in, p01c.in.

Commitments:

None

9.4 Information Need:

Provide additional information regarding collective dose.

AES Response:

The research paper by D. McGeoghegan and K. Binks (Journal of Radiological Protection, 20 (2000) 381-401: "The mortality and cancer morbidity experience of workers at the Capenhurst uranium enrichment facility 1946-95") provides long term historical information on worker doses. It presents the results of a study of a cohort of 12,540 employees at Capenhurst. The collective external dose received by 3,244 radiation workers was 31.95 person-sieverts (3,195 person-rem) over 49 years. From approximately 1950 through the 1990s, the site employed thousands of workers each year, most of whom were not radiation workers. Development work on the gas centrifuge process did not begin until the late 1960s. Prior to that time, the site utilized the gaseous diffusion process. Mean annual doses decreased over time from a high of about 10 mSv (1 rem) in the mid 1950s to less than approximately 0.5 mSv (0.050 rem) in 1995.

The following table summarizes the more recent collective dose data for the Capenhurst site for the period 2003-2007. The data were taken from the Health, Safety and Environment Reports issued by the Urenco Capenhurst site.

Year	Number of UCL Designated Radiation Workers	Average Worker Dose		Collective Dose	
		(mSv)	(rem)	(person- Sieverts)	(person-rem)
2003	269	0.22	0.022	0.0592	5.92
2004	301	0.31	0.031	0.0933	9.33
2005	317	0.22	0.022	0.0697	6.97
2006	325	0.39	0.039	0.1268	12.68
2007	331	0.44	0.044	0.1456	14.56

According to the Urenco *Annual Report and Accounts 2008*, (http://www.urenco.com/content/200/Annual-Report-2008-indexed.aspx), the Capenhurst site had an installed capacity of 5 MSWU per year in December, 2008. In addition, operations other than enrichment occur at the Capenhurst site but the dose data is consolidated. Nevertheless, the collective doses shown in the table above are indicative of what may be expected at the EREF.

EREF License Application Revision:

The response does not require any changes or additions to be made to the EREF License Application.

Attachments:

None

Commitments:

None

10. HYDROLOGY

10.1 Information Need:

Provide additional information regarding the peak water use during construction.

AES Response:

As stated in ER Section 3.4.6.1, the peak water consumption rate was developed based on the conservative assumption that all water users are operating at maximum demand simultaneously. The peak water usage is used to size the piping systems and pumps. The anticipated normal consumption provides the quantity of water usage at the site for the purpose of quantifying the amount of water used over a period of time, not the instantaneous maximum usage rates.

There are several peak water users shown in ER Table 3.4-3 including potable water usage, fire water storage tank refill, and process water usage.

As shown in ER Table 3.4-2, anticipated normal consumption for 550 facility personnel is 16,500 gpd or 30 gal per person per day whereas ER Table 3.4-3 shows peak water usage for plant personnel building locations to be a total of 214 gpm but for a short and intermittent period of time. The peak values are useful in establishing the equipment and line sizes to assure the ability of the system to support these short peak values.

The largest component of peak water use relates to a fire protection (NFPA Code) requirement to re-fill a depleted 180,000 gal (680 m^3) fire water storage tank within eight hours following a fire. This requirement results in a 375 gpm peak water use demand. As indicated above, this is a peak user that must be accounted for in the design of the piping, pumps, and related equipment is not a normal user.

The last category in ER Table 3.4-3 for peak water consumption is for process water. Specifically, process water is used to create deionized water to makeup water lost in plant processes, humidifiers, etc. A peak rate of 284 Lpm (75 gpm) is anticipated for short durations.

In summary, any peak water use will be transient and of short duration. The normal water usage values presented in ER Table 3.4-2 are the values that must be used to establish the water usage requirements for the facility. The average water usage values presented in ER Table 3.4-2 are a small fraction and will not exceed the annual water appropriations limit of 625,000,000 L/yr (165,000,000 gal.yr).

EREF License Application Revision:

Table 3.4-3 erroneously double counts the peak process water consumption value of 248 Lpm (75 gpm) for the total peak flow. The affected sections of the ER will be revised to reduce the anticipated peak facility water consumption rate to 42 L/s (664 gpm). ER Table 3.4-3, Anticipated Peak Facility Water Consumption, will be revised to correct the total peak flow and footnotes will be added to define WC as Water Closet and JC as Janitorial Closet. The following sections of the EREF License Application will be revised to correct the total peak flow rate:

ER Section 1.3.2, State Agencies – Idaho Department of Water Resources

ER Section 3.4.6.1, Public Water Supply and Water Rights

ER Table 3.4-3, Anticipated Peak Plant Water Consumption

ER Section 4.4.5, Ground and Surface Water Use

ER Section 5.1.4, Water Resources

ER Section 7.2.2.7, Other Impacts of Plant Operation

ER Section 8.8, Nonradiological Impacts – Water Resources

Attachments:

Attachment 10.1 provides the markup ER pages of the EREF License Application

Commitments:

Revise the EREF License Application to include these markups in Revision 2.

10.2 Information Need:

Provide the following information: (1) Kuntz, 1994 reference; (2) Scott, 1982 reference; (3) Hackett, et. al., 2002 reference; (4) Water Transfer Application Letter; (5) Pump Drawdown Report; (6) Stormwater modeling methodologies for the detention and retention basins.

AES Response:

The first and second references (Kuntz, 1994; Scott, 1982) are geological maps published by the U.S. Geological Survey that may either be reviewed at one of AREVA's offices (Naperville, IL, Marlborough, MA or Bethesda, MD) or purchased from the U.S. Geological Survey as Map I-2330 (Kuntz, 1994) and Map I-1372 (Scott, 1982). A copy of the third reference (Hackett, et. al., 2002) is provided in Attachment 10.2-1.

The three Water Rights Transfer Letters are provided in Attachment 10.2-2. The three letters deal with: 1) a notice of Security Interest in a Water Right dated May 21, 2008, 2) a Water Rights Transfer Application dated November 21, 2008, and 3) an Acknowledgement of Receipt of a Water Rights Transfer Application dated December 10, 2008.

Attachment 10.2-3 provides the Pump Drawdown Report. The report consists of the following four documents: 1) an aquifer test calculation brief, 2) displacement and recovery plots for wells Lava 3 and GW-5, 3) displacement and recovery test data for wells Lava 3 and GW-5, and 4) pre-test data.

A summary of the methodology used for modeling the Storm Water Detention Basin is as follows:

- Computer Modeling Program: Applied Microcomputer Systems, Hydro CAD, Stormwater Modeling, Version 6, 2001.
- 24-hour, 100-year probability storm event occurrence on saturated soil, all season and winter season.
- Precipitation Data Output, NOAA Atlas 2 Idaho for site specific State Plane Coordinates.
- Saturated Hydraulic Conductivity NRCS Soil Survey, NOAA Atlas 2, Volume V-Idaho, National Weather Service.
- A freeboard of 2 feet is provided from modeled collecting water surface to top of berm.

- Emergency Spillway provided to safely pass stormwater greater than design and guideline requirements.
- The facility was divided into 10 sub watershed areas.
- The amount of impervious and pervious surfaces in each area was calculated to determine the run-off curve numbers to use in the computer model.
- Time of Concentration appropriately calculated based on surface characteristics, flow length and ground slope.
- Detention Basin receives runoff water and is sized to contain the contributing volumes, attenuating the increased runoff due to site development in order that no greater discharge occurs than what the undeveloped area released.

A summary of the methodology used for modeling the Cylinder Storage Pads Stormwater Retention Basins is as follows:

- Modeling only accounted for precipitation falling into the basins and water collected from the Cylinder Storage Pads during a storm.
- Evaporation over time is the only means of eliminating the collected water.
- The amount of water that falls on the site including the Cylinder Storage Pads is based on the highly unlikely minimum and maximum recorded monthly precipitation storm scenarios from data provided by the Western Regional Climate Center for this area.
- Water flows from the Cylinder Storage Pads into the basins using water tight piping. Some of the water will evaporate before the water reaches the basins. This evaporation is calculated using pan evaporation rates that are empirically obtained for the general area where the site is located.
- The water evaporating from the basins is based on empirical evaporation data obtained for the general site location.
- The size of each basin is sufficient to accommodate the difference between the water coming into the basins and the water that evaporates from the basins.
- The amount of freeboard is assumed such that even with the maximum amount of water entering the basins, there is still sufficient available volume to accept the water coming into the basins.

Design inputs and assumptions used to develop the water balance tables for the basins are provided in ER Section 3.4.1.1, Facility Withdrawals and/or Discharges to Hydrologic Systems, and in the notes for ER Tables 3.4-4 and 3.4-5, Water Balance for the Cylinder Storage Pads Stormwater Retention Basins (one of two identical basins), Minimum and Maximum Scenarios, respectively, and ER Tables 3.4-6 and 3.4-7, Water Balance for the Site Stormwater Detention Basin, Minimum and Maximum Scenarios, respectively.

<u>EREF License Application Revision</u>:

The response to the Information Need does not require any changes or additions to be made to the EREF License Application.

Attachments:

Attachment 10.2-1 provides the reference Hackett, et. al., 2002

Attachment 10.2-2 provides the Water Rights Transfer Correspondence

Attachment 10.2-3 provides the Groundwater Pump Drawdown Report

Commitments:

None

10.3 Information Need:

Define the water use values for construction.

AES Response:

ER Section 3.4.6.1, Public Water Supply and Water Rights and ER Section 3.4.7, Quantitative Description of Water Use, have been revised to provide additional text on the quantities of water used during the seven years of heavy construction. Table 3.4-15, Heavy Construction Period Water Use, has been added to provide the quantity of water used during each heavy construction year for each of the major categories of use. The heavy construction period includes years when both construction and operation of cascades overlap.

The water use values for heavy construction increase from the initial construction year of 90,219,000 L/yr (23,833,000 gal/yr) to a maximum of 98,458,000 L/yr (26,010,000 gal/yr) in the second year of construction and then decreases to 84,374,000 L/yr (22,289,000 gal/yr) during the last year of heavy construction. The construction water use varies with the total number of people on site for construction and operations, the amount of concrete mixing and curing, and the amount of soil compaction that occurs in each year. The amount of water used for dust control is assumed to remain constant during the entire heavy construction period. It is assumed that construction water usage during construction years 8 through 11 will diminish markedly as most of the remaining construction activities are for assembly of systems and components and not concrete mixing, dust control, or soil compaction.

EREF License Application Revision:

The following sections of the EREF License Application will be revised to incorporate the above response:

ER Table 3.4-15, Heavy Construction Period Water Use

ER Chapter 3 Table of Contents, List of Tables (p. 3-v)

ER Section 3.4.6.1, Public Water Supply and Water Rights (p. 3.4-7)

ER Section 3.4.7, Quantitative Description of Water Use (p. 3.4-8)

Attachments:

Attachment 10.3-1 contains the markups for ER Sections 3.4.6.1, 3.4.7, ER Table 3.4-15 and the Table of Contents for ER Chapter 3 (List of Tables). Enclosure 3 contains the markup for the proprietary version of ER Table 3.4-15.

Commitments:

Revise the EREF License Application to include these markups in Revision 2.

11. LAND USE

11.1 Information Need:

Provide additional information regarding the routing for the transmission lines that will provide power during operation. Identify that the transmission lines will not cross BLM lands.

AES Response:

The following description of the routing for the transmission lines that will provide power to the EREF during operation is provided in ER Section 4.1.2, Utilities Impacts, page 4.1-2.

Excerpt from ER 4.1.2:
"Electrical transmission lines to provide a dual source of electrical feed will be installed as follows. A 161 kV transmission line originating at the existing Bonneville substation approximately 10 miles east of the EREF site will be constructed. This new transmission line will be relocated with an existing 69 kV transmission line right-of-way (row) between the Bonneville substation and the Kettle substation just to the east of the EREF site on Route 20. The new transmission line will then be constructed for a short distance along Route 20 to the site access road. The second 161 kV transmission line to the site will be from the existing Antelope substation which is 27 miles to the west. This transmission line will be constructed entirely along Route 20 to the site access road. Both transmission lines will then be run along the EREF access road to the facility substation. By installing the new transmission lines along existing row and Route 20, land use impacts are minimized. If needed, application for easements along Route 20 will be submitted to the state (IDAPA, 2008k)."

The above discussion in ER 4.1.2 will be revised to state that the site's electrical transmission lines will not cross any Bureau of Land Management (BLM) Lands. Additionally, the brief description on the routing of the electrical transmission lines in ER 8.8, Non-radiological Impacts, page 8.8-1, will be revised to state that the site's electrical transmission lines will not cross any Bureau of Land Management (BLM) Lands.

EREF License Application Revision:

The EREF License Application will be revised as follows:

Section 4.1.2 of the ER will be modified to state that "The site's electrical transmission lines will not cross any Bureau of Land Management (BLM) lands."

Section 8.8 of the ER will be revised to state that "The site's electrical transmission lines will not cross any Bureau of Land Management (BLM) lands."

Attachments:

Attachment 11.1 provides the markup pages for ER Section 4.1.2 and ER Section 8.8 of the EREF License Application.

Commitments:

Revise the EREF License Application to include these markups in Revision 2.

11.2 Information Need:

Provide an estimate of the amount of acreage to be restored to a native state following construction.

AES Response:

The estimated acreage restored after completion of plant construction is 53.6 ha (132.5 ac). This estimate is presented in ER Section 4.1.1 of the EREF License Application.

ER Section 4.1.1, states "Construction activities, including permanent plant structures, will disturb about 186 ha (460 ac). Temporary construction facilities, parking areas, material storage, and excavated areas for underground utilities will disturb an additional 53.6 ha (132.5 ac). The total disturbed area will, therefore, be 240 ha (592 acres). The temporary construction area will be restored after completion of plant construction."

The temporary construction facilities, parking areas, material storage, and excavated areas for underground utilities comprise the temporary construction area to be restored using native vegetation after completion of plant construction.

EREF License Application Revision:

The EREF License Application will be revised as follows.

ER Section 4.1.1, Construction Impacts, will be revised to clarify the estimated acreage restored after completion of construction.

Attachments:

Attachment 11.2 provides the markup page for ER Section 4.1.1, Construction Impacts, of the EREF license application.

Commitments:

Revise the EREF License Application to include these markups in Revision 2.

12. NOISE

12.1 Information Need: (NO-1 and NO-2)

(NO-1) Provide additional information regarding the methodology for managing noise during the construction of the plant. Define the specific limitations.

(NO-2) Provide additional information regarding impulse sounds due to construction activities (e.g., explosions, metal on metal contact, driving of piles, etc).

AES Response:

In addition to the noise mitigation measures described in ER Sections 4.7.5, 5.2.7, and 7.2.1.7, AES will minimize and manage noise and vibration impacts during construction and decommissioning by:

1. Performing construction or decommissioning activities with the potential for noise or vibration at residential areas that could have a negative impact on the quality of life during the day-time hours (7:00 a.m. - 7:00 pm). If it is necessary to perform an activity that could result in excessive noise or vibration in a residential area after hours, the community will be notified in accordance with the site procedures.
2. Engineered and administrative controls for equipment noise abatement, including the use of equipment and vehicle mufflers, acoustic baffles, shrouding, barriers and noise blankets.
3. Sequencing construction or decommissioning activities to minimize the overall noise and vibration impact (e.g., establishing the activities that can occur simultaneously or in succession).
4. Utilizing blast mats, if necessary.
5. Creating procedures for notifying State and local government agencies, residents and businesses of construction or decommissioning activities that may produce high noise or vibration that could affect them.
6. Posting appropriate State Highway signs warning of blasting.
7. Creating a Complaint Response Protocol for dealing with and responding to noise or vibration complaints, including entering the complaint into the site's Corrective Action Program.

Impacts on EREF License Application:

ER Sections 4.7.5, 5.2.7, and 7.2.1.7 will be revised to include the above items.

Commitments:

Revise the EREF License Application to include these markups in Revision 2.

Attachments:

Attachment 12.1 provides a markup of the ER Sections 4.7.5, 5.2.7, and 7.2.1.7.

13. SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

13.1 Information Need:

Provide the associated correspondence, notes, etc. for correspondence and communications with local and regional offices and citizens confirming that:

- There are no additional areas with minority and low-income population within 4 miles of the AREVA site, beyond those identified in the ER; and
- Areas within 4 miles of the AREVA site are not used for subsistence purposes by low income or minority groups.

AES Response:

Notes for agency and organization telephone interviews regarding minority and low-income populations may be reviewed at one of AREVA's offices (Naperville, IL, Marlborough, MA, or Bethesda, MD). The following agencies and organizations were contacted:

- American Red Cross
- Bonneville County Health & Welfare Office
- Bonneville County Social Services
- Catholic Charities of Idaho
- Community Council of Idaho
- Eastern Idaho Community Action Partnership
- Eastern Idaho Special Services Agency, Inc.
- Idaho Department of Health & Welfare
- Idaho Falls Community Food Bank
- Jefferson County Planning and Zoning
- Mountain View Hospital
- Rigby Chamber of Commerce / Jefferson Star Newspaper
- Ririe Joint School District 252
- Salvation Army
- Soup Kitchen
- United Way (Idaho Falls)

Subsistence use information was not readily available for the area. However, additional information and discussion about recreational uses in the area will be added to ER Section 4.11, Environmental Justice, and to ER Section 8.11, Environmental Justice.

EREF License Application Revision:

The EREF License Application will be revised as follows:

A new subsection (4.11.3) will be added to ER Section 4.11, Environmental Justice, summarizing in the text and new tables major recreational uses that are occurring in the area.

Additional text will be added to ER Section 8.11, Environmental Justice, summarizing information on subsistence.

Attachments:

Attachment 13.1 contains the additional text and tables that will be added as a new subsection (4.11.3) to Section 4.11, Environmental Justice, and the additional text that will be added to ER Section 8.11.

Commitments:

Revise the EREF License Application to include these markups in Revision 2.

13.2 Information Need:

Provide the correspondence and communications with local public officials to determine significance of impact of AREVA construction and operation on the provision of local public and educational services, and housing availability in the region, and any conflicts with proposed housing developments in the vicinity of the site.

AES Response:

Notes of the telephone interviews with county and local agencies and local organizations regarding the impact of AREVA construction and operation on local public and educational services and housing availability may be reviewed at one of AREVA's offices (Naperville, IL, Marlborough, MA, or Bethesda, MD). The following agencies and organizations were contacted:

- Bonneville County Clerk
- Bonneville County Planning & Zoning
- Bonneville County Sheriff's Department
- Bonneville Joint School District 93
- Eastern Idaho Community Action Partnership
- Eastern Idaho Regional Medical Center
- Idaho Division of Financial Management
- Idaho Falls Community Food Bank
- Idaho Falls Fire Department
- Idaho Falls Municipal Services
- Idaho Falls Planning Department
- Idaho Falls Police Department
- Idaho Falls School District 91
- Jefferson County Joint School District 251
- Jefferson County Planning and Zoning
- Mountain View Hospital
- Rigby Chamber of Commerce/ Jefferson Star Newspaper
- Rigby Police Department
- Ririe Joint School District 252
- Soup Kitchen

- United Way (Idaho Falls)

EREF License Application Revision:

The response does not require any changes or additions to be made to the EREF License Application.

Attachments:

None

Commitments:

None

13.3 Information Need:

Provide a discussion on RIMS multipliers – how and why selected (11-county versus 3-county area).

AES Response:

An analysis of the direct and indirect impacts on earnings and employment was conducted using the USBEA RIMS II Multipliers. An 11-county area was selected for the region of influence (ROI) instead of the 3-county ROI used in other sections of the ER. The decision to use this ROI was to account for feedback effects and for the rural nature of this region. Feedback effects can include purchases made by workers who live in counties outside the 3-county ROI, as well as non-labor related inputs that are purchased from other businesses and individuals in other counties. In addition, since Bonneville, Bingham, and Jefferson counties primarily are rural, the assumption was made that many of the purchases would be made outside this ROI based on availability since not all needed industries identified within the set of multipliers are located within the 3 counties.

The requested information to address earnings and employment is substantially provided in ER Section 7.1.2, The Economic Model – USBEA RIMS II Multipliers. ER Section 7.1.2 will be revised to include the following paragraph to be inserted after the third paragraph and before the fourth paragraph in ER Section 7.1.2:

> *"As noted in the RIMS II User Handbook, if a one county region is used, impacts at times are underestimated because the RIMS II multipliers do not reflect "feedback" effects. "Feedback" effects can include purchases made by commuters from nearby counties. As such, the choice of a region should account for the specific facility. For this particular facility, workers may choose to live in counties surrounding the proposed location. In addition, non-labor inputs may be purchased from businesses in other counties. A smaller region would be selected if the impacts were expected only in the immediate vicinity of the proposed facility (USBEA, 1997)."*

EREF License Application Revision:

ER Section 7.1.2, The Economic Model – USBEA RIMSII Multipliers, will be revised to incorporate the AES response.

Attachments:

Attachment 13.2 provides the markup page for ER Section 7.1.2.

Commitments:

Revise the EREF License Application to include these markups in Revision 2.

14. TRANSPORTATION

14.1 Information Need:

Provide the radionuclide inventories for the various shipping containers, so that the NRC may perform a release analysis of an accident involving a shipping container

AES Response:

The radionuclide inventory for each radioactive material container type used in the AES calculation for the EREF Transportation Source Terms is presented in Attachment 14.1: Table 1 (English units) and Table 2 (SI units). The activities are conservative for an individual container and may be used in transportation accident analyses.

EREF License Application Revision:

The above response does not require any changes or additions to the EREF License Application documents.

Attachments:

Attachment 14.1 provides Table 1, Radionuclide Inventory per Radioactive Material Container, Curie, and Table 2, Radionuclide Inventory per Radioactive Material Container, Becquerel.

Commitments:

None

14.2 Information Need:

Provide basis for not projecting construction shipments during years 4-11 and decommissioning or provide quantitative estimates for construction shipments during Years 4 - 11 as well as for decommissioning deliveries.

AES Response:

Construction

Construction shipments for Years 4 through 11 will be added to ER Table 4.2-3, Supply Materials Shipped to the Proposed EREF During the First Three Years of Construction, and ER Table 4.2-4, Waste Materials Shipped from the Proposed EREF During the First Three Years of Construction. Refer to Enclosure 3. Quantitative estimates for shipments to and from the EREF during construction Years 4 through 11 are provided in Enclosure 3. Similar to shipment information provided for construction Years 1 through 3 in ER Tables 4.2-3 and Table 4.2-4, construction shipment information for Years 4 through 11 is proprietary information and is to be withheld in accordance with 10 CFR 2.390.

Decommissioning

Based on the number of waste containers provided in Safety Analysis Report (SAR) Table 10.1-10, Packaging, Shipping and Disposal of Radioactive Wastes (Excluding Labor Costs), the total number of waste shipments over a nine year decommissioning period will be 1,354[1], resulting in an average of about 150 shipments per year during decommissioning of the EREF. Based on 250 work days per year, this equates to less than 1 roundtrip shipment per day (less than 2 vehicle trips per day). Additional shipments for the delivery of materials and equipment to and from the EREF site during decommissioning are estimated to be 10% to 15% of construction shipments. Based on 30 vehicle trips per day for deliveries and waste removal during the first three years of construction (i.e., period of site preparation and major building construction), there will be an additional 3 to 5 vehicle trips per day for material and equipment shipments.

A review of the total workdays required for decommissioning determined that SAR Table 10.1-7, Total Work Days by Labor Category, did not correctly reflect the workdays estimated for decontamination and/or dismantling of radioactive facility components. The estimates were revised to reflect work days versus work hours. The revised estimates were used to calculate the maximum potential increase to traffic due to decommissioning workers.

Based on 293,409 total work days for all labor categories over a 9 year period (See Attachment 3, markup of SAR Table 10.1-7, Total Work Days by Labor Category) and 213.33 work-days/year/person[2], there will be about 153 decommissioning workers on average for a given year and an additional estimated 25 workers providing oversight and administrative support, for a total of 178 workers. Therefore, the maximum potential increase to traffic due to decommissioning workers will be 356 vehicle trips per day. The combined daily vehicle trips (employee and shipments) during decommissioning will be 363 (2 plus 5 plus 356), which represents a 16% increase over the current daily traffic volume of 2,282 vehicles per day on U.S. Highway 20. When operation and decommissioning activities overlap, the maximum potential increase to traffic will be 53% (37%[3] plus 16%) which is equivalent to the maximum increase in traffic during construction.

<u>EREF License Application Revision</u>:

The following sections of the EREF License Application will be revised to incorporate the above response:

ER Table 2.1-7, Summary of Environmental Impacts for the Proposed Action

ER Chapter 4 Table of Contents, List of Tables (p. 4-v)

ER Section 4.2.4, Traffic Impacts (pp. 4.2-5 and 4.2-6)

ER Table 4.2-3, Supply Materials Shipped to the Proposed EREF During the First Three Years of Construction

ER Table 4.2-4, Waste Materials Shipped from the Proposed EREF During the First Three Years of Construction

ER Section 5.1.2, Transportation (p. 5.1-1)

SAR Table 10.1-7, Total Work Days by Labor Category

[1] Calculated as follows: 1,063 Sea-Land containers (for the centrifuges) plus 872 B25 containers (97 + 519 + 256). Three B25 containers will be shipped at a time. Therefore, the total number of waste shipments is 1,063 + (872/3) = 1,354.
[2] SAR Table 10.1-8, Note 2
[3] ER Section 4.2.4, p. 4.2-5

Attachments:

Attachment 14.2-1 contains the markups for the ER (Table 2.1-7, Chapter 4 Table of Contents – List of Tables, Section 4.2.4, Tables 4.2-3 and 4.2-4, and Section 5.1.2).

Enclosure 3 contains the markups for the proprietary versions of ER Tables 4.2-3 and 4.2-4.

Attachment 14.2-2 contains the revisions for SAR Table 10.1-7.

Commitments:

Revise the EREF License Application to include these markups in Revision 2.

14.3 Information Need:

Correct typo in Table 4.2-2. Regarding Natural Uranium Feed - it states 424, and it should be 1424.

AES Response:

Table 4.2-2, Annual Shipments To/From the Proposed EREF (by Truck) During Operation, will be revised to show the estimated number of shipments per year for natural uranium feed is 1,424.

EREF License Application Revision:

ER Table 4.2-2 of the EREF License Application will be revised to correct the number of shipments per year for natural uranium feed.

Attachments:

Attachment 14.3 provides the markup page for ER Table 4.2-2 of the EREF License Application.

Commitments:

Revise the EREF License Application to include these markups in Revision 2.

14.4 Information Need:

4th paragraph on p. 4.2-5: Provide clarification as to whether the 37% increase in transportation during operations, includes construction.

AES Response:

Referring to ER p. 4.2-5, the 37% increase in traffic over the current daily traffic volume on U.S. Highway 20 only accounts for daily vehicle trips for the operational workforce and material shipments (deliveries and waste) during operations. As stated on ER p. 4.2-6, the increase in highway traffic over the current daily traffic volume will be 53% during construction. As further stated, the 53% increase during construction also represents the daily maximum increase in highway vehicle trips during the period when construction and operation overlap.

EREF License Application Revision:

The response to this NRC Supplement Item does not require any changes or additions to the EREF License Application documents.

<u>Attachments</u>:

None

<u>Commitments</u>:

None

15. VISUAL AND SCENIC RESOURCES

15.1 Information Need:

Provide additional information regarding the visual impacts of the site on the Wasden site. This should include the digital photographs, any modeling that was performed, and any discussions with the SHPO.

AES Response:

Images of the Eagle Rock Enrichment Facility (EREF) from the Wasden site, modeled after digital photographs, were provided on September 26, 2008 to the Idaho State Historic Preservation Officer (SHPO). These images included a view of the EREF from the Wasden site without the intervening ridgeline and a view of the EREF from the Wasden site with the intervening ridgeline. Refer to ER Section 3.8.3.4, Survey Findings, and ER Section 3.9.8, Viewshed Information, for information regarding the intervening ridgeline. Following his receipt of the images, the SHPO inquired about the possibility of planting native vegetation in the two to three meter (seven to ten feet) height range to obscure EREF rooflines with the ridgeline. The images provided to the SHPO are contained in Attachment 15.1-1.

Referring to ER Section 5.1.8, Historical and Cultural Resources, the following is stated: "AES is considering planting 0.6 m to 0.9 m (2 ft. to 3 ft.) tall native vegetation to further mask the portions of the EREF buildings that may be visible from the Wasden Complex." This statement is also repeated in ER Section 7.2.1.3, Aesthetic Changes. Since the ER does not accurately reflect SHPO's inquiry, the height of native vegetation as given in ER Sections 5.1.8 and 7.2.1.3 will be revised from "0.6 to 0.9 m (2 to 3 ft)" to "2 to 3 m (7 to 10 ft)".

EREF License Application Revision:

The following sections of the EREF License Application will be revised to incorporate the above response:

ER Section 5.1.8, Historical and Cultural Resources (p. 5.1-4)

ER Section 7.2.1.3, Aesthetic Changes (p. 7.2-2)

Attachments:

Attachment 15.1-1 provides the following images: 1) the EREF view from the Wasden site without the intervening ridgeline and 2) the EREF view from the Wasden site with the intervening ridgeline.

Attachment 15.1-2 provides the markup pages for ER Section 5.1.8, Historical and Cultural Resources (p. 5.1-4) and ER Section 7.2.1.3, Aesthetic Changes (p. 7.2-2).

Commitments:

Revise the EREF License Application to include these markups in Revision 2.

15.2 Information Need:

Provide the Visual Survey Report performed by MWH.

AES Response:

The Visual Resource Inventory Study for the EREF, Revision 1, prepared by MWH is provided in Attachment 15.2.

EREF License Application Revision:

The response does not require any changes or additions to be made to the EREF License Application.

Attachments:

Attachment 15.2 provides the Visual Resource Inventory Study for the EREF, Revision 1, prepared by MWH.

Commitments:

None

16. WASTE MANAGEMENT

16.1 Information Need:

Correction to ER Table 4.13-2; numbers don't add up to $7.76 (add up to $7.66). The value in Table 4.13-2 needs to be corrected - changed from $7.76 to $7.66.

AES Response:

ER Table 4.13-2, Summary of Estimated Costs for Disposal of DUF_6 at DOE Conversion Facilities, will be revised to change the total cost from \$7.76 to \$7.66 per kilogram DUF_6. ER Section 4.13.3.6 presents the correct total cost (\$7.66).

EREF License Application Revision:

The EREF License Application will be revised as follows:

ER Table 4.13-2 will be revised to change the total cost from \$7.76 to \$7.66 per kilogram DUF_6.

Attachments:

Attachment 16.1 provides the revised Table 4.13-2 of the EREF license application.

Commitments:

Revise the EREF License Application to include these markups in Revision 2.

16.2 Information Need:

(1) Need the radionuclide inventory of radiological wastes (necessary for transportation risk analysis).

(2) Provide the basis for the waste quantities presented in the ER (how derived).

AES Response:

(1) Refer to section 14.1 of this response for the radionuclide inventories for the various shipping containers.

(2) The basis for the operational waste quantities presented in the EREF ER was the Environmental Report for the National Enrichment Facility (the Reference Application) which included data provided by European operators. The values in the Reference Application were adjusted to reflect the increased capacity of the expanded EREF.

EREF License Application Revision:

The response does not require any changes or additions to be made to the EREF License Application.

Attachments:

None

Commitments:

None

16.3 Information Need:

The ER mentions waste volume reductions and use of a waste volume reduction facility. Which waste streams are candidate for onsite and/or offsite waste volume reduction?

AES Response:

Referring to ER Section 3.12.1.3.3, System Operation, and ER Section 3.12.2, Solid Waste Management, waste streams that are candidates for onsite waste volume reduction include radiologically contaminated wastes that are a by-product of the Liquid Effluent Collection and Treatment System, and suitable radioactive solid wastes, respectively. As noted in ER Section 3.12.2, Solid Waste Management, ER Section 3.12.2.1.1.1, Wet Trash, ER Section 3.12.2.1.2.1, Trash, and ER Section 4.13.3.1, Radioactive and Mixed Waste Disposal Plans, waste streams that are candidates for offsite waste volume reduction include industrial wastes (i.e., miscellaneous trash, vehicle air filters, empty cutting oil cans, miscellaneous scrap metal, and paper), radioactive wet trash, radioactive dry trash (i.e., that not suitable for onsite volume reduction), and some mixed wastes, respectively. As indicated in ER Section 4.13.5, Waste Minimization, candidate industrial wastes will be volume reduced at a centralized waste processing facility. As indicated in ER Sections 3.12.2.1.1.1 and 3.12.2.1.2.1, radioactive wet and dry trash sent offsite for minimization will be shipped to a Control Volume Reduction Facility (CVRF), such as the EnergySolutions facilities in Oak Ridge, Tennessee. As noted in ER Section 4.13.3.1, the EnergySolutions facilities are also capable of volume reducing mixed wastes.

As stated in ER Section 3.12.2, "The solid waste management systems will be a set of facilities, administrative procedures, and practices that provide for the collection, temporary storage, (no solid waste processing is planned), and disposal of categorized solid waste in accordance with regulatory requirements." A comprehensive Waste Management Plan, including volume reduction, will be implemented for the EREF.

EREF License Application Revision:

The response does not require any changes or additions to be made to the EREF License Application.

Attachments:

None

Commitments:

A comprehensive Waste Management Plan, which addresses practices for the collection, temporary storage, minimization and disposal of wastes, will be developed prior to construction of the EREF.

16.4 Information Need:

There are two separate landfills, one for municipal waste and one for construction waste. Which will the EREF be using?

AES Response:

The two landfills operated by Bonneville County are the Hatch Pit and the Peterson Hill Landfill. The Hatch Pit is only permitted to accept construction and demolition solid wastes. The Peterson Hill Landfill is the County's primary solid waste disposal facility; it is not used for the disposal of construction and demolition wastes. Therefore, construction waste would be disposed at the Hatch Pit and non-radiological, non-hazardous operational waste would be disposed at the Peterson Hill Landfill. However, as indicated in ER Section 3.12.2.2, Construction Waste, AES may opt to dispose of construction waste at another approved landfill and as noted in ER Section 4.2.4, Traffic Impacts, other regional landfills may be used for the disposal of non-radiological, non-hazardous operational waste.

EREF License Application Revision:

The response does not require any changes or additions to be made to the EREF License Application.

Attachments:

None

Commitments:

None

ATTACHMENT 1.1

FIGURE 3.3-12 – MARKUP

a) ~~SMALL COLLAPSED LAVA TUBE~~ PRESSURE RIDGE

b) KETTLE BUTTE FROM NORTH BOUNDARY FENCE FACING EAST

1a

Figure 3.3-12 **Rev. 1**

Photos of Significant Geological Features

EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT

ATTACHMENT 1.2

MARKUPS

ER SECTIONS 1.2.1, 2.1.2.1 AND 3.1.1, AND ER FIGURE 3.2-1

1.2 PROPOSED ACTION

The proposed action is the issuance of an NRC license under 10 CFR 70 (CFR, 2008b) for the construction and operation of a uranium enrichment facility at a site located In Bonneville County, Idaho. The Eagle Rock Enrichment Facility (EREF) will use the gas centrifuge process to separate natural uranium hexafluoride feed material containing approximately 0.71 Uranium-235 (^{235}U) into a product stream enriched up to 5.0 $^{w}/_{o}$ ^{235}U and a depleted UF_6 stream containing approximately 0.15 to 0.30 $^{w}/_{o}$ ^{235}U. Production capacity at design throughput is approximately a nominal 6.0 million Separative Work Units (SWU) per year. Facility construction is expected to require eleven (11) years, including four years of assemblage and testing. Construction will be conducted in eight phases associated with each of the eight Cascade Halls. Operation will commence after the completion of the first cascade in the first Cascade Hall. The facility is licensed for 30 years of operation. Decommissioning and Decontamination (D&D) is projected to take nine (9) years. AREVA Enrichment Services, LLC (AES) estimates the cost of the plant to be approximately $4.1 billion (in 2007 dollars) excluding escalation, contingency, interest, tails disposition, decommissioning, and any replacement equipment required during the operational life of the facility.

1.2.1 The Proposed Site

The proposed site is situated in Bonneville County, Idaho, on the north side of U.S. Highway 20, about 113 km (70 mi) west of the Idaho/Wyoming state line. Portions of Bonneville, Jefferson, and Bingham counties are within 8 km (5 mi) of the proposed site. The approximately 1,700 ha (4,200 ac) property is currently under private ownership by a single landowner. There is a 16-ha (40-ac) parcel within the proposed site, which is administered by the U. S. Bureau of Land Management (BLM). There are two, 16-ha (40-ac) parcels located within the proposed site for which the Federal government did reserve for itself certain mineral rights which were not subject to claim or patent by anyone under the General Mining Act of 1872 (USC, 2008f). These reservations were released, remised and quitclaimed to the person to whom the land was patented pursuant to Section 64.b of the Atomic Energy Act of 1954, as amended, and are no longer valid~~has uranium land patents. The land patents are not subject to the 1872 Mining Law (USC, 2008f) and, therefore, are not available to mining claims~~. The privately held land will be purchased by AES. The approximate center of the EREF is located at latitude 43 degrees, 35 minutes, 7.37 seconds North and longitude 112 degrees, 25 minutes, 28.71 seconds West. Refer to Figure 1.2-1, Location of Proposed Site, and Figure 1.2-2, EREF Location Relative to Population Centers Within 80 Kilometers (50 Miles).

There are no right-of-ways on the property with the exception of the right-of-way for U.S. Highway 20, which forms part of the southern boundary of the proposed site. A dirt road provides site access from U.S. Highway 20, while other dirt roads provide access throughout the proposed site. The proposed site is comprised mostly of relatively flat and gently sloping surfaces with small ridges and areas of rock outcrop. Most of the site is semi-arid steppe covered by eolian soils of variable thickness that incompletely cover broad areas of volcanic lava flows. Elevations at the site range from about 1,556 m (5,106 ft) to about 1,600 m (5,250 ft). Many of the areas with thickest soils and gentle slopes with a minimum of rock outcrop are currently used for crops.

The proposed site is in native rangeland, non-irrigated seeded pasture, and irrigated cropland. The proposed site is seasonally grazed. Wheat, barley, and potatoes are grown on 389 ha (962

2.1.2 Proposed Action

The proposed action, as described in ER Section 1.2, Proposed Action, is the issuance of an NRC license under 10 CFR 30, 40 and 70 (CFR, 2008c; CFR, 2008d; CFR, 2008b) that would authorize AES to possess and use byproduct material, source material and special nuclear material (SNM) and to construct and operate a uranium enrichment facility at a site located in Bonneville County, Idaho. ER Section 1.2 contains a detailed description of the proposed action, including relevant general background information, organization sharing ownership, and project schedule.

2.1.2.1 Description of the Proposed Site

The proposed site is situated in Bonneville County, Idaho, on the north side of U.S. Highway 20, about 113 km (70 mi) west of the Idaho/Wyoming state line. Portions of Bonneville, Jefferson, and Bingham counties are within 8 km (5 mi) of the proposed site. The approximately 1,700 ha (4,200 ac) property is currently under private ownership by a single landowner. There is a 16-ha (40-ac) parcel within the proposed site, which is administered by the U. S. Bureau of Land Management (BLM). Also, there are two, 16-ha (40-ac) parcels located within the proposed site that the Federal government did reserve for itself certain mineral rights which were not subject to claim or patent by anyone under the General Mining Act of 1872 (USC, 2008f). These reservations were released, remised and quitclaimed to the person to whom the land was patented pursuant to Section 64.b of the Atomic Energy Act of 1954, as amended, and are no longer valid~~has uranium land patents. The land patents are not subject to the 1872 Mining Law (USC, 2008f) and, therefore, are not available to mining claims.~~ The privately held land will be purchased by AES. The approximate center of the Eagle Rock Enrichment Facility is located at latitude 43 degrees, 35 minutes, 7.37 seconds North and longitude 112 degrees, 25 minutes, 28.71 seconds West. Refer to Figure 2.1-1, 80-Kilometer (50-Mile) Radius With Cities and Roads.

There are no right-of-ways on the property with the exception of the right-of-way for U.S. Highway 20, which forms part of the southern boundary of the proposed site. Otherwise, the site is in native rangeland, non-irrigated seeded pasture, and irrigated cropland. A dirt road provides site access from U.S. Highway 20, while other dirt roads provide access throughout the proposed site. The proposed site is comprised mostly of relatively flat and gently sloping surfaces with small ridges and areas of rock outcrop. Most of the site is semi-arid steppe covered by eolian soils of variable thickness that incompletely cover broad areas of volcanic lava flows. Elevations at the site range from about 1,556 m (5,106 ft) to about 1,600 m (5,250 ft). Many of the areas with thickest soils and gentle slopes with a minimum of rock outcrop are currently used for crops.

The proposed site is in native rangeland, non-irrigated seeded pasture, and irrigated cropland. The proposed site is seasonally grazed. Wheat, barley, and potatoes are grown on 389 ha (962 ac) of irrigated land on the proposed site. One potato storage facility is located at the south end of the site.

Grazing and cropping are the main land uses within 8 km (5 mi) of the proposed site. State land immediately west of the proposed site and BLM land immediately east of the site are grazed. The nearest offsite croplands are within 0.8 km (0.5 mi) of the southeast corner of the proposed site. The nearest feedlot and dairy operations are about 16 km (10 mi) east of the proposed site. The Department of Energy's Idaho National Laboratory (INL) eastern boundary is 1.6 km (1 mi) west of the proposed site. The INL property near the site is undeveloped rangeland. The closest facility on the INL property is the Materials and Fuels Complex (MFC), located

3.1 LAND USE

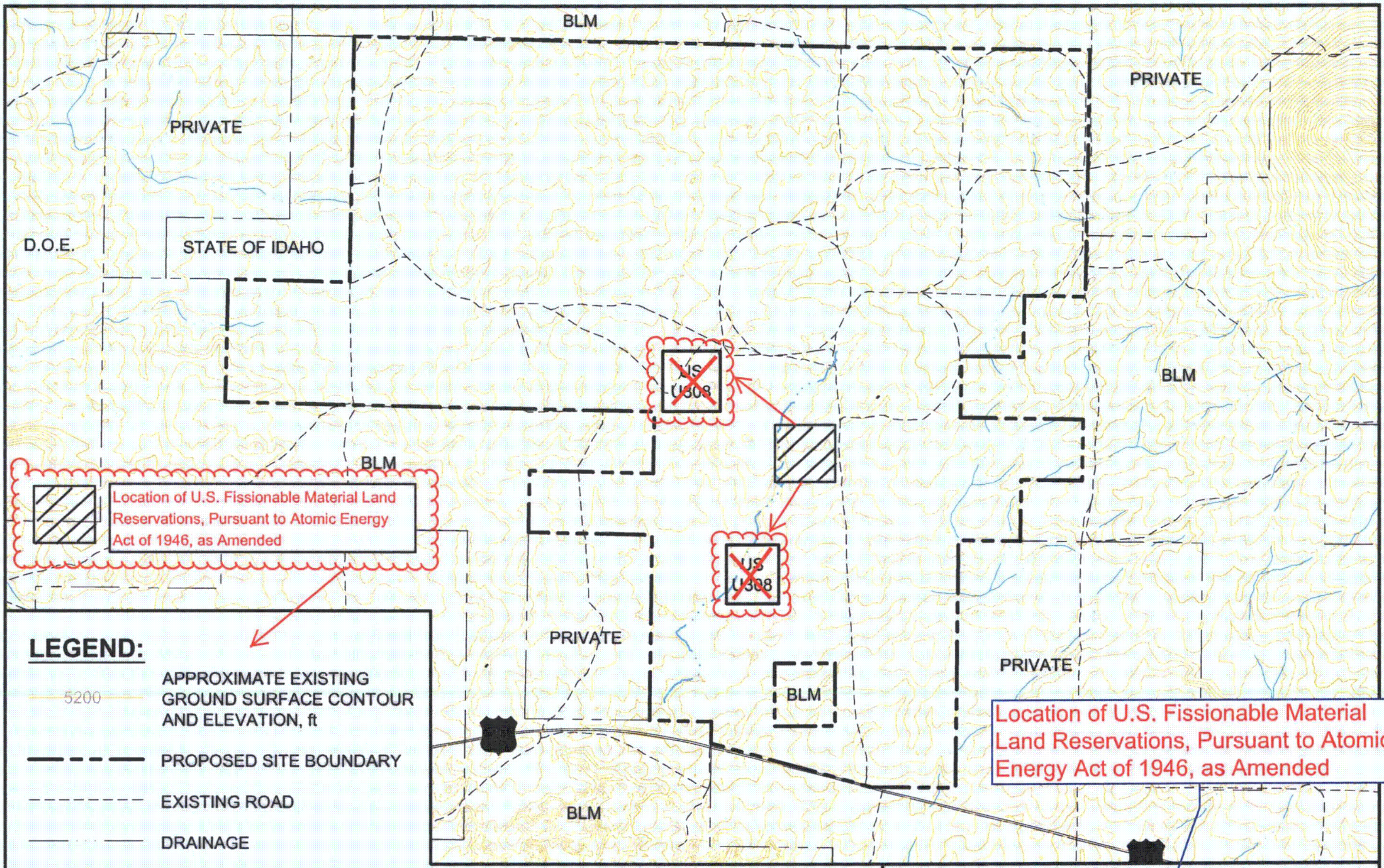
This section describes land uses on the proposed Eagle Rock Enrichment Facility (EREF) site and within 8 km (5 mi) of the proposed site. It also provides a discussion of land uses in the general region within 80 km (50 mi) of the proposed site. Figure 3.1-1, Land Ownership Within 80-km (50 mi), shows the site in relation to regional lands. Major transportation corridors are identified in Section 3.2, Transportation.

3.1.1 Description of the Proposed Property

The proposed site is situated within Bonneville County, Idaho, on the north side of U.S. Highway 20, about 113 km (70 mi) west of the Idaho/Wyoming state line. Portions of Bonneville, Jefferson, and Bingham counties are within 8 km (5 mi) of the proposed site. The approximately 1,700 ha (4,200 ac) property is currently under private ownership by a single landowner. There is a 16-ha (40-ac) parcel within the proposed site, which is administered by the Bureau of Land Management (BLM). The privately held land will be purchased by AREVA Enrichment Services, LLC (AES).

There are no right-of-ways on the property with the exception of the right-of-way for U.S. Highway 20, which forms part of the southern boundary of the proposed site. Otherwise, the site is in native rangeland, non-irrigated seeded pasture, and irrigated cropland. A dirt road provides site access from U.S. Highway 20, while other dirt roads provide access throughout the proposed site.

There are no mineral or oil and gas leases on or near the proposed site. However, the Federal government did reserve for itself certain mineral rights which were not subject to claim or patent by anyone under the General Mining Act of 1872 (USC, 2008f). The reservations were~~has uranium land patents~~ for mineral rights on two, 16-ha (40-ac) parcels located within the proposed site (Figure 3-1.2, Location of U.S. Fissionable Material Land Reservations, Pursuant to Atomic Energy Act of 1946, as Amended~~ U308 Uranium Patents~~). The mineral rights so retained by the U.S. Government were subject to entry and exploitation by the U.S. only.~~land patents are not subject to the 1872 Mining Law (USC, 2008f) and, therefore, are not available to mining claims.~~ Although the U.S. government reserved the right to enter, explore for and recover fissionable materials~~can exploit uranium under the patent if present~~, the geologic setting at the site is not consistent with the occurrence of ~~uranium~~ such deposits because the proposed site is underlain by basaltic lava flows that range up to a few thousand feet in total thickness. Basaltic lavas are not known to host any significant uranium deposits anywhere in the world (Nash, 1981). At the current time, no exploration activity for uranium or active uranium mining is reported to be occurring anywhere in Idaho (Gillerman, 2008a). ~~Based on these geological characteristics and associated information, AES concludes that there are no significant uranium deposits at the proposed site and the patents will not interfere with the safe operation of the facility.~~ AREVA Enrichment Services (AES) contacted the Department of Interior office in Washington, D.C. and the Idaho State office of the Bureau of Land Management (BLM) to determine the current status of these reservations. AES was advised that while the reservation may continue to appear in title searches to be a part of the land patent, in fact, these reservations were released, remised and quitclaimed to the person to whom the land was patented pursuant to Section 64.b of the Atomic Energy Act of 1954, as amended. A review of the Atomic Energy Act confirms that the two mineral reservations associated with the property are no longer valid and have no force or effect in law. Refer to Section 3.3, Geology and Soils, for further discussion on mineral resources in the site vicinity.



NOTES:

1. GROUND SURFACE CONTOUR ELEVATIONS ARE SHOWN IN FEET. METRIC CONVERSION IS 1 m = 3.281 ft.

SCALE
0 800 1600 m

SCALE
0 2500 5000 ft

N

Figure 3.1-2 **Rev. 1**

~~Location of U.S. U308 Uranium Patents~~

EAGLE ROCK ENRICHMENT FACILITY
ENVIRONMENTAL REPORT

ATTACHMENT 1.3

MARKUPS

ER 4.2.5, MITIGATION MEASURES (page 4.2-7)

ER 5.2.2, TRANSPORTATION (page 5.2-2)

ER 9.0, LIST OF REFERENCES (page 9.0-16) on the EREF site

- Covering open-bodied trucks that transport materials likely to give rise to airborne dust.
- Promptly removing earthen materials on paved roads carried onto the roadway by wind, trucks, or earth moving equipment.
- Promptly stabilizing or covering bare areas once roadway and highway entrance earthmoving activities are completed.
- Maintaining low speed limits on site to reduce noise and minimize impacts to wildlife.

4.2.6 Agency Consultations

U.S. Highway 20 has
single axle up to 29,2
capacity can be as hi
(ITD, 2008e). AES wi
(IDAPA, 2008l). Site
for highway modificati
transmission lines ali

Mitigation measures will be used to minimize the release of dirt and other matter onto Highway 20 during construction. These measures will include the following:

- Gravel pads will be built at the EREF entry/exit points along U.S. Highway 20 in accordance with the Idaho Department of Environmental Quality (IDEQ) Catalog of Stormwater Best Management Practices for Idaho Cities and Counties, Volume 2, Erosion and Sediment Controls (IDEQ, 2009). Periodic top dressing of clean stone will be applied to the gravel pads, as needed, to maintain effectiveness of the stone voids. Tire washing will be performed as needed, on a stabilized stone (gravel) area which drains to a sediment trap.
- Vehicles will be inspected for cleanliness from dirt and other matter that could be released onto Highway 20 prior to entering U.S. Highway 20.
- Open-bodied trucks will be covered (e.g., the installation of tarps over open beds) to prevent debris from falling off or blowing out of vehicles onto the highway.

4.2.7 Radioact

Radioactive material s
10 CFR 71 (CFR, 200
environmental impact
Environmental Statem
(NRC, 1977a), update
and Railway Accident
related to the transpo
no significant environmental impacts. The materials that will be transported to and from the EREF are within the scope of the environmental impacts previously evaluated by the NRC. Because these accident-related impacts have been addressed in a previous NRC environmental impact statement (NRC, 1977a), these impacts do not require further evaluation in this report.

The dose equivalent to the public and worker for incident-free transportation as well as the Maximally Exposed Individual (MEI) has been conservatively calculated to illustrate the relative impact resulting from transporting radioactive material. Uranium feed, product, tails and associated low-level waste (LLW) will be transported to and from the EREF. The following sections describe each of these conveyances, associated routes, and the dose contribution to the public and worker, as well as non-radiological environmental impacts associated with vehicle transportation.

4.2.7.1 Radioactive Material Annual Quantities

The annual radioactive material quantity of packages and associated shipments transported to and from the EREF are summarized on Table 4.2-5, Annual Radioactive Material Quantities and Shipments, and are discussed separately below.

4.2.7.1.1 Uranium Feed

The uranium feed for the facility is natural uranium in the form of uranium hexafluoride (UF_6). The UF_6 is transported to the facility in 48Y cylinders. These cylinders are designed, fabricated

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on the EREF site

undisturbed areas with silt fencing and straw bales, and placing crushed stone on top of disturbed soil in areas of concentrated runoff.

- Covering open-bodied trucks that transport materials likely to give rise to airborne dust.
- Promptly removing earthen materials on paved roads carried onto the roadway by wind, trucks, or earth moving equipment.
- Promptly stabilizing or covering bare areas once roadway and highway entrance earthmoving activities are completed.
- Maintaining low speed limits on site to reduce noise and minimize impacts to wildlife.

5.2.3 Geology and Soils

Mitigation measures Mitigation measures will be used to minimize the release of dirt and other include the following matter onto Highway 20 during construction. These measures will include the following:

- Gravel pads will be built at the EREF entry/exit points along U.S. Highway 20 in accordance with the Idaho Department of Environmental Quality (IDEQ) Catalog of Stormwater Best Management Practices for Idaho Cities and Counties, Volume 2, Erosion and Sediment Controls (IDEQ, 2009). Periodic top dressing of clean stone will be applied to the gravel pads, as needed, to maintain effectiveness of the stone voids. Tire washing will be performed as needed, on a stabilized stone (gravel) area which drains to a sediment trap.
- Vehicles will be inspected for cleanliness from dirt and other matter that could be released onto Highway 20 prior to entering U.S. Highway 20.
- Open-bodied trucks will be covered (e.g., the installation of tarps over open beds) to prevent debris from falling off or blowing out of vehicles onto the highway.

- The use of BMP fences).
- Prompt reveget impacts of erosi
- Watering will be
- Process water w subsurface bedr
- BMPs will be us drainage ditche
- Grading plans w stormwater to th
- Standard drilling and blasting techniques, if required, will be used to minimize impact to bedrock, reducing the potential for over-excavation thereby minimizing damage to the surrounding rock, and protecting adjacent surfaces that are intended to remain intact.
- Soil stockpiles generated during construction will be placed in a manner to reduce erosion.
- On-site excavated materials will be reused whenever possible.

5.2.4 Water Resources

Mitigation measures will be in place to minimize potential impacts on water resources during construction and operation. These include employing BMPs and the control of hazardous materials and fuels. In addition, the following controls will also be implemented:

- Construction equipment will be in good repair without visible leaks of oil, greases, or hydraulic fluids.
- The control and mitigation of spills during construction will be in conformance with the Spill Prevention Control and Countermeasure (SPCC) plan.
- BMPs will be used to control stormwater runoff to prevent releases to nearby areas to the extent possible. See Section 4.1.1 for descriptions of construction BMPs.

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SECTION 2, ACCIDENTS

NOT USED

AIR QUALITY AND METEOROLOGY

ATTACHMENT 3.1-1

COMPARISON OF AIR QUALITY IMPACTS DURING CONSTRUCTION AND OPERATION

Comparison of Air Quality Impacts During Construction and Operation								
Construction			**Operations**			**Combined**		
AERMOD -site construction	ER Table 4.6-3	ppm	AERMOD -site construction		ppm	AERMOD -site construction		ppm
CO	8-hour	2.1	CO	8-hour	0	CO	8-hour	< peak construction
	1-hour	4.6		1-hour	0		1-hour	< peak construction
NO2	annual	11.6	NO2	annual	0	NO2	annual	< peak construction
SO2	annual	15.7	SO2	annual	0	SO2	annual	< peak construction
	24-hour	63.4		24-hour	0		24-hour	< peak construction
	3-hour	163.1		3-hour	0		3-hour	< peak construction
PM10	annual	25.8	PM10	annual	0	PM10	annual	< peak construction
	24-hour	150		24-hour	0		24-hour	< peak construction
PM2.5	annual	7.1	PM2.5	annual	0	PM2.5	annual	< peak construction
	24-hour	30		24-hour	0		24-hour	< peak construction
Fugitive Dust	ER Table 4.6-4	g/s	Fugitive Dust			Fugitive Dust		g/s
PM10		21.8	PM10		0	PM10		< peak construction
PM2.5		3.3	PM2.5		0	PM2.5		< peak construction
Onsite Vehicle Exhaust	ER Table 4.6-4	tons/yr	Onsite Vehicle Exhaust		tons/yr	Onsite Vehicle Exhaust		tons/yr
		4.5			< peak construction			< peak construction
MSB DG	ER Table 4.6-4	tons/yr	MSB DG	ER Table 4.6-6	tons/yr	MSB DG		tons/yr
PM10		0.067	PM10		0.067	PM10		0.067
NOx		9.3	NOx		9.3	NOx		9.3
CO		0.8	CO		0.8	CO		0.8
VOC		0.185	VOC		0.185	VOC		0.185
SB DG	ER Table 4.6-4	tons/yr	SB DG	ER Table 4.6-6	tons/yr	SB DG		tons/yr
PM10		0.0066	PM10		0.0066	PM10		0.0066
NOx		2.1	NOx		2.1	NOx		2.1
CO		0.1	CO		0.1	CO		0.1
VOC		0.0037	VOC		0.0037	VOC		0.0037
FWT DG	ER Table 4.6-4	tons/yr	FWT DG	ER Table 4.6-6	tons/yr	FWT DG		tons/yr
PM10		0.006	PM10		0.006	PM10		0.006
NOx		0.2	NOx		0.2	NOx		0.2
CO		0.027	CO		0.027	CO		0.027
VOC		0.007	VOC		0.007	VOC		0.007
Offsite Vehicle Emissions	ER Table 4.6-5	tons/day	Offsite Vehicle Emissions	ER Table 4.6-7	tons/day	Offsite Vehicle Emissions		tons/day
HC		0.065	HC		0.047	HC		
CO		1	CO		0.678	CO		
NOx		0.14	NOx		0.24	NOx		

AIR QUALITY AND METEOROLOGY

ATTACHMENT 3.1-2

ER SECTION 4.6.1 MARKUP

The results of the air quality impact analysis of the EREF construction site preparation activities are presented in Table 4.6-3, Results of Air Quality Impact AERMOD Dispersion Modeling for EREF Construction Site Preparation Activity. All predicted concentrations shown in Table 4.6-3, Results of Air Quality Impact AERMOD Dispersion Modeling for EREF Construction Site Preparation Activity, include the appropriate ambient background level noted in Table 4.6-2, Background Air Quality Concentrations for AERMOD Modeling Analysis. No NAAQS has been set for hydrocarbons; however, the total annual emissions of hydrocarbons predicted from the site (approximately 4,045 kg (4.5 tons)) are well below the level of 36,287 kg (40 tons) that defines a significant source of volatile organic compounds (40 CFR 52.21(b)(23)(i)) (CFR, 2008qq).

As shown in Table 4.6-3, Results of Air Quality Impact AERMOD Dispersion Modeling for EREF Construction Site Preparation Activity, the maximum predicted one-hour and eight-hour CO concentrations for the EREF construction site preparation were 4.6 ppm and 2.1 ppm, respectively. All CO concentrations were generated by vehicle exhaust from support vehicles and construction equipment utilized on-site. None of the modeled CO concentrations exceed the NAAQS noted in Table 4.6-3, Results of Air Quality Impact AERMOD Dispersion Modeling for EREF Construction Site Preparation Activity.

The maximum predicted annual nitrogen dioxide (NO_2) concentration was estimated to be 11.6 $\mu g/m^3$. As with CO concentrations, all NO_2 concentrations were generated from vehicle exhaust and do not exceed the NAAQS.

For SO_2 concentrations, the estimated maximum annual concentration was 15.7 $\mu g/m^3$, 63.4 $\mu g/m^3$ for the 24-hour averaging period, and 163.1 $\mu g/m^3$ for the 3-hour averaging period. SO_2 concentrations were generated by vehicle exhaust from construction equipment. None of the predicted SO_2 concentrations exceeded the NAAQS.

PM_{10} concentrations were mainly generated by fugitive dust caused by construction activity. To a lesser extent, vehicle exhaust from construction equipment contributed to the PM_{10} concentrations. As can be seen in Table 4.6-3, Results of Air Quality Impact AERMOD Dispersion Modeling for EREF Construction Site Preparation Activity, the maximum predicted annual PM_{10} concentration was 25.8 $\mu g/m^3$ while the 24-hour PM_{10} concentration was estimated to be 150 $\mu g/m^3$. The NAAQS for the annual averaging period was revoked in 2006 and therefore does not apply. The 24-hour PM_{10} concentration is at the NAAQS but does not exceed the limit noted in Table 4.6-3, Results of Air Quality Impact AERMOD Dispersion Modeling for EREF Construction Site Preparation Activity. This maximum 24-hour PM_{10} concentration is predicted to occur at a location on the property boundary that is closest to the southwest portion of the area of disturbance.

Predicted maximum $PM_{2.5}$ annual concentrations were estimated to be 7.1 $\mu g/m^3$ and the 24-hour concentration was 30 $\mu g/m^3$. These concentrations do not exceed the annual and 24-hour NAAQS shown in Table 4.6-3, Results of Air Quality Impact AERMOD Dispersion Modeling for EREF Construction Site Preparation Activity. Fugitive dust generated by construction activity and vehicle exhaust is a contributor to the $PM_{2.5}$ concentrations.

Other onsite air quality impacts will occur due to the construction work, such as portable generator exhaust, air compressor exhaust, welding torch fumes, and paint fumes. Since the EREF will be constructed using a phased construction plan, some of the facility will be operational while construction continues. As such, other air quality impacts will occur due to the operation of the standby diesel generators. Construction emission types, source locations, and emission quantities are presented in Table 4.6-4, Construction Emission Types.

A comparison of the air quality impacts during construction and operation indicates that the construction emissions are bounding.

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ATTACHMENT 3.2

MARKUPS

ER Section 4.1.1, Construction Impacts (p. 4.1-1)

ER Section 4.2.5, Mitigation Measures (p. 4.2-6)

ER Section 4.3, Geology and Soils Impacts (p. 4.3-2)

ER Section 4.4.7.1, Mitigations (p. 4.4-9)

ER Section 4.5.8, Construction Practices (p. 4.5-5)

ER Section 4.6.5, Mitigative Measures for Air Quality Impacts (p. 4.6-7)

ER Section 5.2.1, Land Use (p. 5.2-1)

ER Section 5.2.2, Transportation (p. 5.2-1)

ER Section 5.2.4, Water Resources (p. 5.2-3)

ER Section 5.2.5, Ecological Resources (p. 5.2-4)

ER Section 5.2.6, Air Quality (p. 5.2-5)

ER Section 8.5, Environmental Impacts of Construction (p. 8.5-2)

ER Section 8.8, Nonradiological Impacts (p. 8.8-1)

ER Appendix B, Section 3.4 Emission Source Data – Fugitive Dust (p. B-4)

4.1 LAND USE IMPACTS

4.1.1 Construction Impacts

The proposed Eagle Rock Enrichment Plant (EREF) will be built on land which is currently privately owned by a single landowner. Since the site is currently used for crops and grazing, potential land use impacts will be from site preparation and construction activities.

The proposed EREF site is approximately 1,700 ha (4,200 ac) in size. Construction activities, including permanent plant structures, will disturb about 186 ha (460 ac). Temporary construction facilities, parking areas, material storage, and excavated areas for underground utilities will disturb an additional 53.6 ha (132.5 ac). The total disturbed area will, therefore, be 240 ha (592 acres). The temporary construction area will be restored after completion of plant construction. The balance of the property, 1,460 ha (3,608 ac), will be left in a natural state with no designated use. The plot plan and site boundaries of the permanent facilities indicating the areas to be cleared for construction activities are shown in ER Figure 2.1-2, Site Area and Facility Layout Map, and Figure 2.1-3, Existing Conditions Site Aerial Photograph.

During the construction phase of the facility, conventional earth, and rock moving and earth grading equipment will be used. Blasting and mass rock excavation may be required. However, only about 14% of the total site area will be disturbed, affording wildlife of the site an opportunity to move to undisturbed on-site areas as well as additional areas of suitable habitat bordering the plant (see Section 4.5, Ecological Resources Impacts). The construction will also result in a small loss of seasonal cattle grazing lands. No mitigation is necessary to offset this impact.

According to the Kettle Butte, Idaho, U.S.G.S. Quadrangle Map, the proposed property terrain currently ranges in elevation from about 1,556 m (5,106 ft) near U.S. Highway Route 20 to about 1,600 m (5,250 ft) in a small area at the eastern edge of the property. The terrain in the area of the developed site facility footprint ranges in elevation from about 1,573 m (5,161 ft) above msl in the vicinity of the stormwater basins to 1,588 m (5,210 ft) above msl. Approximately 164.9 ha (407.5 ac) will be graded to bring the developed central footprint portion (i.e., building clusters and storage pads that drain to the stormwater basins) of the site to a final grade between 1,573 m (5,161 ft) to 1,585 m (5,200 ft) above msl at the stormwater detention basin. The material excavated will be used for on-site fill. Site preparation will include the cutting and filling of approximately 778,700 m^3 (27,500,000 ft^3) of soil with the deepest cut being 6 m (20 ft) and the deepest fill being 6 m (20 ft). Blasting will be used as necessary to aid in the removal of fractured basalt (hardened lava) where depth to bedrock interferes with the installation of utilities and installation of substructures.

The anticipated effects on the soil during construction activities are limited to a potential short-term increase in soil erosion. However, this will be mitigated by proper construction best management practices (BMPs). These practices include minimizing the construction footprint to the extent possible, limiting site slopes to a horizontal to vertical ratio of four to one or less, the use of a sedimentation detention basin, protection of undisturbed areas with silt fencing and straw bales as appropriate, and site stabilization practices such as placing crushed stone on top of disturbed soil in areas of concentrated runoff. In addition, as indicated in Section 4.2.5, Mitigation Measures (Transportation Impacts), on-site construction roads will be periodically watered down~~, if required,~~ (at least twice daily, when needed) to control fugitive dust emissions. After construction is complete, the site will be stabilized with natural, low maintenance landscaping and pavement.

Impacts to land and groundwater will be controlled during construction through compliance with the National Pollutant Discharge Elimination System (NPDES) Construction General Permit

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centrifuge and process equipment to the facility. These deliveries will occur during the four to five year period that the centrifuges are being assembled for installation in the facility.

Therefore, the combined daily trips (employee and delivery) during construction will be about 1,210 vehicle trips per day on U.S. Highway 20. This represents a 53% increase over current daily traffic volume of 2,282 vehicles per day on U.S. Highway 20. This is the maximum number of additional vehicle trips anticipated even when project construction and operations activities overlap. Car pooling will be encouraged to minimize the traffic due to employee travel. Shift change times and shipment times to and from the site could be set so as to occur at times when traffic volume on U.S. Highway 20 is typically at a minimum.

The impacts of traffic volume increases associated with construction of the EREF will be moderate to large, while the impacts of traffic volume increases associated with operation of the EREF will be small. The moderate to large impact of traffic volume increases associated with construction of the EREF will be mitigated by constructing the highway entrances early in the construction process and designing the highway entrances to minimize the disruption of traffic flow, particularly during the times of peak commute.

Impacts from on-site construction traffic, after the highway entrances and access roads are constructed, will include vehicle emissions, changes in scenic value, increased noise levels, potential vehicle-wildlife collisions, and disturbance of adjacent habitat by wildlife. Traffic *volumes will be observable during shift changes and will reduce the scenic quality of the view of* the site. Noise levels will be lower than noise levels on U.S. Highway 20 because traffic will be traveling much slower. Wildlife will likely avoid the access roads, particularly when shift changes occur, due to noise; however, some wildlife mortality of birds and small mammals will occur as animals become habituated to the activities on site. Reduced traffic speeds and lighting at night will reduce wildlife mortality.

Impacts of Decontamination and Decommissioning (D&D) will be similar to operations with a slight increase due to a few more daily deliveries of material and waste removal trips and an increase in worker trips when operation and D&D activities are concurrent. The increase in worker trips will not approach the number of workers during construction and, therefore, will be a small increase. Transportation impacts from D&D will be small.

4.2.5 Mitigation Measures

at least twice daily, when needed,

Mitigation measures will be used to reduce traffic volumes, and minimize fugitive dust production, noise, and wildlife mortality. These measures may include the following:

- Encouraging car pooling to minimize traffic due to employee travel.
- Staggering shift changes to reduce the peak traffic volume on U.S. Highway 20.
- *Construction and use of acceleration and deceleration lanes to improve traffic flow and* safety on U.S. Highway 20 at the proposed EREF highway entrances.
- Using water ~~or surfactants~~ for dust suppression on dirt roads, in clearing and grading operations, and construction activities. ~~Water conservation will be considered when deciding how often dust suppression water sprays would be applied.~~
- Using adequate containment methods during excavation and other similar operations including minimizing the construction footprint, limiting site slopes to a horizontal to vertical ratio of four to one or less, constructing a sedimentation detention basin, protecting undisturbed areas with silt fencing and straw bales, and placing crushed stone on top of disturbed soil in areas of concentrated runoff.

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Other fugutive dust prevention and control methods will also be implemented.

At a minimum (when needed) twice-daily watering

in addition to other fugutive dust prevention and control BMPs discussed in ER Section 4.6.5, Mitigative Measures for Air Quality Impacts.

The proposed facility will be located on flat terrain, requiring cut and fill of significant areas to bring ground level to a final grade of 1,573 to 1,585 m (5,161 to 5,200 ft). The excavation of a detention basin will also produce fill material. The material excavated will be a combination of soil and basaltic bedrock. It is planned that the volume of material excavated from the higher portions of the site will be fully utilized for fill at the lower areas of the site, with a total of about 778,700 m^3 (1,018,500 yd^3) cut and used as fill. The modification of the site to a finished grade of 1,573 to 1,585 m (5,161 to 5,200 ft) will cause about 59 ha (145 acres) of the site to be raised with soil fill and 88 ha (218 acres) to be excavated down to that elevation. There are no current plans to dispose of excavated materials off site. Because of the agricultural history of the site, the resulting terrain change for the site from gently sloping to flat topography as a result of construction of the proposed facility is expected to cause a small environmental impact to the site geology or soils.

The entire area of the facility is underlain by competent bedrock of basaltic lava that is not expected to subside due to construction of buildings and related infrastructure. The possible exception to this generalization is a low potential for the occurrence of lava tubes in the subsurface that could be subject to collapse due to increased loads resulting from facility construction. Lava tubes have been observed at other locations on the Eastern Snake River Plain (ESRP) and are locally a major mode of lava flow movement across the landscape. Generally, however, lava tubes collapse after a volcanic event terminates because they are no longer supported by the flowing lava. Based on these observations, the likelihood of subsurface lava tubes within the facility footprint is expected to be small but should be considered during detailed subsurface investigations associated with facility construction.

Short-term increases in soil erosion and dust generation in the areas in and adjacent to the proposed facility footprint and roads may occur during construction due to earth-moving activities, clearing of vegetation, and compaction of soils. However, rainfall in the region is limited and erosional impacts due to site clearing and grading will be mitigated by utilization of construction and erosion control best management practices (BMPs). (See ER Section 4.1, Land Use Impacts, for a discussion of construction BMPs.) Disturbed soils would be stabilized as part of construction work. Earth berms, dikes, and sediment fences will be utilized as necessary during all phases of construction to limit runoff. These measures will prevent the local surface drainages from being affected substantially by construction activities. Much of the excavated areas would be covered by structures or paved, limiting the creation of new dust sources. ~~Watering~~ will be used to control potentially fugitive construction dust. ~~Water conservation will be considered when deciding how often dust suppression sprays would be applied. ER Section 4.4.7, Control of Impacts for Water Quality, contains a discussion of water conservation measures.~~ Because site preparation and construction result in only short-term effects to the geology and soils, the impacts will be small.

The operation phase of the proposed facility will not involve additional disruption of the local bedrock and therefore, is expected to have no impact on the site geology beyond that caused by excavation activities during construction. Thus, the impact to geology and soils due to operation will be small. Also, during operation of the proposed facility, BMPs will be used to manage stormwater runoff from paved and compacted surfaces to drainage ditches and basins. Process waste water will be contained within enclosed systems treated and evaporated; process waste waster and will not be disposed to the subsurface bedrock or local soils. These various measures will minimize impacts to geology and soils from the proposed facility.

A portion of the proposed site located primarily in the northeastern corner is currently used for irrigated crops. The remainder of the proposed site is currently used for seasonal cattle grazing. These areas of cropland and grazing will be taken out of service during construction and operation of the proposed facility. However, it is not expected that agrarian areas surrounding

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In addition to twice-daily watering (when needed) other

stormwater diversions. The purpose of the diversions is to divert surface runoff away from the EREF structures during extreme precipitation events. Retention or attenuation of flows in the diversions is not expected. Since there are no modifications or attenuation of flows, there are no adverse impacts and no mitigative measures will be required.

4.4.7.1 Mitigations

Mitigation measures will be in place to minimize potential impacts on water resources during construction and operation. These include employing BMPs and the control of hazardous materials and fuels. In addition, the following controls will also be implemented:

- Construction equipment will be in good repair without visible leaks of oil, grease, or hydraulic fluids.
- The control and mitigation of spills during construction will be in conformance with the SPCC plan.
- Use of the BMPs will control stormwater runoff to prevent releases to nearby areas to the extent possible. See ER Section 4.1.1, Construction Impacts, for descriptions of construction BMPs.
- BMPs will also be used for dust control associated with excavation and fill operations during construction. ~~Water conservation will be considered when deciding how often dust suppression sprays will be applied.~~
- Silt fencing and/or sediment traps will be used.
- External vehicle washing will use only water (no detergents).
- Stone construction pads will be placed at entrance/exits if unpaved construction access adjoins a state road.
- All temporary construction and permanent basins will be arranged to provide for the prompt, systematic sampling of runoff in the event of any special needs.
- Water quality impacts will be controlled during construction by compliance with the NPDES – Construction General Permit requirements and by applying BMPs as detailed in the site SWPPP.
- A SPCC plan will be implemented for the facility to identify potential spill substances, sources and responsibilities.
- All above-ground diesel storage tanks will be bermed or self contained.
- Any hazardous materials will be handled by approved methods and shipped off site to approved disposal sites. Sanitary wastes generated during site construction will be handled by portable systems until the Domestic Sanitary Sewage Treatment Plant is available for site use. An adequate number of these portable systems will be provided.
- The Liquid Effluent Collection and Treatment System will use evaporators, eliminating the need to discharge treated process water to an on-site basin.
- Control of surface water runoff will be required for activities covered by the NPDES Construction General Permit.

The proposed EREF is designed to minimize the use of water resources as shown by the following measures:

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4.5.6 Tolerances or Susceptibilities of Important Biota to Pollutants

Species that are highly mobile are not susceptible to localized physical and chemical pollutants as are other less mobile species such as invertebrates and aquatic species. The facility will have very low air emissions (see Section 4.6, Air Quality Impacts) and limited water discharges (see Section 4.4, Water Resources Impacts). Treated domestic sanitary effluent and storm water runoff from Cylinder Storage Pads will be collected in lined retention basins. Stormwater runoff from roads, parking lots, and roofs will be collected in a detention basin. The retention and detention basins will be fenced, therefore limiting access to wildlife. There will be no impacts to aquatic systems because there are no existing aquatic resources on the proposed site, and the plant will not discharge water to any drainages.

4.5.7 Maintenance Practices

Maintenance practices such as the use of chemical herbicides and removal of detention basin residues will be employed during plant operation. No herbicides will be used during construction, but may be used during operations in limited amounts along the access roads, plant area, and security fence surrounding the plant. Herbicides will be used according to government regulations and manufacturer's instructions to control unwanted noxious vegetation during operation of the plant. Any eroded areas that may develop will be repaired and stabilized and sediment will be collected in a stormwater detention basin.

4.5.7.1 Special Maintenance Practices

No unique habitats (e.g., marshes, natural areas, bogs) have been identified within the 1,700-ha (4,200-ac) proposed site. Similarly, no special maintenance practices will be required to construct or operate the proposed EREF. Therefore, no special maintenance practices will be used.

4.5.8 Construction Practices

Standard land clearing methods, primarily the use of heavy equipment, will be used during the construction phase of the proposed EREF site. Erosion and runoff control methods, both temporary and permanent, will follow Best Management Practices (BMPs). These practices include minimizing the construction footprint to the extent possible, limiting site slopes to a horizontal to vertical ratio of four to one or less, using temporary sedimentation detention basins, protecting adjacent undisturbed areas with silt fencing and straw bales as appropriate, using crushed stone on top of disturbed soil in areas of concentrated runoff, and other site stabilization practices. ~~When required, water~~ Water will be applied at least twice daily, when needed, to control dust in construction areas in addition to other fugutive dust prevention and control methods. ~~Water conservation will be considered when deciding how often dust suppression sprays will be applied. See ER Section 4.4.7 for water conservation measures.~~

4.5.9 Practices and Procedures to Minimize Adverse Impacts

Several practices and procedures have been designed to minimize adverse impacts to the ecological resources of the proposed site. These practices and procedures include the use of BMP's recommended by various state and federal management agencies (refer to Section 4.5.8, Construction Practices), minimizing the construction footprint to the extent possible, avoiding all direct discharge (including stormwater) to any waters of the United States (i.e., the use of temporary detention ponds), and site stabilization practices to reduce the potential for erosion and sedimentation. The use of native plant species in disturbed area revegetation will

06 sec/m^3 on the site boundary at a distance of 1,073 m (3,520 ft) in the north sector. The highest deposition factor was 1.710 E-08 1/m^2 on the site boundary at a distance of 1,073 m (3,520 ft) in the north-northeast sector. Tables 4.6-9 through 4.6-14 present atmospheric dispersion and deposition factors out to 80 km (50 mi).

4.6.3 Visibility Impacts

Visibility impacts from construction will be limited to fugitive dust emissions. Fugitive dust will originate predominantly from vehicle traffic on unpaved surfaces, earth moving, excavating and bulldozing, and to a lesser extent from wind erosion. There are no anticipated visibility impacts from operation of the EREF since there are no cooling towers that would produce visible plumes. Visibility impacts from decommissioning will be limited to fugitive dust. Fugitive dust will originate predominantly from building demolition, bulldozing, and vehicle traffic on unpaved surfaces.

4.6.4 Air Quality Impacts from Decommissioning

Air quality impacts will occur during the decommissioning work, such as fugitive dust, vehicle exhaust, portable generator exhaust, air compressor exhaust, cutting torch fumes, and solvent fumes. Decommissioning emission types, source locations, and emission quantities are presented in Table 4.6-15, Decommissioning Emission Types. Fugitive dust and vehicle exhaust during decommissioning are assumed to be bounded by the emissions during construction.

The air quality impacts from decommissioning activities will be small, because these impacts are similar to and bounded by the air quality impacts associated with the construction of the EREF. The construction impacts were determined to be small.

4.6.5 Mitigative Measures for Air Quality Impacts

Air concentrations of criteria pollutants for vehicle emissions and fugitive dust will be below the NAAQS. Particulate matter and visibility impacts from fugitive dust emissions will be minimized by watering of the site at least twice daily (when needed) during the construction phase to suppress dust emissions. ~~Water conservation will be considered when deciding how often dust suppression sprays will be applied.~~

Mitigative measures for all credible accident scenarios considered in the Safety Analysis Report (SAR) are summarized in ER Section 4.12, Public and Occupational Health Impacts and ER Chapter 5, Mitigation Measures.

Mitigation measures will be in place to minimize potential impact on air quality. These include the following items:

- The SBM Safe-by-Design GEVS and SBM Local Extraction GEVS are designed to collect and clean all potentially hazardous gases from the plant prior to release into the atmosphere. Instrumentation is provided to detect and signal via alarm all non-routine process conditions, including the presence of radionuclides or HF in the exhaust system that will trip the system to a safe condition in the event of effluent detection beyond routine operational limits.
- The TSB GEVS is designed to collect and clean all potentially hazardous gases from the serviced areas in the TSB prior to release into the atmosphere. Instrumentation is provided to detect and signal the Control Room via alarm all non-routine process conditions, including

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5.2 MITIGATIONS

This section summarizes the mitigation measures that are in place to reduce adverse impacts that may result from the construction and operation of the proposed Eagle Rock Enrichment Facility (EREF). The residual and unavoidable adverse impacts, which will remain after application of the mitigation measures, are of such a small magnitude that AREVA Enrichment Services (AES) considers that additional analysis is not necessary.

5.2.1 Land Use

The anticipated effects on the soil during construction activities are limited to a potential short-term increase in soil erosion. However, this impact will be mitigated by following construction best management practices (BMPs), including:

- Minimizing the construction footprint to the extent possible.
- Limiting site slopes to a horizontal-vertical ratio of four to one or less.
- Using a sedimentation detention basin.
- Protecting undisturbed areas with silt fencing and straw bales as appropriate.
- Using site stabilization practices such as placing crushed stone on top of disturbed soil in areas of concentrated runoff.
- ~~Periodically using water on~~ Watering on-site construction roads~~, as required,~~ at least twice daily (when needed) to control fugitive dust emissions.

Additional discussion is provided in ER Section 5.2.3, Geology and Soils.

After construction is complete, the site will be stabilized with natural, low water consumption, low-maintenance landscaping, and pavement.

5.2.2 Transportation

Mitigation measures will be used to reduce traffic volumes and minimize fugitive dust production, noise, and wildlife mortality. These measures will include the following:

- Encouraging car-pooling to minimize traffic due to employee travel.
- Staggering shift changes to reduce the peak traffic volume on U.S. Highway 20.
- Construction deliveries (e.g., concrete truck deliveries, engineered fill deliveries, construction supplies) will be coordinated and scheduled to avoid peak traffic periods, thereby minimizing traffic impacts.
- Constructing and using acceleration and deceleration lanes to improve traffic flow and safety on U.S. Highway 20 at the proposed EREF highway entrances.
- Using water ~~or surfactants~~ for dust suppression at least twice daily (when needed) on dirt roads, in clearing and grading operations, and construction activities. Other fugutive dust prevention and control methods will also be implemented. ~~Water conservation will be considered when deciding how often dust suppression water sprays will be applied.~~
- Using adequate containment methods during excavation and/or other similar operations, including minimizing the construction footprint, limiting site slopes to a horizontal to vertical ratio of four to one or less, constructing a sedimentation detention basin, protecting

In addition to twice-daily watering (when needed), other

- BMPs will also be used for dust control associated with excavation and fill operations during construction. ~~Water conservation will be considered when deciding how often dust suppression sprays will be applied.~~
- Silt fencing and/or sediment traps will be used.
- External vehicle washing will use only water (no detergents).
- Stone construction pads will be placed at entrance/exits where unpaved construction access adjoins a state road.
- All temporary construction and permanent basins will be arranged to provide for the prompt, systematic sampling of runoff in the event of any special needs.
- Water quality impacts will be controlled during construction by compliance with the National Pollution Discharge Elimination System (NPDES) - Construction General Permit requirements and by applying BMPs as detailed in the site Stormwater Pollution Prevention Plan (SWPPP).
- A SPCC plan will be implemented for the facility to identify potential spill substances, sources, and responsibilities.
- All above ground diesel storage tanks will be bermed.
- Any hazardous materials will be handled by approved methods and shipped off site to approved disposal sites. Sanitary wastes generated during site construction will be handled by portable systems until the Domestic Sanitary Sewage Treatment Plant is available for site use. An adequate number of these portable systems will be provided.
- The Liquid Effluent Collection and Treatment System will use evaporators, eliminating the need to discharge treated process water to an on-site basin.
- Water from the EREF Domestic Sanitary Sewage Treatment Plant will meet required levels for all contaminants stipulated in any permit or license required for that activity.
- Control of surface water runoff will be required for activities covered by the NPDES Construction General Permit.

The proposed EREF will be designed to minimize the use of water resources as shown by the following measures:

- The use of low-water consumption landscaping versus conventional landscaping reduces water usage.
- The installation of low flow toilets, sinks, and showers reduces water usage.
- Localized floor washing using mops and self-contained cleaning machines reduces water usage compared to conventional washing with a hose.
- Laundry services will not be performed on site resulting in use of less water and laundry wash water will not have to be treated and disposed.
- Closed-loop cooling systems have been incorporated to reduce water usage.
- Cooling towers will not be used resulting in the use of less water since evaporative losses and cooling tower blowdown are eliminated.

The facility design will include two types of basins. The Site Stormwater Detention Basin will collect runoff from parking lots, roofs, roads, landscaped areas and diversions from unaltered 1a areas around the site. The detention basin will be designed to contain runoff for a volume equal to the 24-hour, 100-year return frequency rainstorm.

The Cylinder Storage Pads Stormwater Retention Basins will collect runoff from the Cylinder Storage Pads and treated domestic sanitary waste water. The retention basin will be lined to prevent infiltration and designed to retain a volume equal to twice that for the 24-hour, 100-year frequency rain storm plus allowances for daily treated domestic sanitary discharges. The retention basins will have no flow outlets so that the only means for water loss is by evaporation. The retention basins will also be designed for sampling of the contained water and sediment.

5.2.5 Ecological Resources

at least twice daily (when needed)

Mitigation measures will be in place to minimize potential impact on ecological resources. These include the following items:

- The management of unused open areas (i.e., leave undisturbed), including areas of native grasses and shrubs for the benefit of wildlife.
- The use of native plant species (i.e., low-water consuming plants) to revegetate disturbed areas to enhance wildlife habitat.
- The stormwater discharge basins will be fenced to limit access by wildlife.
- Vehicle speeds onsite will be reduced.
- Best management practices will be used to minimize dust. ~~When required, water~~ Water will be applied to control dust in construction areas in addition to other fugutive dust prevention and control methods. ~~Water conservation will be considered when deciding how often dust suppression sprays will be applied.~~
- All lights will be focused downward.
- The existing boundary fence will be improved to ensure pronghorn access to the remaining habitat on the proposed site.
- Removal of livestock, when the plant becomes operational, to improve sagebrush habitat.
- Precautions will be taken during land clearing activities to protect migratory birds during nesting season.
- No herbicides will be used during construction, but may be used during operations in limited amounts along the access roads, plant area, and security fence surrounding the plant. Herbicides would be used according to government regulations and manufacturer's instructions to control unwanted noxious vegetation during operation of the plant.
- Any eroded areas that may develop will be repaired and stabilized, and sediment will be collected in a stormwater detention basin.
- Erosion and runoff control methods, both temporary and permanent, will follow BMPs. BMPs will include minimizing the construction footprint to the extent possible, limiting site slopes to a horizontal to vertical ratio of four to one or less, using sedimentation detention basins, protecting adjacent undisturbed areas with silt fencing and straw bales as appropriate, and using crushed stone on top of disturbed soil in areas of concentrated runoff.
- Re-seed cropland areas on the property with native species when the plant becomes operational.

In addition to proposed wildlife management practices above, AES will consider all recommendations of appropriate state and federal agencies, including the United States Fish and Wildlife Service and the Idaho Department of Fish and Game.

5.2.6 Air Quality

Mitigation measures will be in place to minimize potential impact on air quality. These include the following items:

- The SBM Safe-by-Design GEVS and SBM Local Extraction GEVS are designed to collect and clean all potentially hazardous gases from the plant prior to release into the atmosphere. Instrumentation is provided to detect and signal via alarm all non-routine process conditions, including the presence of radionuclides or hydrogen fluoride (HF) in the exhaust system that will trip the system to a safe condition in the event of effluent detection beyond routine operational limits.
- The TSB GEVS is designed to collect and clean all potentially hazardous gases from the serviced areas in the TSB prior to release into the atmosphere. Instrumentation is provided to detect and signal the Control Room via alarm all non-routine process conditions, including the presence of radionuclides or HF in the exhaust stream. Operators will then take appropriate actions to mitigate the release.
- The Centrifuge Test and Post Mortem Facilities GEVS is designed to collect and clean all potentially hazardous gases from the serviced areas in the Centrifuge Assembly Building prior to release into the atmosphere. Instrumentation is provided to detect and signal the Control Room via alarm all non-routine process conditions, including the presence of radionuclides or HF in the exhaust stream. Operators will then take appropriate actions to mitigate the release.
- The TSB Contaminated Area HVAC, the Ventilated Room HVAC System in the BSPB, and the Centrifuge Test and Post Mortem Facilities Exhaust Filtration System are designed to collect and clean all potentially hazardous gases from the serviced areas prior to release into the atmosphere.
- Construction BMPs will be applied to minimize fugitive dusts.
- Applying gravel to the unpaved surface of ~~secondary access road.~~
- Imposing speed limits on unpaved ~~secondary access road.~~

haul roads

- Air concentrations of the Criteria Pollutants resulting from vehicle emissions and fugitive dust will be below the National Ambient Air Quality Standards.

5.2.7 Noise

Mitigation of the operational noise sources will occur primarily from the plant design, whereby cooling systems, valves, transformers, pumps, generators, and other facility equipment, will mostly reside inside plant structures. The buildings themselves will absorb the majority of the noise located within. Natural land contours, vegetation (such as scrub brush), and site buildings and structures will mitigate the impact of other equipment located outside of structures that contribute to site noise levels.

The nearest home is located approximately 7.7 km (4.8 mi) east of the proposed site; and the Bureau of Land management Hell's Half Acre Wilderness Study Area (WSA) is located immediately south of the proposed site. Both the residence and the WSA are near U.S.

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- Applying an environmentally safe chemical soil stabilizer or chemical dust suppressant to the surface of the unpaved haul roads.
- Using water spray bars at drop and conveyor transfer points.
- Limiting the height and disturbances of stockpiles.
- Applying water to the surface of stockpiles.

earthwork will likely be the period of highest emissions with the greatest number of construction vehicles operating on an unprepared surface. However, no more than 14% of the site, or about 240 ha (592 acres), will be involved in this type of work. Airborne dust will be controlled through the use of BMPs such as surface water sprays ~~(when required),~~ by ensuring trucks' loads and soil piles are covered, and by promptly removing construction wastes from the site. The application of water sprays for dust suppression will be applied ~~only when required so that water resources can be conserved to the maximum extent possible.~~

at least twice daily (when needed). Other dust control BMPs will also be implemented.

Construction of the EREF is expected to have generally positive socioeconomic impacts on the region. No radioactive releases (other than natural radioactive materials, for example, in soil) will result from site development and facility construction activities.

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8.8 NONRADIOLOGICAL IMPACTS

Numerous design features and administrative procedures are employed to minimize gaseous and liquid effluent releases and keep them within regulatory limits. Potential nonradiological impacts of operation of the EREF include releases of inorganic and organic chemicals to the atmosphere and surface water impoundments during normal operations. Other potential impacts involve land use, transportation, soils, water resources, ecological resources, air quality, historic and cultural resources, socioeconomic and public health. Impacts from hazardous, radiological, and mixed wastes and radiological effluents have been discussed earlier.

The other potential nonradiological impacts from the construction and operation of EREF are discussed below:

Land-Use Impacts

(at least twice daily, when needed)

The anticipated effects on the soil during construction activities are limited to a potential short-term increase in soil erosion. However, this will be mitigated by proper construction best management practices (BMPs). These practices include minimizing the construction footprint to the extent possible, limiting site slopes, using a sedimentation detention basin, protecting undisturbed areas with silt fencing and straw bales as appropriate, and employing site stabilization practices such as placing crushed stone on top of disturbed soil in areas of concentrated runoff. In addition, onsite construction roads will be periodically watered ~~when required,~~ to control fugitive dust emissions. After construction is complete, the site will be stabilized with natural, low-water maintenance landscaping, and pavement.

A Spill Prevention, Control, and Countermeasures (SPCC) plan will also be implemented during construction to minimize environmental impacts from potential spills and ensure prompt and appropriate remediation. Spills during construction are likely to occur around vehicle maintenance and fueling locations, storage tanks, and painting operations. The SPCC plan will identify sources, locations and quantities of potential spills, and response measures. The plan will also identify individuals and their responsibilities for implementation of the plan and provide for prompt notification of state and local authorities, as required.

Waste management BMPs will be used to minimize solid waste and hazardous materials. These practices include the placement of waste receptacles and trash dumpsters at convenient locations and the designation of vehicle and equipment maintenance areas for the collection of oil, grease and hydraulic fluids. Where practicable, materials suitable for recycling will be collected. If external washing of construction vehicles is necessary, no detergents will be used, and the runoff will be diverted to onsite retention basins. Adequately maintained sanitary facilities will be provided for construction crews.

The EREF facility will require the installation of water well(s) and electrical utility lines. In lieu of connecting to a public sewer system, an on-site domestic sanitary sewage treatment plant will be installed for the treatment of sanitary and non contaminated wastes.

Potable water will be provided from one or more site wells. Since there are no bodies of surface water on the site, no waterways will be disturbed. No natural gas will be used at the EREF.

The two electrical transmission lines that will provide a dual source of electrical feed to the EREF will be constructed along an existing right-of-way, Route 20, and the site access road. In this way, land use impacts will be minimized.

Overall land use impacts to the site and vicinity will be changing the use from agriculture to industrial. However, a majority of the site (approximately 86%) will remain undeveloped, and

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Fugitive Dust

Fugitive dust emissions are dependent on the area of land being worked on and also the level of construction vehicle operations occurring at any given time. A fugitive dust emission factor of 2.69 Mg per hectare (1.2 tons per acre) per month of construction activity is provided in AP-42 (EPA, 2008d) for heavy construction operation activities. This factor includes all site-related sources of particulates. The value is most applicable to construction sites with: (1) medium activity level, (2) moderate silt content and (3) a semi-arid climate.

The AP-42 emission factor applies to total suspended particulates (TSP), whereas the NAAQS for particulates applies to PM_{10} (i.e., particles 10 μm or less in size) and $PM_{2.5}$ (i.e., particles 2.5 μm or less in size). Based on particle size multipliers presented in AP-42 for fugitive dust sources, a correction factor of 0.5 was applied to the TSP construction emission factor in order to determine the PM_{10} emission factor. Similarly, AP-42 provides an adjustment factor to determine the amount of $PM_{2.5}$ present in the fugitive dust. Based on AP-42, a correction factor of 0.15 was applied to the PM_{10} emission factor to make the adjustment to $PM_{2.5}$. Therefore, a correction factor of 0.08 (i.e., 0.5 x 0.15 = 0.08) was applied to the TSP construction emission factor to obtain $PM_{2.5}$.

Since the derivation of the AP-42 emission factor assumed construction activity on 30 days per month, a second correction factor to account for actual number of workdays was applied. The average number of workdays per month will be 21.4 (4 major holidays were excluded). The second correction factor that was used is 21.4/30 or 0.71.

The AP-42 emission factor also assumes uncontrolled emissions, whereas the EREF construction site will undergo watering for dust suppression. ~~Water conservation will be considered when deciding how often dust suppression sprays will be applied.~~ The EPA suggests that a twice-daily watering program will reduce dust emissions by up to 90%. Therefore, a third correction factor of 0.1 was applied to the AP-42 emission factor to account for fugitive dust controls.

An additional factor to account for the high silt content of the site soil was also included since AP-42 considers moderate silt content in the emission factor value. Since the site soil silt content is estimated to be approximately 70% and the fact that moderate silt content used in the AP-42 emission factor is defined to be about 30%, a silt content correction factor was established by taking the ratio of the "high to moderate" silt content. Therefore, a correction factor for silt content that was used is 70% / 30% = 2.3.

The workday emission rate (in g/s) was calculated assuming approximately 75 hectares (185 acres) of the construction site would be under construction at any given time and that emissions occur entirely within the 10-hour workday. This workday emission rate was assumed to occur 214 hours per month (i.e., 21.4 average work days/month x 10-hour work day) for the entire year.

The resulting estimate of workday emission rate for PM_{10} was determined to be 21.8 g/s (172.7 lb/hr) and 3.3 g/s (25.9 lb/hr) for $PM_{2.5}$ emissions.

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SECTION 4, CUMULATIVE

THERE ARE NO ATTACHMENTS FOR THIS SECTION.

ATTACHMENT 5.1

MARKUPS

ER SECTIONS 1.3.1, 4.5.4, 4.5.5, 4.5.9, 4.5.10 AND 5.2.5

dangers that may exist in workplaces and establish employee safety and health standards. The identification, classification, and regulation of potential occupational carcinogens are found at 29 CFR 1910.101 (CFR, 2008n), while the standards pertaining to hazardous materials are listed in 29 CFR 1910.120 (CFR, 2008n). OSHA regulates mitigation requirements and mandates proper training and equipment for workers. Facility employees and management are subject to the requirements of 29 CFR 1910 (CFR, 2008n).

<u>U.S. Department of Interior</u>

The U.S. Fish and Wildlife Service (USFWS) is responsible for the protection and recovery of threatened and endangered species under the Endangered Species Act (USC, 2008n).

AES conducted a rare, threatened and endangered species survey for both plants and animals. No threatened or endangered species or habitat is present on the proposed site. The site provides potential habitat for the pygmy rabbit and greater sage grouse. USFWS initiated status reviews in January 2008 for the pygmy rabbit (FR, 2008b) and in February 2008 for the greater sage grouse (FR, 2008c) (FR, 2008d) to determine if listing of either species is warranted. However, neither species is listed as a candidate, threatened, or endangered species as of September 2008. By letter dated June 30, 2008, the USFWS notified AES of its determination that Endangered Species Act consultation is not needed (USFWS, 2008a).

The USFWS is responsible for the protection of migratory bird species under the Migratory Bird Treaty Act of 1918 (MBTA) (USC, 2008k). ~~Although~~ The facility occupies land that is potential habitat for several migratory species protected under the MBTA. ~~the proposed action will not impact such species on-site~~. AES will minimize the impacts to migratory birds by taking a number of actions as described in Sections 4.5.9 and 5.2.5

1.3.2 State Agencies

Several state agencies are responsible for the protection and management of the environment and public health in the state of Idaho. State departments include divisions of the Idaho Department of Environmental Quality (IDEQ), Idaho Department of Water Resources (IDWR), Idaho Department of Lands, Idaho Department of Fish and Game (IDFG), Idaho Department of Health and Welfare (IDHW), Idaho State Historic Preservation Office (IDSHPO), Idaho Transportation Department (ITD), and the Division of Building Safety. AES has consulted with these State agencies regarding permit and consultation requirements. The general and specific consultations, permits and requirements are discussed below by the agency that has responsibility for consultations and permitting actions.

<u>Idaho Air Quality Division</u>

The Air Quality Division (AQD) Permitting Section processes permit applications for any business or industry (source) in Idaho that emits, or has the potential to emit, pollutants into the air. Permits are issued when new sources begin operation and when existing sources modify their facilities.

The AQD issues several different types of permits based on the emissions from the facility and/or emitting source. Permits require sources to comply with all health- and technology-based standards established by the EPA and Idaho's Rules for Control of Air Pollution in Idaho (IDAPA, 2008i).

Construction Permits are required for constructing or modifying a stationary source which has a potential emission rate equal to 91 MT per year (100 tons per year) of any regulated air contaminant for which there is an Idaho Air Quality Standard. If the specified threshold is exceeded for any one regulated air contaminant, all regulated air contaminants emitted are

Habitat loss (i.e., clearing of vegetation) from site preparation, construction, and operation of the proposed EREF will result in mobile animal species being displaced and loss of less mobile animals (e.g., small mammals). Mobile species moving through the area will likely avoid the disturbed area and facilities. Loss of the agriculture fields will result in some loss of a food source (e.g., grains) for mobile species. As discussed in Section 4.5.3, Area of Disturbance, the amount of habitat to be disturbed is 240 ha (592 ac) and is a small percentage of the available habitat in the 8 km (5 mi) area. Therefore, impacts will be small.

Dust emissions during construction may reduce vegetation productivity in the immediate vicinity of the disturbed areas. Best management practices will be used to minimize dust. Therefore, impacts will be negligible to small.

9 • Noise from heavy equipment, traffic, and blasting during site preparation; from heavy equipment and traffic during construction; and from chillers, other equipment, and traffic during operations will result in reduced use of nearby onsite and offsite habitat for some species. Blasting and heavy equipment will have the largest noise footprints (see Section 4.7, Noise Impacts) and will result in the greatest reduction in habitat use by wildlife. ~~Site preparation will be a short-term activity and precautions will be taken during land clearing activities to protect migratory birds during breeding or nesting season~~ As defined in Section 4.5.9 AES will take actions to minimize impacts to migratory birds. Maximum noise levels will be about 95 dBA at 15 m (50 ft) and about 61 dBA at the nearest site boundary to the footprint of the proposed plant. This level exceeds the limit that is considered acceptable based on the Housing and Urban Development (HUD) land use compatibility guideline of 60 dBA for farm land use (See Table 3.7-2, U.S. Department of Housing Urban Development Land Use Compatibility Guidelines). However, this sound level is within the guideline for industrial facilities of 70 dBA. Blasting will be limited and episodic. For comparison, thunder can generate sound levels of 120 dB.

9 • Equipment used during construction will generate noise levels as high as 95 dBA at 15 m (50 ft) and about 46 to 61 dBA at the nearest site boundary to the footprint of the proposed plant. This sound level exceeds the HUD land use compatibility guideline of 60 dBA for farm land use but is within the guideline for industrial facilities of 70 dBA. Construction sound levels will be within the HUD land use compatibility guidelines of 60 dBA for farm land use about 1 km (0.6 mi) from the site footprint, which is no more than 0.4 km (0.25 mi) from the boundary of the proposed site nearest to the proposed EREF footprint.

Noise from the plant during operations will be less than 15 dBA at the north boundary of the proposed site. This sound level is within the HUD land use compatibility guidelines of 60 dBA for farm land use.

The impacts to wildlife from noise during construction and operation of the proposed EREF likely will be small.

Night lighting will be used during operation of the proposed EREF. Lighting could reduce wildlife use of habitat adjacent to the facility. Bats could be attracted to the lights since insects, a food source for many bat species, are also attracted to the lights. Lighting will be limited to the plant and access roads. All lights will be pointed or aimed downward to minimize the distance that lights could be observed. Therefore, impacts likely will be small.

Cranes will be used during construction. The tallest plant structure will be about 20 m (65 ft) in height. Bird strikes are possible. However, the structure height is less than the 61 m (200 ft) threshold that requires notifying the FAA and installing lights for aviation safety (CFR, 2008pp); and no wires will be required to support the structure or cranes. In addition, the proposed site is not within a migration concentration area (e.g., near major water bodies or topographic access to the remaining habitat on the proposed site. Removal of livestock will likely improve cover and vegetation diversity of the remaining sagebrush steppe and seeded crested wheatgrass vegetation types. This improvement may increase the carrying capacity and use of the remaining acres for pronghorn use.

Impacts to greater sage grouse will be similar to those for general wildlife relying on the sagebrush steppe habitat. About 75 ha (185 ac) of sagebrush steppe habitat that could be used for nesting, roosting, and brood rearing will be lost. Greater sage grouse are birds that require large expanses of habitat. Home ranges for non-migratory greater sage grouse have been reported to vary between 11 to 31 km^2 (4-12 mi^2) (Crawford, 2004) (Utah DNR, 2002). This is equivalent to approximately 1,100 ha (2,718 ac) to 3,100 ha (7,660 ac). The median distance traversed by birds from nests to summer/fall range has been reported to be 20.9 km (13 mi) (Fischer, 1993) while hens in Idaho nest an average of 3-5 km (2-3 mi) from their lek of capture but may move more than 8 km (5 mi) to nest (Connelly, 2004). Because greater sage grouse require large areas, the proposed site, which is 1,700 ha (4,200 ac) in size, likely supports only a few birds. The area of sagebrush steppe directly affected by land clearing is about 75 ha (185 ac) which is less than 10% of the median home range for a bird.

Portions of the remaining habitat will be avoided or used less frequently due to noise, human presence, and night lighting. Greater sage grouse mortality may increase if raptors use the remaining habitat more heavily due to increased numbers of perch sites. Removal of grazing may improve the remaining sagebrush steppe vegetation and may increase greater sage grouse use of this vegetation along the western portions of the proposed site. Noise during construction may affect the lek activity and decrease numbers of birds at this lek during breeding season. Maximum construction noise levels will be about 35 dBA at the nearest known lek, which is within ambient noise levels measured in June 2008. This lek is between 6.4 and 8 km (4 and 5 mi) from the proposed site. Therefore, breeding success at this lek may be affected. All other known leks are over 8 km (5 mi) from the proposed EREF site and will not be affected. Therefore, impacts to greater sage grouse from the proposed EREF will be small.

Impacts to the pygmy rabbit may be similar to those for general wildlife relying on the sagebrush steppe habitat. About 75 ha (185 ac) of sagebrush steppe habitat will be lost. Pygmy rabbits and sign were not observed during June and October 2008 surveys. Pygmy rabbits and sign were not observed during surveys conducted on two areas on the INL within 3.2 km (2 mi) of the proposed site and on several other INL areas within 8 km (5 mi) of the proposed EREF site. However, rabbits have been observed during surveys on the INL about 8.7 km (5.4 mi) from the proposed site. If pygmy rabbits are present, portions of the remaining habitat will be avoided or used less frequently due to noise and human presence. Pygmy rabbit mortality may increase if raptors use the remaining habitat more heavily due to increased numbers of perch sites. Conversely, removal of grazing may improve the remaining sagebrush steppe vegetation and increase pygmy rabbit use along the western portions of the proposed site.

Impacts to migratory birds will include loss of breeding, nesting habitat, roosting, rearing, and feeding habitat. All three vegetation types totaling 240 ha (592 ac) provide some habitat for selected species of migratory birds. Therefore, the loss of habitat will result in birds relocating to adjacent habitat. None of the habitat is unique and remaining habitat may improve as grazing is eliminated, thereby, potentially offsetting some of the impacts. ~~In addition, precautions will be taken when conducting site preparation activities (e.g., land clearing) during nesting season to further minimize impacts to migratory birds.~~ AES will minimize the impacts to migratory birds by taking the actions defined in Section 4.5.9

enhance and maximize the opportunity for native wildlife habitat to be re-established at the site. In addition, AREVA has identified the following additional mitigations to reduce impacts to ecological resources:

- Dust suppression methods will be used to minimize dust emissions.
- Fence the stormwater discharge retention and detention basins to limit access by wildlife.
- Improve the existing boundary fence by using smooth wire on the bottom wire and maintaining a minimum distance of about 40 cm (16 in) between the bottom wire and the ground.
- Continue seasonal monitoring of habitat to confirm habitat use by sensitive species.
- ~~Exercise precautions during site preparation (e.g. land clearing) activities to protect migratory birds during nesting season~~. ← Insert A
- The use of low maintenance landscaping in and around the stormwater detention basin.
- The management of unused open areas (i.e. leave undisturbed), including areas of native grasses and shrubs for the benefit of wildlife.
- Eliminate livestock grazing on the property, when the plant becomes operational.
- Re-seed cropland areas on the property with native species, when the plant becomes operational.

4.5.10 Coordination with Federal and State Agencies

Currently, no listed rare, threatened, or endangered species or habitats are known to occur on the proposed site. However, the sagebrush community isolated to the northwestern one-third of the proposed site has the potential to provide habitat for the pygmy rabbit and is used by the greater sage grouse. In January 2008, the USFWS initiated a status review for the pygmy rabbit (USFWS, 2008d) and in February 2008 for the greater sage grouse (USFWS, 2008e) (USFWS, 2008f) to determine if listing of either species is warranted. In addition, multiple agencies, including IDFG, published an updated sage grouse conservation plan (ISGAC, 2006). The life history and habitat requirements for both species are discussed in Section 3.5.3, Description of Important Wildlife and Plant Species. By letter dated June 30, 2008, the USFWS notified AES of its determination that Endangered Species Act consultation is not needed.

AREVA met with the Idaho Department of Fish and Game (IDFG) and the U.S. Fish and Wildlife Service (USFWS). AREVA, IDFG, and USFWS agreed to continue discussions as the proposed project planning evolves and, as appropriate, develop mitigations to minimize impacts to ecological resources. Section 4.5.9, Practices and Procedures to Minimize Adverse Impacts, provides the current mitigations identified by AREVA. AREVA, if needed, will ~~obtain a permit(s) from~~ consult with the USFWS for taking of migratory birds. In addition, AREVA will continue to work with USFWS and IDFG if either the greater sage grouse or pygmy rabbit are listed as threatened or endangered. to determine appropriate actions

4.5.11 Cumulative Impacts

The cumulative impacts to the ecological resources is limited to those resulting from construction and operation of the EREF and existing development on surrounding properties, because AES does not know of any other Federal, State, or private development plans within 16 km (10 mi) of the EREF. Continued land use, primarily agriculture and grazing, will continue areas around the site. The detention basin will be designed to contain runoff for a volume equal to the 24-hour, 100-year return frequency rainstorm.

The Cylinder Storage Pads Stormwater Retention Basins will collect runoff from the Cylinder Storage Pads and treated domestic sanitary waste water. The retention basin will be lined to prevent infiltration and designed to retain a volume equal to twice that for the 24-hour, 100-year frequency rain storm plus allowances for daily treated domestic sanitary discharges. The retention basins will have no flow outlets so that the only means for water loss is by evaporation. The retention basins will also be designed for sampling of the contained water and sediment.

5.2.5 Ecological Resources

Mitigation measures will be in place to minimize potential impact on ecological resources. These include the following items:

- The management of unused open areas (i.e., leave undisturbed), including areas of native grasses and shrubs for the benefit of wildlife.
- The use of native plant species (i.e., low-water consuming plants) to revegetate disturbed areas to enhance wildlife habitat.
- The stormwater discharge basins will be fenced to limit access by wildlife.
- Vehicle speeds onsite will be reduced.
- Best management practices will be used to minimize dust. When required, water will be applied to control dust in construction areas. Water conservation will be considered when deciding how often dust suppression sprays will be applied.
- All lights will be focused downward.
- The existing boundary fence will be improved to ensure pronghorn access to the remaining habitat on the proposed site.
- Removal of livestock, when the plant becomes operational, to improve sagebrush habitat.
- ~~Precautions will be taken during land clearing activities to protect migratory birds during nesting season.~~ ← Insert A
- No herbicides will be used during construction, but may be used during operations in limited amounts along the access roads, plant area, and security fence surrounding the plant. Herbicides would be used according to government regulations and manufacturer's instructions to control unwanted noxious vegetation during operation of the plant.
- Any eroded areas that may develop will be repaired and stabilized, and sediment will be collected in a stormwater detention basin.
- Erosion and runoff control methods, both temporary and permanent, will follow BMPs. BMPs will include minimizing the construction footprint to the extent possible, limiting site slopes to a horizontal to vertical ratio of four to one or less, using sedimentation detention basins, protecting adjacent undisturbed areas with silt fencing and straw bales as appropriate, and using crushed stone on top of disturbed soil in areas of concentrated runoff.
- Re-seed cropland areas on the property with native species when the plant becomes operational.

Insert A to ER Sections 4.5.9 and 5.2.5

- To protect migratory birds during the construction and decommissioning of the EREF the following measures will be taken:

  - Clearing or removal of habitat (e.g., sagebrush), including buffer zones, will be performed outside of the breeding and nesting season for migratory birds.

  - If additional areas are to be disturbed or impacted that have not been cleared outside of breeding and nesting season, surveys will be performed to identify active nests during breeding and nesting season for migratory birds. Activities in areas containing active nests for migratory birds will be avoided.

  - AES will consult with the United States Fish and Wildlife Service to determine the appropriate actions to take a migratory bird, if needed.

SECTION 6, GEOLOGY

NOT USED

SECTION 7, HISTORIC AND CULTURAL RESOURCES

THERE ARE NO ATTACHMENTS FOR THIS SECTION

HUMAN HEALTH – NON-RADIOLOGICAL

ATTACHMENT 8.1

ER SECTION 3.11.4 AND ER SECTION 4.12.1.1 - MARKUPS

The state of California has adopted a chronic Reference Exposure Level (REL) of 14 μg/m^3 (CAO, 2003). A chronic REL is a dose or concentration at or below which adverse health effects are not likely to occur. The California limit is a factor of 143 times lower than the OSHA occupational limit of 2.0 mg/m^3 and is by far the most stringent of any state or federal agency. However, this limit applies to chronic exposure, not occupational exposure situations. The annual expected average HF concentration emission from a 6 million SWU/yr centrifuge enrichment plant is estimated to be ~~7.8~~ 7.7 μg/m^3 at the point of discharge (rooftop) without atmospheric dispersion taken into consideration. This comparison demonstrates that the EREF gaseous HF emissions (at rooftop without dispersion considered) are below any existing standards and therefore will have a negligible environmental and public health impact.

3.11.5 Work Force Safety Training

The safety training for the EREF will comply with the applicable sections of Occupational Safety and Health Administration (OSHA) regulations such as 29 CFR 1910 (Occupational Safety and Health Standards) (CFR, 2008bb), 1910.1200 (Hazard Communication) and NRC's regulations 10 CFR 20 (Standards for Protection Against Radiation) (CFR, 2008x) and 10 CFR 19 (Notices, Instructions and Reports to Workers: Inspection and Investigations).

Safety training will be carried out for all site personnel using a training manual and through the use of specific safety instructions for contractors. The manual used for safety training will provide new employees with an understanding of the conditions, procedures, and safety principles required on-site. The manual will cover topics such as security, safety, emergency alarms and actions. The safety portion of the training will include safety instructions, which are mandatory for all personnel and are used to ensure compliance with regulatory and other health, safety, and environmental requirements. Safety instruction categories include administration, nuclear site license, industrial safety, ionizing radiation, occupational hygiene, and emergency planning.

The safety instruction used for safety training of on-site contractors will cover the procedures to ensure contractors have the competence and resources to perform their work safely and not endanger other plant personnel or the environment. Contractors will be supervised at all times while on site to ensure compliance with the relevant health, safety, and environmental management system requirements.

All persons under the supervision of facility management (including contractors) will be required to participate in General Employee Training. In part, the scope of this training includes:

- Industrial safety, health, and first aid
- Chemical safety
- Nuclear safety
- Emergency Plan and implementing procedures
- Use of dosimetry
- Use of equipment and protective clothing

Additionally, Job Hazard Analysis (JHA), sometimes referred to as Job Safety Analysis (JSA) (i.e., a step-by-step process used to evaluate job hazards), will be used as part of on-the-job training for providing employees the skills necessary to perform their jobs safely at the EREF.

1a

4.12 PUBLIC AND OCCUPATIONAL HEALTH IMPACTS

4.12.1 Nonradiological Impacts

Sources of nonradiological exposure to the public and to facility workers are characterized below. Nonradiological effluents have been evaluated and do not exceed criteria in 40 CFR 50, 59, 60, 61, 122, 129, or 141 (CFR, 2008nn) (CFR, 2008rr) (CFR, 2008ss) (CFR, 2008tt) (CFR, 2008uu) (CFR, 2008vv) (CFR, 2008q). In addition, all regulated gaseous effluents will be below regulatory limits as specified by the Idaho Department of Environmental Quality (DEQ).

Radionuclides, hydrogen fluoride, and methylene chloride are governed as National Emission Standards Hazardous Air Pollutants (NESHAP) (CFR, 2008tt). Details of radiological gaseous effluent impacts and controls are described in Section 4.12.2, Radiological Impacts. A detailed list of the chemicals that will be used at the EREF, by building and exterior areas, is contained in Tables 2.1-2 through 2.1-6. ER Figure 2.1-4 indicates where these buildings and areas will be located on the EREF site.

4.12.1.1 Routine Gaseous Effluent

Routine gaseous effluents from the facility are listed in Table 3.12-3, Estimated Annual Gaseous Effluent. The primary material in use at the facility is uranium hexafluoride (UF_6). UF_6 is hygroscopic (moisture absorbing) and, in contact with water, will chemically break down into uranyl fluoride (UO_2F_2) and hydrogen fluoride (HF). When released to the atmosphere, gaseous UF_6 combines with humidity to form a cloud of particulate UO_2F_2 and HF fumes. Inhalation of UF_6 typically results in internal exposure to UO_2F_2 and HF. In addition to a potential radiation dose, a worker would be subjected to two other primary toxic effects: (1) the uranium in the uranyl complex acts as a heavy metal poison that can affect the kidneys and (2) the HF can cause severe irritation to the skin and lungs at high concentrations.

Of primary importance to the EREF is the control of UF_6. The UF_6 readily reacts with air, moisture, and some other materials. The most significant reaction products in this plant will be HF, UO_2F_2, and small amounts of uranium tetrafluoride (UF_4). Of these, HF is the most significant hazard, being toxic to humans. Refer to ER Section 3.11.4, Public and Occupational Exposure Limits, for public and occupational exposure limits.

As described in ER Section 3.11.4 and shown in ER Table 3.11-7, Hydrogen Fluoride (HF) Regulations and Guidelines, there is a wide range of regulatory limits, which in turn depend on exposure (acute vs. chronic) and population (worker vs. public). The OSHA limit to worker exposure, for example, is 2.0 mg/m^3 for an 8-hr workday (OSHA, 2008). The state of California has adopted a chronic Reference Exposure Level (REL) of 14 μg/m3 (CAO, 2003). A chronic REL is a dose or concentration at or below which adverse health effects are not likely to occur. The California REL is by far the most stringent of any state or federal agency for HF, regardless of exposure or population.

By comparison, the annual expected average HF concentration/emission from a nominal 6 million SWU/yr centrifuge enrichment plant is calculated as ~~7.8~~ 7.7 μg/m^3 at the point of discharge (rooftop) without atmospheric dispersion taken into consideration. Referring to Table 3.12-3, based on the estimated annual HF gaseous effluent of <2.0 kg (<4.4 lb), if standard dispersion modeling techniques are applied to estimate the exposure to the nearest public receptors under normal operating conditions from the EREF, the concentration is considerably lower. For instance, the concentration is calculated to be 2.7×10^{-4} μg/m^3 at the site boundary; 1.9×10^{-4} μg/m^3 at the nearest recreational area, a BLM hiking trail about 0.5 km (0.3 mi) south-southwest from the site boundary; and 3.2×10^{-5} μg/m^3 at the nearest business, located 4.7 km (2.9 mi) 1a

ATTACHMENT 9.1-1

INPUT PARAMETERS - LIMITING SEISMIC SCENARIO

INPUT PARAMETERS - LIMITING SEISMIC SCENARIO

Parameter	Parameter Value	Unit	Comments
Material At Risk (MAR)	Refer to ISA table	grams of UF_6	MAR values are found in Table 2-14 of Appendix E of the ISA Summary
Damage Ratio	1	Unitless	Assumes that 100% of UF_6 is available for release.
Atmospheric Release Fraction U (Worker)	0.1	Unitless	Assumes 90% of the U material either remains inside the component or immediately falls to the floor once outside component. The justification is that since U particles are heavy, they will not remain airborne. Therefore, 10% of the U material originally inside the component becomes airborne.
Atmospheric Release Fraction U (Boundary)	0.05	Unitless	0.1*0.5 (to account for only 50% of U escaping)
Atmospheric Release Fraction HF	1	Unitless	Assumes 100% becomes airborne.
Respirable Fraction U	1	Unitless	Assumes 100% can be inhaled.
Respirable Fraction HF	1	Unitless	Assumes 100% can be inhaled.
Leak Path Fraction	1	Unitless	Assumes 100% leaves the building.
Enrichment of material released	5	Percent	EREF enrichment level
Release Duration	30	Minutes	Release duration associated with MAR release. Set equal to offsite site boundary individual exposure duration.
Room volume (SBM areas)	Refer to ISA Table	m^3	Table 2-13 of Appendix E of the ISA Summary (Building and Room Volumes). Sum of thermal enclosure and headspace volumes.
Mixing efficiency	0.3	Unitless	Minimum value from Table D-1 of NFPA National Fire Protection Association®: NFPA® 69: Standard on Explosion Prevention Systems (2008 Edition). Multiple exhaust openings and no positive supply apply to seismic since there are multiple leaks from UF_6 systems.
Free Volume Fraction	0.8	Unitless	Assumes 80% of room free air space with 20% taken up by equipment and other items.
Room Temperature	20	°C	Room conditions not used in calculation (Information only)
Relative Humidity	0.2	Unitless	Room conditions not used in calculation (Information only)

INPUT PARAMETERS - LIMITING SEISMIC SCENARIO

Parameter	Parameter Value	Unit	Comments
Worker Exposure Duration	2.5	minutes	Assumes worker in room recognizes seismic event has occurred. Further he is trained to recognize HF (visibility and odor) and leaves room as quickly as possible.
Worker Breathing Rate	3.50E-04	m^3/sec	NRC Reg Guide 1.183: Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors, Section 4.1.3, 07/2000
X/Q at Boundary	2.80E-04	sec/m^3	Value derived using on-site specific information.
Building Leak Rate (SBM)	Refer to ISA Table	m^3/sec	Table 2-12 of Appendix E of the ISA Summary (Room Ventilation Flow Rates). Headspace only; thermal enclosure is not ventilated.
Exposure Duration at Boundary	30	minutes	Assumes offsite individual at site boundary will leave plume centerline within 30 minute period to avoid HF fumes. Fumes are very irritating at very low concentration.
Breathing Rate	3.50E-04	m^3/sec	NRC Reg Guide 1.183: Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors, Section 4.1.3, 07/2000
U/(UF_6)	0.676060	Unitless	Conversion factor
(HF)/(UF_6)	0.227417	Unitless	Conversion factor
($2H_20$)/(4HF)	0.450238	Unitless	Conversion factor
Dose Conversion Factor	6.20E-02	Sv/gm	Dose Conversion Factor
Time based concentration averaging factor	0.5	Unitless	For Worker Calculation
UF_6 AEGL-2 limit	28	mg/m^3	Worker limit
UF_6 AEGL-3 limit	216	mg/m^3	Worker limit
HF AEGL-2 limit	78	mg/m^3	Worker limit
HF AEGL-3 limit	139	mg/m^3	Worker limit
Dose limit, category 2	0.25	Sv	Worker limit
Dose limit, category 3	1	Sv	Worker limit
HF AEGL-2 limit	28	mg/m^3	Limit for public at boundary
HF AEGL-1 limit	0.8	mg/m^3	Limit for public at boundary
Dose limit, category 2	0.05	Sv	Limit for public at boundary
Dose limit, category 3	0.25	Sv	Limit for public at boundary
Concentration Limit (24 hour average)	6.48E+00	mg/m^3	Limit for public at boundary
Uranium Intake Limit, category 2	4.06	mg	Limit for public at boundary

INPUT PARAMETERS - LIMITING SEISMIC SCENARIO

Parameter	Parameter Value	Unit	Comments
Uranium Intake Limit, category 3	21	mg	Limit for public at boundary

ATTACHMENT 9.1-2

INPUT PARAMETERS - LIMITING FIRE SCENARIO

INPUT PARAMETERS - LIMITING FIRE SCENARIO

Parameter	Parameter Value	Unit	Comments
Material At Risk (MAR)	Refer to ISA table	grams of UF_6	MAR values are found in Table 2-14 of Appendix E of the ISA Summary
Damage Ratio	1	Unitless	Assumes that 100% of UF_6 is available for release.
Atmospheric Release Fraction U (Worker)	N/A	Unitless	Not applicable since the fire scenario applies to public only, not worker.
Atmospheric Release Fraction U (Boundary)	0.1	Unitless	Assumes 90% of the U material either remains inside the component or immediately falls to the floor once outside component. The justification is that since U particles are heavy, they will not remain airborne. Therefore, 10% of the U material originally inside the component becomes airborne.
Atmospheric Release Fraction HF	1	Unitless	Assumes 100% becomes airborne.
Respirable Fraction U	1	Unitless	Assumes 100% can be inhaled.
Respirable Fraction HF	1	Unitless	Assumes 100% can be inhaled.
Leak Path Fraction	1	Unitless	Assumes 100% leaves the building.
Enrichment of material released	5	Percent	EREF enrichment level
Release Duration	30	Minutes	Release duration associated with MAR release. Set equal to offsite site boundary individual exposure duration.
Room volume (SBM areas)	Refer to ISA Table	m^3	Table 2-13 of Appendix E of the ISA Summary (Building and Room Volumes). Sum of thermal enclosure and headspace volumes.
Mixing efficiency	0.3	Unitless	Minimum value from Table D-1 of NFPA National Fire Protection Association®: NFPA® 69: Standard on Explosion Prevention Systems (2008 Edition). Multiple exhaust openings and no positive supply.
Free Volume Fraction	0.8	Unitless	Assumes 80% of room free air space with 20% taken up by equipment and other items.
Room Temperature	20	°C	Room conditions not used in calculation (Information only)
Relative Humidity	0.2	Unitless	Room conditions not used in calculation (Information only)
Worker Exposure Duration	N/A	minutes	Not applicable since the fire scenario applies to public only, not worker.

INPUT PARAMETERS - LIMITING FIRE SCENARIO

Parameter	Parameter Value	Unit	Comments
Worker Breathing Rate	N/A	m^3/sec	Not applicable since the fire scenario applies to public only, not worker.
X/Q at Boundary	2.80E-04	sec/m^3	Value derived using on-site specific information.
Building Leak Rate (SBM)	Refer to ISA Table	m^3/sec	Table 2-12 of Appendix E of the ISA Summary (Room Ventilation Flow Rates). TSB Chemical Trap Workshop. Note that this calculation was then repeated to determine the ventilation flow rate necessary to achieve LOW consequences. The solution was obtained by trial and error.
Exposure Duration at Boundary	30	minutes	Assumes offsite individual at site boundary will leave plume centerline within 30 minute period to avoid HF fumes. Fumes are very irritating at very low concentration
Breathing Rate	3.50E-04	m^3/sec	NRC Reg Guide 1.183: Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors, Section 4.1.3, 07/2000
$U/(UF_6)$	0.676060	Unitless	Conversion factor
$(HF)/(UF_6)$	0.227417	Unitless	Conversion factor
$(2H_20)/(4HF)$	0.450238	Unitless	Conversion factor
Dose Conversion Factor	6.20E-02	Sv/gm	Dose Conversion Factor
Time based concentration averaging factor	0.5	Unitless	For Worker Calculation
HF AEGL-2 limit	28	mg/m^3	Limit for public at boundary
HF AEGL-1 limit	0.8	mg/m^3	Limit for public at boundary
Dose limit, category 2	0.05	Sv	Limit for public at boundary
Dose limit, category 3	0.25	Sv	Limit for public at boundary
Concentration Limit (24 hour average)	6.48E+00	mg/m^3	Limit for public at boundary
Uranium Intake Limit, category 2	4.06	mg	Limit for public at boundary
Uranium Intake Limit, category 3	21	mg	Limit for public at boundary

ATTACHMENT 9.2

AEOLUS3 COMPUTER CODE

1A - ASSUMPTIONS AND DESIGN INPUT USED IN THE AEOLUS3 MODELING

1B - AEOLUS3 INPUT FILES

1C - AEOLUS3 INPUT REQUIREMENTS

1.1 Atmospheric Dispersion and Deposition Factors for Release from the Building Complex

Both maximum sector and five-percent overall site atmospheric dispersion factors were generated (as described in RG 1.145) and the higher value selected.

1.1.1 Assumptions for Release from the Building Complex

- Ground level release.
- For ground level releases modeled using the computer code AEOLUS3, terrain heights are not used. (Per Reg. Guide 1.145 Section 1.3.2, release-point and receptor elevations are assumed to be the same.)
- Downwind distances from the release point for which atmospheric dispersion factors for accident release analyses will be determined using computer code AEOLUS3 version 1.0 are: 400 meters, 800 meters, 1200 meters, distance to the site boundary for each of the 16 wind directions, 1609.4 meters (1 mile), 3218.8 meters (2 miles), 4828.2 meters (3 miles), 6437.6 meters (4 miles) and 8047.0 meters (5 miles).
- Site Boundary receptors were the closest point to the rectangle that encompassed the building complex north of the line labeled 18500.0 within 45 degrees centered on the compass direction of interest.
- No buoyant plume rise.
- Maximum meteorological parameter values accepted as valid observations: Wind direction: 360°, Wind speed: 90 meters/second (201 miles/hour), Temperature difference: 18° C (64°F), Solar radiation: 2 cal/min/cm^2 (not used), Precipitation: 5 inches (127 mm).
- Height of building adjacent to release point is 10 meters (33 feet).
- Cross-sectional area of building adjacent to release point is 1500 meters^2 (16,146 ft^2).

1.1.2 Design Input for Release from the Building Complex

Table: Design Input for Release from the Building Complex

Parameter	Value(s)
Wind speed group upper limits for AEOLUS3	0.27 (0.60), 0.5 (1.1), 1.0 (2.2), 1.5 (3.4), 2.0 (4.5), 3.0 (6.7), 4.0 (8.9), 5.0 (11.2), 6.0 (13.4), 8.0 (17.9), 10.0 (22.4), 89.9 (201.1) meters/second (miles/hour)
AEOLUS3 wind speed assigned to calms	0.14 meters/second (0.31 miles/hour)
Anemometer starting speed for the AEOLUS3 runs	0.27 meters/second (0.60 miles/ hour)
Temperature sensor separation	75m (246ft) – 10m (33ft) or 65 meters (213ft)

Parameter	Value(s)
Wind instrument heights	10m (33ft), 75m (246ft). 10m (33ft) winds used for this calculation.
The annual average mixing layer height	1225 meters (4019ft)
Meteorological channel units of measure	Wind speed – meters/second Wind direction - degrees from True North Delta-Temperature - degrees Celsius per sensor separation in meters
Number of months in meteorological database	60 (5 years)
Gamma energy spectra for χ/Q's	Midpoint energy (MeV) = 0.01, 0.025, 0.0375, 0.0575, 0.085, 0.125, 0.225, 0.375, 0.575, 0.85, 1.25, 1.75, 2.25, 2.75, 3.5, 5.0 Relative intensity (MeV/sec) = 2.905E+07, 5.927E+06, 4.741E+07, 1.078E+06, 1.307E+04, 2.564E+07, 1.13E+10, 1.2E+10, 4.42E+10, 4.4E+10, 5.03E+10, 6.98E+10, 3.93E+10, 2.55E+10, 5.18E+10, 5.47E+09
Site Boundary Receptors (Sector and Distance in meters)	N 1101.6 m NNE 1101.6 m NE 1202.4 m ENE 1180.8 m E 1080 m ESE 882 m SE 882 m SSE 1922.4 m S 1512 m SSW 1008 m SW 1008 m WSW 1116 m W 1980 m WNW 2606.4 m NW 1202.4 m NNW 1101.6 m

1.1.3 Assumptions for Cylinder Pad Releases

- Ground level release.
- For ground level releases modeled using the computer code AEOLUS3, terrain heights are not used. (Per Reg. Guide 1.145 Section 1.3.2, release-point and receptor elevations are assumed to be the same.)
- Downwind distances from the release point for which atmospheric dispersion factors for accident release analyses will be determined using computer code AEOLUS3 version 1.0 are: distance to the site boundary for the west clockwise through east sectors (the cylinder pad is closest to the site boundary in these sectors).
- Site Boundary receptors were the closest point to the nearest point on the cylinder pad within 45 degrees centered on the compass direction of interest.
- No buoyant plume rise.
- Maximum meteorological parameter values accepted as valid observations: Wind direction: 360°, Wind speed: 90 meters/second (201 miles/hour), Temperature difference: 18° C (64°F), Solar radiation: 2 cal/min/cm^2 (not used), Precipitation: 5 inches (127 mm).

1.1.4 Design Input for Cylinder Pad Releases

Table: Design Input for Cylinder Pad Releases

Parameter	Value(s)
Wind speed group upper limits for AEOLUS3	0.27 (0.60), 0.5 (1.1), 1.0 (2.2), 1.5 (3.4), 2.0 (4.5), 3.0 (6.7), 4.0 (8.9), 5.0 (11.2), 6.0 (13.4), 8.0 (17.9), 10.0 (22.4), 89.9 (201.1) meters/second (miles/hour)
AEOLUS3 wind speed assigned to calms	0.14 meters/second (0.31 miles/hour)
Anemometer starting speed for the AEOLUS3 runs	0.27 meters/second (0.60 miles/ hour)
Temperature sensor separation	75m (246ft) – 10m (33ft) or 65 meters (213ft)
Wind instrument heights	10m (33ft), 75m (246ft). 10m (33ft) winds used for this calculation.
The annual average mixing layer height	1225 meters (4019ft)
Meteorological channel units of measure	Wind speed – meters/second Wind direction - degrees from True North Delta-Temperature - degrees Celsius per sensor separation in meters
Number of months in meteorological database	60 (5 years)

Parameter	Value(s)	
Distances to the site boundary (meters)	N	849.6
	NNE	849.6
	NE	921.6
	ENE	1195.2
	E	1224.0
	W	2296.8
	WNW	1216.8
	NW	921.6
	NNW	849.6

1.1.5 Assumptions for Atmospheric Dispersion Factors for Use in Determining Compliance with Environmental Limits

- Ground level release.
- For ground level releases modeled using the computer code AEOLUS3, terrain heights are not used. (Per Reg. Guide 1.145 Section 1.3.2, release-point and receptor elevations are assumed to be the same.)
- Downwind distances from the release point for which atmospheric dispersion factors for accident release analyses will be determined using computer code AEOLUS3 version 1.0 are: 10 m (33 ft), 10.7 m (35 ft), 12.2 m (40 ft), 13.7 m (45 ft), 15.2 m (50 ft), 16.8 m (55 ft), 18.3 m (60 ft), 19.8 m (65 ft), 21.3 m (70 ft), 22.9 m (75 ft), 30.5 m (100 ft), 36.6 m (120 ft), 42.7 m (140 ft), 48.8 m (160 ft), 54.9 m (180 ft), 61.0 m (200 ft), 64.0 m (210 ft), 67.1 m (220 ft).
- No buoyant plume rise.
- Maximum meteorological parameter values accepted as valid observations: Wind direction: 360°, Wind speed: 90 meters/second (201 miles/hour), Temperature difference: 18° C (64°F), Solar radiation: 2 cal/min/cm^2 (not used), Precipitation: 5 inches (127 mm).
- Height of building adjacent to release point is 10 meters (33 feet).
- Cross-sectional area of building adjacent to release point is 1500 $meters^2$ (16,146 ft^2).

1.1.6 Design Input Atmospheric Dispersion Factors for Use in Determining Compliance with Environmental Limits

Table: Design Input Atmospheric Dispersion Factors for Use in Determining Compliance with Environmental Limits

Parameter	Value(s)
Wind speed group upper limits for AEOLUS3	0.27 (0.60), 0.5 (1.1), 1.0 (2.2), 1.5 (3.4), 2.0 (4.5), 3.0 (6.7), 4.0 (8.9), 5.0 (11.2), 6.0 (13.4), 8.0 (17.9), 10.0 (22.4), 89.9 (201.1) meters/second (miles/hour)
AEOLUS3 wind speed assigned to calms	0.14 meters/second (0.31 miles/hour)

Parameter	Value(s)
Anemometer starting speed for the AEOLUS3 runs	0.27 meters/second (0.60 miles/ hour)
Temperature sensor separation	75m (246ft) – 10m (33ft) or 65 meters (213ft)
Wind instrument heights	10m (33ft), 75m (246ft). 10m (33ft) winds used for this calculation.
The annual average mixing layer height	1225 meters (4019ft)
Meteorological channel units of measure	Wind speed – meters/second Wind direction - degrees from True North Delta-Temperature - degrees Celsius per sensor separation in meters
Number of months in meteorological database	60 (5 years)

1.1.7 Assumptions for Atmospheric Dispersion Factors For A Postulated Accident At A Blending Donor Station

- Default meteorological conditions (F stability class with a wind speed of 0.6 m/sec; D stability class with a wind speed of 2.0 m/sec) are used.
- Minimum cross-sectional area of building (Blending, Sampling & Preparation Building) for wake effects is 135 ft X 34 ft = 4590 ft^2 or 426 m^2.
- Receptors were set to the following downwind distances: 200, 400, 600, 800, 1000, 1200, 1400, 1600, 1800, 2000 meters.

1.1.8 Design Input for Atmospheric Dispersion Factors for a Postulated Accident at a Blending Donor Station

Table: Design Input for Atmospheric Dispersion Factors for a Postulated Accident at a Blending Donor Station

Parameter	Value(s)
Wind speed group upper limits for AEOLUS3	0.60, 3.4, 6.0, 8.0 meters/second
AEOLUS3 wind speed assigned to calms	0.6 meters/second
Anemometer starting speed for the AEOLUS3 runs	0.6 meters/second
Temperature sensor separation	100m
Wind instrument heights	10m (33ft), 75m (246ft). 10m (33ft) winds used for this calculation.
The annual average mixing layer height	1225 meters (4019ft)

Parameter	Value(s)
Meteorological channel units of measure	Wind speed – meters/second Wind direction - degrees from True North Delta-Temperature - degrees Celsius per sensor separation in meters
Number of months in meteorological database	1 (one)
Gamma energy spectra for χ/Q's	Midpoint energy (MeV) = 0.01, 0.025, 0.0375, 0.0575, 0.085, 0.125, 0.225, 0.375, 0.575, 0.85, 1.25, 1.75, 2.25, 2.75, 3.5, 5.0 Relative intensity (MeV/sec) = 2.905E+07, 5.927E+06, 4.741E+07, 1.078E+06, 1.307E+04, 2.564E+07, 1.13E+10, 1.2E+10, 4.42E+10, 4.4E+10, 5.03E+10, 6.98E+10, 3.93E+10, 2.55E+10, 5.18E+10, 5.47E+09

AEOLUS3 Input File for Accidental Release from the Building Complex

```
LINE              1         2         3         4         5         6         7         8
SEQ.     12345678901234567890123456789012345678901234567890123456789012345678901234567890

  1      INEL 2003-2007 MET ACCIDENT RELEASE AEF WITH GAMMA ENERGY SPECTRA
  2          3    1    1    0    1    1    1    0    2    1   12   16                60
  3       0.27      0.5       1.0       1.5       2.0       3.0       4.0       5.0
  4        6.0       8.0      10.0      89.9
  5        0.0      10.0      1500.0    0.0       000000.0  0.0
  6      1225.     1225.      2.26      8.0       0.0       0.0
  7        0.01     0.025     0.0375    0.0575    0.085     0.125     0.225     0.375
  8        0.575    0.85      1.25      1.75      2.25      2.75      3.5       5.0
  9      2.905E+07 5.927E+06 4.741E+07 1.078E+06 1.307E+04 2.564E+07 1.13E+10  1.2E+10
 10      4.42E+10  4.4E+10   5.03E+10  6.98E+10  3.93E+10  2.55E+10  5.18E+10  5.47E+09
 11       1.0       0.012     0.01      0.006     0.003     0.002     0.0012    0.0008
 12       10.0      0.018     0.015     0.009     0.0045    0.003     0.0018    0.0012
 13      (3x,f2.0,1x,f2.0,1x,f2.0,1x,f2.0,1x,f6.1,1x,f6.1,1x,14x,f7.2,1x,f7.2,1x,f6.1)
 14          1    2    3    4    6    5    7    9    8   12    1
 15       360.0     90.0      18.0      2.0       5.0
 16       1.000     1.000     1.0       25.4      0.14      10.       65.0      888.
 17          6     1.0       2.0       6.0       16.0      72.0      624.0
 18      RECEPTOR DATA
 19      *400m
 20      N    0    0 400.0
 21      NNE 0     0 400.0
 22      NE   0    0 400.0
 23      ENE 0     0 400.0
 24      E    0    0 400.0
 25      ESE 0     0 400.0
 26      SE   0    0 400.0
 27      SSE 0     0 400.0
 28      S    0    0 400.0
 29      SSW 0     0 400.0
 30      SW   0    0 400.0
 31      WSW 0     0 400.0
 32      W    0    0 400.0
 33      WNW 0     0 400.0
 34      NW   0    0 400.0
 35      NNW 0     0 400.0
 36      *800m
 37      N    0    0 800.0
 38      NNE 0     0 800.0
```

```
NE  0    0 800.0
ENE 0    0 800.0
E   0    0 800.0
ESE 0    0 800.0
SE  0    0 800.0
SSE 0    0 800.0
S   0    0 800.0
SSW 0    0 800.0
SW  0    0 800.0
WSW 0    0 800.0
W   0    0 800.0
WNW 0    0 800.0
NW  0    0 800.0
NNW 0    0 800.0
*1200m
N   0    0 1200.0
NNE 0    0 1200.0
NE  0    0 1200.0
ENE 0    0 1200.0
E   0    0 1200.0
ESE 0    0 1200.0
SE  0    0 1200.0
SSE 0    0 1200.0
S   0    0 1200.0
SSW 0    0 1200.0
SW  0    0 1200.0
WSW 0    0 1200.0
W   0    0 1200.0
WNW 0    0 1200.0
NW  0    0 1200.0
NNW 0    0 1200.0
*SB
N   0    0 1072.8
NNE 0    0 1072.8
NE  0    0 1166.4
ENE 0    0 1173.6
E   0    0 1000.8
ESE 0    0 1000.8
SE  0    0 1000.8
SSE 0    0 1087.2
S   0    0 1706.4
SSW 0    0 1094.4
SW  0    0 1094.4
WSW 1    0 1094.4
W   0    0 2030.4
WNW 0    0 1533.6
NW  0    0 1173.6
```

```
NNW 0     0 1072.8
*1mi
N   0     0 1609.4
NNE 0     0 1609.4
NE  0     0 1609.4
ENE 0     0 1609.4
E   0     0 1609.4
ESE 0     0 1609.4
SE  0     0 1609.4
SSE 0     0 1609.4
S   0     0 1609.4
SSW 0     0 1609.4
SW  0     0 1609.4
WSW 0     0 1609.4
W   0     0 1609.4
WNW 0     0 1609.4
NW  0     0 1609.4
NNW 0     0 1609.4
*2mi
N   0     0 3218.8
NNE 0     0 3218.8
NE  0     0 3218.8
ENE 0     0 3218.8
E   0     0 3218.8
ESE 0     0 3218.8
SE  0     0 3218.8
SSE 0     0 3218.8
S   0     0 3218.8
SSW 0     0 3218.8
SW  0     0 3218.8
WSW 0     0 3218.8
W   0     0 3218.8
WNW 0     0 3218.8
NW  0     0 3218.8
NNW 0     0 3218.8
*3mi
N   0     0 4828.2
NNE 0     0 4828.2
NE  0     0 4828.2
ENE 0     0 4828.2
E   0     0 4828.2
ESE 0     0 4828.2
SE  0     0 4828.2
SSE 0     0 4828.2
S   0     0 4828.2
SSW 0     0 4828.2
SW  0     0 4828.2
```

```
WSW 0    0 4828.2
W   0    0 4828.2
WNW 0    0 4828.2
NW  0    0 4828.2
NNW 0    0 4828.2
*4mi
N   0    0 6437.6
NNE 0    0 6437.6
NE  0    0 6437.6
ENE 0    0 6437.6
E   0    0 6437.6
ESE 0    0 6437.6
SE  0    0 6437.6
SSE 0    0 6437.6
S   0    0 6437.6
SSW 0    0 6437.6
SW  0    0 6437.6
WSW 0    0 6437.6
W   0    0 6437.6
WNW 0    0 6437.6
NW  0    0 6437.6
NNW 0    0 6437.6
*5mi
N   0    0 8047.0
NNE 0    0 8047.0
NE  0    0 8047.0
ENE 0    0 8047.0
E   0    0 8047.0
ESE 0    0 8047.0
SE  0    0 8047.0
SSE 0    0 8047.0
S   0    0 8047.0
SSW 0    0 8047.0
SW  0    0 8047.0
WSW 0    0 8047.0
W   0    0 8047.0
WNW 0    0 8047.0
NW  0    0 8047.0
NNW 0    0 8047.0
```

AEOLUS3 Input File for Accidental Release from the Cylinder Pad

```
LINE              1         2         3         4         5         6         7         8
SEQ.     12345678901234567890123456789012345678901234567890123456789012345678901234567890

         ACCIDENT RELEASE FROM UBC PAD OF AEF USING INEL 2003-2007 MET 6SWU
             3    0    1    0    1    0    1    0    2    1   12    0             60
          0.27      0.5       1.0       1.5       2.0       3.0       4.0       5.0
           6.0       8.0      10.0      89.9
           0.0       0.0       00.0     0.0       000000.0  0.0
         1225.     1225.     2.26      8.0       0.0       0.0
          1.0      0.012     0.01      0.006     0.003     0.002     0.0012    0.0008
          10.0     0.018     0.015     0.009     0.0045    0.003     0.0018    0.0012
         (3x,f2.0,1x,f2.0,1x,f2.0,1x,f2.0,1x,f6.1,1x,f6.1,1x,14x,f7.2,1x,f7.2,1x,f6.1)
             1    2    3    4    6    5    7    9    8   12    1
          360.0     90.0      18.0      2.0       5.0
          1.000     1.000     1.0       25.4      0.14      10.       65.0      888.
             6     1.0       2.0       6.0       16.0      72.0      624.0
         RECEPTOR DATA
         *UBC
         N   0    0 756.0
         NNE 0    0 756.0
         NE  0    0 813.6
         ENE 0    0 1058.4
         E   0    0 1224.0
         W   0    0 2052.0
         WNW 0    0 1065.6
         NW  0    0 820.8
         NNW 0    0 756.0
```

AEOLUS3 Input File for Accidental Release from the Blending Donor Station

```
LINE             1         2         3         4         5         6         7         8
SEQ.    12345678901234567890123456789012345678901234567890123456789012345678901234567890

        EREF X/Qs FOR ASSUMED CONDITIONS - PLUME MEANDER & BLDG WAKE - ACC GAMMA
            3    1    1    0    0    1    1    0    2    0    4   16    0    0    1
         0.6       3.4       6.0       8.0
          0.0       10.0       426.0    0.0        000000.0  0.0
        1225.     1225.      2.26      8.0       0.0        0.0
          0.01     0.025     0.0375    0.0575    0.085     0.125     0.225     0.375
          0.575    0.85      1.25      1.75      2.25      2.75      3.5       5.0
        2.905E+07 5.927E+06 4.741E+07 1.078E+06 1.307E+04 2.564E+07 1.13E+10  1.2E+10
        4.42E+10  4.4E+10   5.03E+10  6.98E+10  3.93E+10  2.55E+10  5.18E+10  5.47E+09
         1.0       0.012     0.01      0.006     0.003     0.002     0.0012    0.0008
         10.0      0.018     0.015     0.009     0.0045    0.003     0.0018    0.0012
        (F2.0,3F3.0,7X,5F10.1)
            1    2    3    4    5    6    7    0    0    7    0
         900.0     99.0      9.9       9.9       9.9
         1.0       1.0       0.0       0.0       0.6        10.0      100.0     888.0
            6    1.0       2.0       6.0       16.0      72.0      624.0
        RECEPTOR DATA
        *BDS
        N   1    0 200.0     0.0
        NNE 1    0 400.0     0.0
        NE  1    0 600.0     0.0
        E   1    0 800.0     0.0
        ESE 1    0 1000.0    0.0
        SE  1    0 1200.0    0.0
        SSE 1    0 1400.0    0.0
        S   1    0 1600.0    0.0
        SSW 1    0 1800.0    0.0
        SW  1    0 2000.0    0.0
```

AEOLUS3 Input File for Normal Effluent Release from the EREF

```
LINE         1         2         3         4         5         6         7         8
SEQ.12345678901234567890123456789012345678901234567890123456789012345678901234567890

INEL 2003-2007 MET NORMAL EFFLUENT GROUND RELEASE AEF 6SWU
    1    0    1    0    1    0    1    0    0    0   12    0              60
 0.27      0.5       1.0       1.5       2.0       3.0       4.0       5.0
  6.0       8.0      10.0      89.9
  0.0      10.0      1500.0    0.0       000000.0  0.0
1225.     1225.      2.26      8.0       0.0       0.0
(3x,f2.0,1x,f2.0,1x,f2.0,1x,f2.0,1x,f6.1,1x,f6.1,1x,14x,f7.2,1x,f7.2,1x,f6.1)
    1    2    3    4    6    5    7    9    8   12    1
 360.0     90.0      18.0      2.0       5.0
 1.000     1.000     1.0       25.4      0.14      10.      65.0      888.
RECEPTOR DATA
*SB
N   0    0 1072.8
NNE 0    0 1072.8
NE  0    0 1166.4
ENE 0    0 1173.6
E   0    0 1000.8
ESE 0    0 1000.8
SE  0    0 1000.8
SSE 0    0 1087.2
S   0    0 1706.4
SSW 0    0 1094.4
SW  0    0 1094.4
WSW 0    0 1094.4
W   0    0 2030.4
WNW 0    0 1533.6
NW  0    0 1173.6
NNW 0    0 1072.8
*GARDEN
NNE 0    0 8500.0
NE  0    0 6000.0
ENE 0    0 6000.0
E   0    0 6000.0
ESE 0    0 6000.0
SE  0    0 3700.0
SSE 0    0 2900.0
SW  0    0 5800.0
*MEAT
N   0    0 825.0
NNE 0    0 835.0
NE  0    0 965.0
```

```
ENE 0     0 1290.0
E   0     0 1219.0
ESE 0     0 869.0
SE  0     0 1000.0
SSE 0     0 2515.0
S   0     0 3060.0
SSW 0     0 1116.0
SW  0     0 998.0
WSW 0     0 2591.0
W   0     0 2242.0
WNW 0     0 1481.0
NW  0     0 990.0
NNW 0     0 851.0
*BUSINESS
S   0     0 2834.0
SW  0     0 4700.0
*200m
N   0     0 200.0
NNE 0     0 200.0
NE  0     0 200.0
ENE 0     0 200.0
E   0     0 200.0
ESE 0     0 200.0
SE  0     0 200.0
SSE 0     0 200.0
S   0     0 200.0
SSW 0     0 200.0
SW  0     0 200.0
WSW 0     0 200.0
W   0     0 200.0
WNW 0     0 200.0
NW  0     0 200.0
NNW 0     0 200.0
*400m
N   0     0 400.0
NNE 0     0 400.0
NE  0     0 400.0
ENE 0     0 400.0
E   0     0 400.0
ESE 0     0 400.0
SE  0     0 400.0
SSE 0     0 400.0
S   0     0 400.0
SSW 0     0 400.0
SW  0     0 400.0
WSW 0     0 400.0
W   0     0 400.0
```

```
WNW 0     0 400.0
NW  0     0 400.0
NNW 0     0 400.0
*600m
N   0     0 600.0
NNE 0     0 600.0
NE  0     0 600.0
ENE 0     0 600.0
E   0     0 600.0
ESE 0     0 600.0
SE  0     0 600.0
SSE 0     0 600.0
S   0     0 600.0
SSW 0     0 600.0
SW  0     0 600.0
WSW 0     0 600.0
W   0     0 600.0
WNW 0     0 600.0
NW  0     0 600.0
NNW 0     0 600.0
*805m
N   0     0 805.0
NNE 0     0 805.0
NE  0     0 805.0
ENE 0     0 805.0
E   0     0 805.0
ESE 0     0 805.0
SE  0     0 805.0
SSE 0     0 805.0
S   0     0 805.0
SSW 0     0 805.0
SW  0     0 805.0
WSW 0     0 805.0
W   0     0 805.0
WNW 0     0 805.0
NW  0     0 805.0
NNW 0     0 805.0
*1000m
N   0     0 1000.0
NNE 0     0 1000.0
NE  0     0 1000.0
ENE 0     0 1000.0
E   0     0 1000.0
ESE 0     0 1000.0
SE  0     0 1000.0
SSE 0     0 1000.0
S   0     0 1000.0
```

```
SSW 0     0 1000.0
SW  0     0 1000.0
WSW 0     0 1000.0
W   0     0 1000.0
WNW 0     0 1000.0
NW  0     0 1000.0
NNW 0     0 1000.0
*1200m
N   0     0 1200.0
NNE 0     0 1200.0
NE  0     0 1200.0
ENE 0     0 1200.0
E   0     0 1200.0
ESE 0     0 1200.0
SE  0     0 1200.0
SSE 0     0 1200.0
S   0     0 1200.0
SSW 0     0 1200.0
SW  0     0 1200.0
WSW 0     0 1200.0
W   0     0 1200.0
WNW 0     0 1200.0
NW  0     0 1200.0
NNW 0     0 1200.0
*1400m
N   0     0 1400.0
NNE 0     0 1400.0
NE  0     0 1400.0
ENE 0     0 1400.0
E   0     0 1400.0
ESE 0     0 1400.0
SE  0     0 1400.0
SSE 0     0 1400.0
S   0     0 1400.0
SSW 0     0 1400.0
SW  0     0 1400.0
WSW 0     0 1400.0
W   0     0 1400.0
WNW 0     0 1400.0
NW  0     0 1400.0
NNW 0     0 1400.0
*1mi
N   0     0 1609.4
NNE 0     0 1609.4
NE  0     0 1609.4
ENE 0     0 1609.4
E   0     0 1609.4
```

```
ESE 0    0 1609.4
SE  0    0 1609.4
SSE 0    0 1609.4
S   0    0 1609.4
SSW 0    0 1609.4
SW  0    0 1609.4
WSW 0    0 1609.4
W   0    0 1609.4
WNW 0    0 1609.4
NW  0    0 1609.4
NNW 0    0 1609.4
*1800m
N   0    0 1800.0
NNE 0    0 1800.0
NE  0    0 1800.0
ENE 0    0 1800.0
E   0    0 1800.0
ESE 0    0 1800.0
SE  0    0 1800.0
SSE 0    0 1800.0
S   0    0 1800.0
SSW 0    0 1800.0
SW  0    0 1800.0
WSW 0    0 1800.0
W   0    0 1800.0
WNW 0    0 1800.0
NW  0    0 1800.0
NNW 0    0 1800.0
*2000m
N   0    0 2000.0
NNE 0    0 2000.0
NE  0    0 2000.0
ENE 0    0 2000.0
E   0    0 2000.0
ESE 0    0 2000.0
SE  0    0 2000.0
SSE 0    0 2000.0
S   0    0 2000.0
SSW 0    0 2000.0
SW  0    0 2000.0
WSW 0    0 2000.0
W   0    0 2000.0
WNW 0    0 2000.0
NW  0    0 2000.0
NNW 0    0 2000.0
*2200m
N   0    0 2200.0
```

```
NNE 0     0 2200.0
NE  0     0 2200.0
ENE 0     0 2200.0
E   0     0 2200.0
ESE 0     0 2200.0
SE  0     0 2200.0
SSE 0     0 2200.0
S   0     0 2200.0
SSW 0     0 2200.0
SW  0     0 2200.0
WSW 0     0 2200.0
W   0     0 2200.0
WNW 0     0 2200.0
NW  0     0 2200.0
NNW 0     0 2200.0
*2415m
N   0     0 2415.0
NNE 0     0 2415.0
NE  0     0 2415.0
ENE 0     0 2415.0
E   0     0 2415.0
ESE 0     0 2415.0
SE  0     0 2415.0
SSE 0     0 2415.0
S   0     0 2415.0
SSW 0     0 2415.0
SW  0     0 2415.0
WSW 0     0 2415.0
W   0     0 2415.0
WNW 0     0 2415.0
NW  0     0 2415.0
NNW 0     0 2415.0
*2600m
N   0     0 2600.0
NNE 0     0 2600.0
NE  0     0 2600.0
ENE 0     0 2600.0
E   0     0 2600.0
ESE 0     0 2600.0
SE  0     0 2600.0
SSE 0     0 2600.0
S   0     0 2600.0
SSW 0     0 2600.0
SW  0     0 2600.0
WSW 0     0 2600.0
W   0     0 2600.0
WNW 0     0 2600.0
```

```
NW  0     0 2600.0
NNW 0     0 2600.0
*2800m
N   0     0 2800.0
NNE 0     0 2800.0
NE  0     0 2800.0
ENE 0     0 2800.0
E   0     0 2800.0
ESE 0     0 2800.0
SE  0     0 2800.0
SSE 0     0 2800.0
S   0     0 2800.0
SSW 0     0 2800.0
SW  0     0 2800.0
WSW 0     0 2800.0
W   0     0 2800.0
WNW 0     0 2800.0
NW  0     0 2800.0
NNW 0     0 2800.0
*3000m
N   0     0 3000.0
NNE 0     0 3000.0
NE  0     0 3000.0
ENE 0     0 3000.0
E   0     0 3000.0
ESE 0     0 3000.0
SE  0     0 3000.0
SSE 0     0 3000.0
S   0     0 3000.0
SSW 0     0 3000.0
SW  0     0 3000.0
WSW 0     0 3000.0
W   0     0 3000.0
WNW 0     0 3000.0
NW  0     0 3000.0
NNW 0     0 3000.0
*2mi
N   0     0 3218.8
NNE 0     0 3218.8
NE  0     0 3218.8
ENE 0     0 3218.8
E   0     0 3218.8
ESE 0     0 3218.8
SE  0     0 3218.8
SSE 0     0 3218.8
S   0     0 3218.8
SSW 0     0 3218.8
```

```
SW  0    0 3218.8
WSW 0    0 3218.8
W   0    0 3218.8
WNW 0    0 3218.8
NW  0    0 3218.8
NNW 0    0 3218.8
*2.5mi
N   0    0 4023.5
NNE 0    0 4023.5
NE  0    0 4023.5
ENE 0    0 4023.5
E   0    0 4023.5
ESE 0    0 4023.5
SE  0    0 4023.5
SSE 0    0 4023.5
S   0    0 4023.5
SSW 0    0 4023.5
SW  0    0 4023.5
WSW 0    0 4023.5
W   0    0 4023.5
WNW 0    0 4023.5
NW  0    0 4023.5
NNW 0    0 4023.5
*3mi
N   0    0 4828.2
NNE 0    0 4828.2
NE  0    0 4828.2
ENE 0    0 4828.2
E   0    0 4828.2
ESE 0    0 4828.2
SE  0    0 4828.2
SSE 0    0 4828.2
S   0    0 4828.2
SSW 0    0 4828.2
SW  0    0 4828.2
WSW 0    0 4828.2
W   0    0 4828.2
WNW 0    0 4828.2
NW  0    0 4828.2
NNW 0    0 4828.2
*3.5mi
N   0    0 5632.9
NNE 0    0 5632.9
NE  0    0 5632.9
ENE 0    0 5632.9
E   0    0 5632.9
ESE 0    0 5632.9
```

371	SE	0	0	5632.9
372	SSE	0	0	5632.9
373	S	0	0	5632.9
374	SSW	0	0	5632.9
375	SW	0	0	5632.9
376	WSW	0	0	5632.9
377	W	0	0	5632.9
378	WNW	0	0	5632.9
379	NW	0	0	5632.9
380	NNW	0	0	5632.9
381	*4mi			
382	N	0	0	6437.6
383	NNE	0	0	6437.6
384	NE	0	0	6437.6
385	ENE	0	0	6437.6
386	E	0	0	6437.6
387	ESE	0	0	6437.6
388	SE	0	0	6437.6
389	SSE	0	0	6437.6
390	S	0	0	6437.6
391	SSW	0	0	6437.6
392	SW	0	0	6437.6
393	WSW	0	0	6437.6
394	W	0	0	6437.6
395	WNW	0	0	6437.6
396	NW	0	0	6437.6
397	NNW	0	0	6437.6
398	*4.5mi			
399	N	0	0	7242.3
400	NNE	0	0	7242.3
401	NE	0	0	7242.3
402	ENE	0	0	7242.3
403	E	0	0	7242.3
404	ESE	0	0	7242.3
405	SE	0	0	7242.3
406	SSE	0	0	7242.3
407	S	0	0	7242.3
408	SSW	0	0	7242.3
409	SW	0	0	7242.3
410	WSW	0	0	7242.3
411	W	0	0	7242.3
412	WNW	0	0	7242.3
413	NW	0	0	7242.3
414	NNW	0	0	7242.3
415	*5mi			
416	N	0	0	8047.0
417	NNE	0	0	8047.0

```
418       NE  0     0 8047.0
419       ENE 0     0 8047.0
420       E   0     0 8047.0
421       ESE 0     0 8047.0
422       SE  0     0 8047.0
423       SSE 0     0 8047.0
424       S   0     0 8047.0
425       SSW 0     0 8047.0
426       SW  0     0 8047.0
427       WSW 0     0 8047.0
428       W   0     0 8047.0
429       WNW 0     0 8047.0
430       NW  0     0 8047.0
431       NNW 0     0 8047.0
432       *7.5mi
433       N   0     0 12070.5
434       NNE 0     0 12070.5
435       NE  0     0 12070.5
436       ENE 0     0 12070.5
437       E   0     0 12070.5
438       ESE 0     0 12070.5
439       SE  0     0 12070.5
440       SSE 0     0 12070.5
441       S   0     0 12070.5
442       SSW 0     0 12070.5
443       SW  0     0 12070.5
444       WSW 0     0 12070.5
445       W   0     0 12070.5
446       WNW 0     0 12070.5
447       NW  0     0 12070.5
448       NNW 0     0 12070.5
449       *10mi
450       N   0     0 16094.0
451       NNE 0     0 16094.0
452       NE  0     0 16094.0
453       ENE 0     0 16094.0
454       E   0     0 16094.0
455       ESE 0     0 16094.0
456       SE  0     0 16094.0
457       SSE 0     0 16094.0
458       S   0     0 16094.0
459       SSW 0     0 16094.0
460       SW  0     0 16094.0
461       WSW 0     0 16094.0
462       W   0     0 16094.0
463       WNW 0     0 16094.0
464       NW  0     0 16094.0
```

465	NNW	0	0	16094.0
466	*15mi			
467	N	0	0	24141.0
468	NNE	0	0	24141.0
469	NE	0	0	24141.0
470	ENE	0	0	24141.0
471	E	0	0	24141.0
472	ESE	0	0	24141.0
473	SE	0	0	24141.0
474	SSE	0	0	24141.0
475	S	0	0	24141.0
476	SSW	0	0	24141.0
477	SW	0	0	24141.0
478	WSW	0	0	24141.0
479	W	0	0	24141.0
480	WNW	0	0	24141.0
481	NW	0	0	24141.0
482	NNW	0	0	24141.0
483	*20mi			
484	N	0	0	32188.0
485	NNE	0	0	32188.0
486	NE	0	0	32188.0
487	ENE	0	0	32188.0
488	E	0	0	32188.0
489	ESE	0	0	32188.0
490	SE	0	0	32188.0
491	SSE	0	0	32188.0
492	S	0	0	32188.0
493	SSW	0	0	32188.0
494	SW	0	0	32188.0
495	WSW	0	0	32188.0
496	W	0	0	32188.0
497	WNW	0	0	32188.0
498	NW	0	0	32188.0
499	NNW	0	0	32188.0
500	*25mi			
501	N	0	0	40235.0
502	NNE	0	0	40235.0
503	NE	0	0	40235.0
504	ENE	0	0	40235.0
505	E	0	0	40235.0
506	ESE	0	0	40235.0
507	SE	0	0	40235.0
508	SSE	0	0	40235.0
509	S	0	0	40235.0
510	SSW	0	0	40235.0
511	SW	0	0	40235.0

```
WSW 0     0 40235.0
W   0     0 40235.0
WNW 0     0 40235.0
NW  0     0 40235.0
NNW 0     0 40235.0
*30mi
N   0     0 48282.0
NNE 0     0 48282.0
NE  0     0 48282.0
ENE 0     0 48282.0
E   0     0 48282.0
ESE 0     0 48282.0
SE  0     0 48282.0
SSE 0     0 48282.0
S   0     0 48282.0
SSW 0     0 48282.0
SW  0     0 48282.0
WSW 0     0 48282.0
W   0     0 48282.0
WNW 0     0 48282.0
NW  0     0 48282.0
NNW 0     0 48282.0
*35mi
N   0     0 56329.0
NNE 0     0 56329.0
NE  0     0 56329.0
ENE 0     0 56329.0
E   0     0 56329.0
ESE 0     0 56329.0
SE  0     0 56329.0
SSE 0     0 56329.0
S   0     0 56329.0
SSW 0     0 56329.0
SW  0     0 56329.0
WSW 0     0 56329.0
W   0     0 56329.0
WNW 0     0 56329.0
NW  0     0 56329.0
NNW 0     0 56329.0
*40mi
N   0     0 64376.0
NNE 0     0 64376.0
NE  0     0 64376.0
ENE 0     0 64376.0
E   0     0 64376.0
ESE 0     0 64376.0
SE  0     0 64376.0
```

```
SSE 0     0 64376.0
S   0     0 64376.0
SSW 0     0 64376.0
SW  0     0 64376.0
WSW 0     0 64376.0
W   0     0 64376.0
WNW 0     0 64376.0
NW  0     0 64376.0
NNW 0     0 64376.0
*45mi
N   0     0 72423.0
NNE 0     0 72423.0
NE  0     0 72423.0
ENE 0     0 72423.0
E   0     0 72423.0
ESE 0     0 72423.0
SE  0     0 72423.0
SSE 0     0 72423.0
S   0     0 72423.0
SSW 0     0 72423.0
SW  0     0 72423.0
WSW 0     0 72423.0
W   0     0 72423.0
WNW 0     0 72423.0
NW  0     0 72423.0
NNW 0     0 72423.0
*50mi
N   0     0 80470.0
NNE 0     0 80470.0
NE  0     0 80470.0
ENE 0     0 80470.0
E   0     0 80470.0
ESE 0     0 80470.0
SE  0     0 80470.0
SSE 0     0 80470.0
S   0     0 80470.0
SSW 0     0 80470.0
SW  0     0 80470.0
WSW 0     0 80470.0
W   0     0 80470.0
WNW 0     0 80470.0
NW  0     0 80470.0
NNW 0     0 80470.0
```

<u>AEOLUS3 Input File for Normal Effluent Release from the EREF – Revised Site Boundary</u>

```
LINE             1         2         3         4         5         6         7         8
SEQ.    12345678901234567890123456789012345678901234567890123456789012345678901234567890

  1     INEL 2003-2007 MET NORMAL EFFLUENT GROUND RELEASE AEF 6SWU
  2         1    0    1    0    1    0    1    0    0    0   12    0              60
  3      0.27      0.5       1.0       1.5       2.0       3.0       4.0       5.0
  4       6.0       8.0      10.0      89.9
  5       0.0      10.0      1500.0    0.0       000000.0  0.0
  6     1225.     1225.      2.26      8.0       0.0       0.0
  7     (3x,f2.0,1x,f2.0,1x,f2.0,1x,f2.0,1x,f6.1,1x,f6.1,1x,14x,f7.2,1x,f7.2,1x,f6.1)
  8         1    2    3    4    6    5    7    9    8   12    1
  9      360.0    90.0       18.0      2.0       5.0
 10      1.000     1.000     1.0       25.4      0.14      10.      65.0      888.
 11     RECEPTOR DATA
 12     *SB
 13     N   0    0 1072.8
 14     NNE 0    0 1166.4
 15     NE  0    0 1504.8
 16     ENE 0    0 1699.2
 17     E   0    0 1173.6
 18     ESE 0    0 1000.8
 19     SE  0    0 1087.2
 20     SSE 0    0 1972.8
 21     S   0    0 2944.8
 22     SSW 0    0 1706.4
 23     SW  0    0 1094.4
 24     WSW 0    0 2030.4
 25     W   0    0 2664.0
 26     WNW 0    0 2714.4
 27     NW  0    0 1533.6
 28     NNW 0    0 1173.6
```

Input Line 1 (20A4)

Col. 1-80	TITLE	Any alphanumeric characters for problem identification.

Input Line 2 (16I5) Program control options

Col. 5 — KOPT — Application option, as follows:

- (a) 1 = Continuous, routine releases
- (b) 2 = Intermittent releases
- (c) 3 = Accidental releases

Col. 10 — KPRINT — Printout control option, as follows:

- (a) 0 = Short printout (which includes the input data and final summaries)
- (b) 1 = Full printout along with intermediate results

See also KPRMET in Input Line 12 and KPRT in Input Line 24B.

Col. 14-15 — KMN — Plume meander control option, as follows:

- (a) -1 = Activate the Murphy and Campe building wake correction model (see parameter CONDIA in Input Line 5)
- (b) 0 = Exclude plume meander consideration in the plume centerline concentration X/Q
- (c) 1 = Include plume meander consideration in the plume centerline concentration X/Q

Col. 20 — KCF — Control option for recirculation correction, as follows:

- (a) 0 = No correction
- (b) 1 = Open terrain recirculation correction factors in Reg. Guide 1.111 (Ref. 2, Rev. 0), as built in AEOLUS-3

(c) 2 = User-supplied correction factors via Input Line Set 24

Defaults to 2 for valleys (i.e., if KVORS<0 in Col. 39-40)

Col. 25	KWEXP	Wind-speed extrapolation control option, as follows:
		(a) 0 = No extrapolation of wind speed with height (i.e. input wind speeds will be assumed to apply also at the point of release)
		(b) 1 = The following built in extrapolation: Stabilities A, B, C, D : 0.25 Stabilities E, F, G : 0.50
		(c) 2 = User-supplied coefficients, as described in Input Line 4
Col. 30	KGX	Gamma (X/Q) control option, as follows:
		(a) 0 = Bypass this calculation (b) 1 = Include this calculation
Col. 35	KSIG	Model-selection control option for the dispersion coefficients σ_y and σ_z, as follows:
		(a) 0 = ENTECH's model with parabolic interpolation
		(b) 1 = Eimutis/Konicek model in XOQDOQ
Col. 39-40	KVORS	Sea breeze/Valley model option selection, as follows:
		(a) -1 = Valley analysis (b) 0 = Open terrain analysis (c) 1 = Sea breeze analysis
Col. 44-45	KDEPL	Depletion model control option:
		(a) -1 =Single deposition-velocity value for all stabilities and wind speeds (see Input Line 10A)
		(b) 0 = Reg. Guide 1.111 (Ref. 2, Rev. 1) depletion and deposition curves

		(c) >0 = Model in Meteorology & Atomic Energy, with KDELP = number of wind speeds in the WSDEP and VUDEP arrays in Input Lines 10B through 10X (max=12)
Col. 50	KRAIN	Wet deposition control option, as follows: (a) 0 = Do not evaluate wet deposition effects (b) 1 = Evaluate wet deposition effects
Col. 55	NWSIN	Number of wind speed groups (max 12) (see Line Set 3)
Col. 60	NEG	Number of gamma energy groups in the user- specified spectrum, if any (max 16). Set NEG = 0 if Input Line Set 9 is provided, or if KGX = 0.
Col. 61-65	INTERM	Duration of intermittent releases (hours). Leave blank for the analysis of continuous or accidental releases. Set INTERM = total number of hours (not necessarily consecutive) during which intermittent releases took place, during the entire time interval represented by the joint-frequency distribution; for multi-year runs enter the annual worst-year total.
Col. 66-70	IPCT	Hourly value exceedance probability for intermittent releases (percent). Leave blank for continuous or accidental releases. Set equal to 1, 3, 5, 10, 15, 20, 25, 30, 35, 40, 45 or 50 for intermittent releases. Defaults to 15 if not provided, or if the selected value is greater than 50. IPCT = 2 defaults to IPCT = 1, and any value greater than 3 defaults to the nearest entry in the above list.
Col. 74-75	NMONTH	Number of monthly records in the met data base which will be analyzed (maximum 240, for 20 years)
Col. 80	KTP7	Control option for transferring information to tape7 (YODA inputs) as follows (Note: Tape7 is generated only if KOPT□2): (a) 1 = Sector, distance, description/pathway, sector-average undepleted and undecayed concentration X/Q, sector-average depleted and decayed concentration X/Q, sector-average D/Q, and sector-average undecayed and undepleted gamma X/Q

(b) 2 = Sector, distance, description/pathway, plume centerline undepleted and undecayed concentration X/Q, plume centerline depleted and decayed concentration X/Q, plume centerline D/Q, and plume centerline undecayed and undepleted gamma X/Q

If not supplied, default value is KTP7=1.

Input Line Set 3 Wind speed group definition (See notes under WSLIM(2) and WSLIM(NWSIN+1))

Input Line 3A (8E103)

Col. 1-10 WSLIM(2) Upper wind speed (m/sec) in the first wind speed group. Enter here the minimum wind speed acceptable as a valid observation (m/sec), corresponding to the anemometer or wind vane starting speed, whichever is larger. Hourly observations with wind speed less than WSLIM(2) will be classified as calms with a wind speed defined by parameter WSCALM in Input Line 14) (Note: WSLIM(1) is internally defined as 0.0)

Col. 11-20 WSLIM(3) Upper wind speed (m/sec) in the second wind speed group (Note: All hourly wind speeds WS in the range WSLIM(2) $<$ WS $\leq$ WSLIM(3) will be assigned to this group)

.

.

Col. 71-80 WSLIM(9) Upper wind speed for the eighth wind speed group (may be left blank)

Input Line 3B (8E10.3) Omit this Input Line if NWSIN in Input Line 2 is less than 9.

Col. 1-10 WSLIM(10) Upper wind-speed of the ninth wind speed group

.

.

WSLIM(NWSIN + 1)
Upper wind-speed of the last wind-speed group (Note: this entry should correspond to the maximum wind-speed acceptable as a valid observation, i.e., to parameter WSMAX defined in Input Line 13, after conversion to the same units)

<u>Input Line 4</u> (8E10.3) Wind-speed extrapolation data. Include this Input Line only if KWEXP = 2 (in Input Line 2). Default values for KWEXP = 1, are shown in parentheses.

Col. 1-10	WSEXP(1)	Wind-speed extrapolation coefficient for atmospheric stability A, in the form: $$u(new) = u(old)*[h(new)/h(old)]^{WSEXP}$$ h(new) is internally set equal to 10 m for the ground-level wind speed, and to HREL (in Input Line 5) for the wind speed at the release point. WSEXP(1) defaults to 0.25 if KWEXP=1.
Col. 11-20	WSEXP(2)	Coef. for stability B (0.25)
Col. 21-30	WSEXP(3)	Coef. for stability C (0.25)
Col. 31-40	WSEXP(4)	Coef. for stability D (0.25)
Col. 41-50	WSEXP(5)	Coef. for stability E (0.50)
Col. 51-60	WSEXP(6)	Coef. for stability F (0.50)
Col. 61-70	WSEXP(7)	Coef. for stability G (0.50)

<u>Input Line 5</u> (8E10.3) Release-point data

Col. 1-10	HREL	Height of release (m above release point grade)
Col. 11-20	HBLD	Height of building adjacent to the release point (m above release-point grade)
Col. 21-30	BAREA	Cross-sectional area of building adjacent to the release point causing building wake effects (m^2)
Col. 31-40	DIAMTR	Effluent vent effective internal diameter (m). Set DIAMTR = 0 for ground-level releases (HREL = 0), or for bypassing plume rise effects in elevated releases.
Col. 41-50	VFLOW	Effluent vent flow (scfm). Set VFLOW = 0 for ground-level releases, or for bypassing plume rise effects in elevated releases. Vent flow and exit velocity (EXITV) are related as follows: $$VFLOW(scfm) = 1664.18*EXITV(m/sec)*DIAMTR(m)^2$$

Col. 51-60	QH	Stack effluent heat content (cal/sec) (if >0 only buoyant plume rise will be calculated)
Col. 61-70	CONDIA	Equivalent diameter (m) of building causing wake effects (for use in conjunction with the Murphy and Campe building wake model, as described in Sec. 4.1.10 of the technical manual) (Defaults to 0.0 if KMN $\geq$ 0 in Input Line 2)
Col. 71-80	RVUSER	Value of Rv (vent exit velocity to wind speed ratio) for the definition of plume entrainment, in lieu of the built-in Reg. Guide 1.111 model. A plume will be totally elevated (E_t = 0) if Rv $\geq$ RVUSER, and at ground level (E_t = 1) otherwise. Set RVUSER = 0 for the Reg. Guide model with partial entrainment.

<u>Input Line 6</u> (8E10.3) General site data

Col. 1-10	HINV	Annual average height of inversion layer at the selected site (m above receptor grade); defaults to 1000 m if not provided.
Col. 11-20	HFMX	Maximum allowable plume centerline height (m above receptor grade) (defaults to HINV if not provided)
Col. 21-30	THLFNG	Noble gas half-life for decay-in-transit analysis (days). Typically set equal to 2.26 days for Xe133m. Enter 0 for no decay.
Col. 31-40	THLFIO	Iodine half-life for decay-in-transit analysis (days). Typically set equal to 8 days for I131. Enter 0 for no decay.
Col. 41-50	SCAVCF(1)	User-specified coefficient for scavenging rate due to rainfall, based on the equation: $$\text{Scavenging rate (1/sec)} = \text{SCAVCF(1)} * (\text{Rainfall rate (mm/hr)})^{\text{SCAVCF(2)}}$$ Leave blank if KRAIN=0 in Input Line 2.
Col. 51-60	SCAVCF(2)	Second coefficient for the scavenging rate equation, as defined above.

<u>Input Line Set 7</u> Gamma energy spectra for the gamma X/Q's. Omit this input line set if KGX = 0, or if NEG = 0, in Input Line 2

Input Line 7A (8E10.3)

Col. 1-10	ENGIN(1)	Midpoint energy of the first group in the gamma spectrum associated with the released radioactivity (MeV)
.		
.		
Col. 71-80	ENGIN(8)	Midpoint energy of the 8th group in the spectrum (if any)

Input Line 7B (8E10.3) Omit this input line if NEG<9

Col. 1-10	ENGIN(9)	Midpoint energy of the 9th group in the gamma spectrum associated with the released radioactivity (MeV)
.		
.		
Col. ---	ENGIN(NEG)	Midpoint energy of the last group in the spectrum

Input Line Set 8 Gamma energy spectra for the gamma X/Q's. Omit this input line set if KGX = 0, or if NEG = 0 in Input Line 2. Note: ABUND(i), where i=1 to NEG, will be ignored if it is less than (1/10,000)th of the ABUND sum.

Input Line 8A (8E10.3)

Col. 1-10	ABUND(1)	Relative intensity of first group in the gamma spectrum corresponding to ENGIN (1) (in terms of MeV/sec).
.		
.		
Col. 71-80	ABUND(8)	Relative intensity of 8th group in the spectrum

Input Line 8B (8E10.3) Omit this input line if NEG<9

Col. 1-10	ABUND(9)	Relative intensity of 9th group in the gamma spectrum corresponding to ENGIN (9)
.		
.		
Col. ---	ABUND(NEG)	Relative intensity of last group in the spectrum

Input Line Set 9 Release isotopics for the gamma X/Q's. Omit this input line set if KGX = 0, or if NEG > 0 (in Input Line 2)

Input Line 9A (8E10.3)

Col. 1-10	CONC(1)	Br-83 relative concentration in the effluent vent, or relative release rate
Col. 11-20	CONC(2)	Br-84 relative concentration
Col. 21-30	CONC(3)	Br-85 relative concentration
Col. 31-40	CONC(4)	Br-88 relative concentration
Col. 41-50	CONC(5)	Kr-83m relative concentration
Col. 51-60	CONC(6)	Kr-85m relative concentration
Col. 61-70	CONC(7)	Kr-85 relative concentration
Col. 71-80	CONC(8)	Kr-87 relative concentration

Input Line 9B (8E10.3)

Col. 1-10	CONC(9)	Kr-88 relative concentration
Col. 11-20	CONC(10)	Kr-89 relative concentration
Col. 21-30	CONC(11)	Kr-90 relative concentration
Col. 31-40	CONC(12)	I-129 relative concentration
Col. 41-50	CONC(13)	I-130 relative concentration
Col. 51-60	CONC(14)	I-131 relative concentration
Col. 61-70	CONC(15)	I-132 relative concentration
Col. 71-80	CONC(16)	I-133 relative concentration

Input Line 9C (8E10.3)

Col. 1-10	CONC(17)	I-134 relative concentration
Col. 11-20	CONC(18)	I-135 relative concentration
Col. 21-30	CONC(19)	I-136 relative concentration
Col. 31-40	CONC(20)	Xe-131m relative concentration

Col. 41-50	CONC(21)	XE-133m relative concentration
Col. 51-60	CONC(22)	Xe-133 relative concentration
Col. 61-70	CONC(23)	Xe-135m relative concentration
Col. 71-80	CONC(24)	Xe-135 relative concentration

Input Line 9D

Col. 1-10	CONC(25)	Xe-137 relative concentration
Col. 11-20	CONC(26)	Xe-138 relative concentration
Col. 21-30	CONC(27)	Ar-41 relative concentration
Col. 31-40	CONC(28)	N-13 relative concentration

Input Line Set 10 — Deposition velocity/atmospheric stability correlations. Omit this input line if KDEPL=0 in Input Line 2; enter Input Line 10A if KDEPL<0; otherwise enter n input lines, where n = KDEPL, using Input Lines 10B through 10X.

Input Line 10A (8E10.3) — Omit this input line if KDEPL $\geq$ 0

Col. 1-10	DEPV	Single deposition-velocity value, for use in conjunction with all wind speeds and all atmospheric stabilities (m/sec)

Input Lines 10B - 10X — Omit these input lines if KDEPL $\leq$ 0. For KDEPL>2, AEOLUS3 applies parabolic interpolation to the WSDEP and VUDEP data provided in Input Lines 10B - 10X to compute stability and wind-speed dependent deposition velocities corresponding to the average wind speed calculated for each stability and wind speed group combination. If KDEPL = 2, the interpolation applied reduces to linear. If the (deposition velocity/wind speed) ratios are stability dependent but independent of wind speed, set KDEPL = 1, along with any value for WSDEP(1).

Input Line 10B (8E10.3) — First wind speed of interest

Col. 1-10	WSDEP(1)	Wind speed (m/sec)
Col. 11-20	VUDEP(1,1)	(Deposition velocity/wind speed) ratio for Pasquill stability A
Col. 21-30	VUDEP(1,2)	Ratio for stability B

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.

Col. 71-80 VUDEP(1,7) Ratio for stability G

Input Line 10C (8E10.3) Second wind speed of interest (if any) (See Input Line 10B for details)

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Input Line 10X (8E10.3) Last wind speed of interest, where X stands for the (KDEPL+1)'th sequential letter in the alphabet

Input Line 11 (A80) Meteorological data input format for the 9 parameters defined in Input Line 12 below

Col. 1-80 IMT Met. data input format for the 9 parameters. Example: (5X,9F5.0)

Note:

(a) Use only one set of parentheses

(b) Use only F formats; e.g., use F2.0 to read a 2-digit integer

(c) You must specify the formats for 9 parameters, even though the data base may contain less or more; read blank fields for parameters not available

(d) If the meteorological data files do not contain any decimals, then the F fields must be specified correctly. For instance, if the number 123 is the wind speed entry and corresponds to a measured wind speed of 12.3 mph., read it using the format F3.1, where the 3 is equal to the total number of digits and 1 is equal to the number of digits to the right of the decimal point; if the measured wind speed is 1.23 mph., then use the format F3.2.

Input Line 12 (11I5) Meteorological data sequence numbers in IMT (enter 0 or blank for any parameter that is not available)

Col. 5 ID(1) Sequence number of "year" in IMT

Col. 10 ID(2) Sequence number of "month"

Col. 15 ID(3) Sequence number of "day"

Col. 20	ID(4)	Sequence number of "hour"
Col. 25	ID(5)	Sequence number of "wind direction"
Col. 30	ID(6)	Sequence number of "wind speed"
Col. 35	ID(7)	Sequence number of "temperature difference"
Col. 40	ID(8)	Sequence number of "solar radiation". Defaults to 0 if KVORS ≤ 0 in Input Line 2
Col. 45	ID(9)	Sequence number of "precipitation". Defaults to 0 if KRAIN=0 in Input Line 2
Col. 49-50	KPRMET	Printout control option for the hourly met data, as follows:

(a) 0 = Do not include the hourly met data in the printout

(b) 1 = Include all hourly met data in the printout

(c) 2-24 = Print the first KPRMET entries in each month

(d) >24 = Print only every KPRMET'th entry in each month

KPRMET is not affected by the value selected for KPRINT in Input Line 2. (Recommended value is 2 or 3. Caution: Colossal output may result with KPRMET=1)

Col. 55	KPRJFD	Printout control option for the joint frequency distributions, as follows:

(a) 0 = Do not include the joint frequency distributions in the printout

(b) 1 = Include the joint frequency distributions in the printout

<u>Input Line 13</u> (8E10.3) Valid entries in the meteorological data base (same units as in the data base)

Col. 1-10	WDMAX	Maximum wind direction acceptable as a valid observation

Col. 11-20	WSMAX	Maximum wind speed acceptable as a valid observation; WSMAX defaults to [WSLIM(NWSIN)/WSCONV] if it is less than that ratio, where WSCONV in defined in Input Line 14; i.e., preference is given to the wind-speed group definitions, and all hourly observations with wind speeds in excess of WSLIM(NWSIN) (m/sec) will be excluded from the analysis.
Col. 21-30	DTMAX	Maximum temperature difference acceptable as a valid observation
Col. 31-40	SUNMAX	Maximum solar radiation acceptable as a valid observation
Col. 41-50	RAINMX	Maximum precipitation acceptable as a valid observation

<u>Input Line 14</u> (8E10.3) Met data conversion factors

Col. 1-10	WSCONV	Factor to convert input wind speed to m/sec
Col. 11-20	DTCONV	Factor to convert input temperature difference to □C.
Col. 21-30	SUNCON	Factor to convert solar radiation to cal/min-cm^2
Col. 31-40	RAINCV	Factor to convert precipitation data to mm of water
Col. 41-50	WSCALM	Wind speed (m/sec) to be assigned to calms (i.e., to all hourly wind speed observations which are less than WSLIM(2), the minimum wind speed acceptable as a valid observation, as defined in Input Line 3A). As specified in Reg. Guide 1.111, for instruments conforming with the intent of Reg. Guide 1.23, WSCALM should be set equal to 0.5*WSLIM(2); for non-conforming instruments, WSCALM should be assigned the value of 0.1 (m/sec).
Col. 51-60	WSHITE	Height of wind speed measurement (m above release-point grade), as needed for extrapolation of the wind speeds in the data base to different heights (see parameter h(old) in Input Line 4). Set WSHITE=10 m if wind speed is measured at ground level; it defaults to 10 m if the user-specified value is <10 m.
Col. 61-70	DH	Temperature sensor separation (m)
Col. 71-80	WDVAR	Number assigned to variable wind directions (all variable wind directions will be assigned to calms)

Input Line 15 (16I5)		Sea breeze data. Omit this input line if KVORS≤0.
Col. 1- 5	ISEAM1	First calendar month number in sea breeze season (e.g.: enter 5 for May)
Col. 6-10	ISEAM2	Last calendar month number in sea breeze season
Col. 14-15	ISEAH1	Sea breeze earliest daytime limit (hours) (≥0)
Col. 19-20	ISEAH2	Sea breeze latest daytime limit (hours) (≤23)
Col. 24-25	ISEASC(1)	First sea breeze downwind sector (1 for N, 2 for NNE, etc.; see input line 20 for sequence)
Col. 29-30	ISEASC(2)	Second sea breeze downwind sector (may be 0)
.		
.		
Col. 79-80	ISEASC(12)	12th sea breeze downwind sector
Input Line 16 (16I5)		Sea breeze data. Omit this input line if KVORS≤0
Col. 5	ICSBM	Highest stability index (and default value) in the sea breeze joint frequency distribution that would be acceptable as a valid condition underneath the TIBL for sea breeze analysis (e.g.: if ICSBM = 4, identified sea breeze conditions with stabilities E, F and G in the sea breeze joint-frequency distribution will automatically default to stability D). Note that AEOLUS3 does not employ the stability index in the identification of sea breeze conditions. If ICSBM ≤ 0, or if ICSBM > 7, ICSBM defaults to 4.
Col. 10	ICSBD	Default stability index below the TIBL when the TIBL elevation is below the upper delta-T sensor on the meteorological tower. If ICSBD ≤ 0, or if ICSBD > 7, ICSBD defaults to 4.
Input Line 17 (8E10.3)		Sea breeze data. Omit this input line if KVORS ≤ 0
Col. 1-10	FWSMIN	Min. wind speed for sea breeze (m/sec)
Col. 11-20	FWSMAX	Maximum wind speed for sea breeze
Col. 21-30	SUNMIN	Min. solar radiation for sea breeze (may be 0.0) (cal/min-cm^2)

Col. 31-40	HINSB	Depth of inversion layer during sea breeze conditions (m above receptor grade) (Defaults to HINV in Input Line 6 if not provided, or if it is greater than HINV)
Col. 41-50	DTHITE	Height of upper level delta-T sensor (m above release-point grade)
Col. 51-60	TBLCOF(1)	User-specified coefficient for TIBL height calculation during sea breezes, based on the equation: $\text{TIBL HT} = \text{TBLCOF(1)}*(\text{Dist}*\text{Solar Rad})^{0.5} + \text{TBLCOF(2)}$ (Max. value = HINSB)
Col. 61-70	TBLCOF(2)	Second coefficient for the TIBL-height equation given above

Input Line Set 18 — Sea breeze data. Omit these input lines if KVORS ≤ 0

Input Line 18A (8E10.3)

Col. 1-10	DSHRP(1)	Distance (m) from release point to the shoreline - N sector
Col. 11-20	DSHRP(2)	Dist. from rel. pt to shoreline - NNE
Col. 21-30	DSHRP(3)	Dist. from rel. pt to shoreline - NE
Col. 31-40	DSHRP(4)	Dist. from rel. pt to shoreline - ENE
Col. 41-50	DSHRP(5)	Dist. from rel. pt to shoreline - E
Col. 51-60	DSHRP(6)	Dist. from rel. pt to shoreline - ESE
Col. 61-70	DSHRP(7)	Dist. from rel. pt to shoreline - SE
Col. 71-80	DSHRP(8)	Dist. from rel. pt to shoreline - SSE

Input Line 18B (8E10.3)

Col. 1-10	DSHRP(9)	Distance (m) from release point to shoreline - S sector
Col. 11-20	DSHRP(10)	Dist. from rel. pt to shoreline - SSW sector
Col. 21-30	DSHRP(11)	Dist. from rel. pt to shoreline - SW

Col. 31-40	DSHRP(12)	Dist. from rel. pt to shoreline - WSW
Col. 41-50	DSHRP(13)	Dist. from rel. pt to shoreline - W
Col. 51-60	DSHRP(14)	Dist. from rel. pt to shoreline - WNW
Col. 61-70	DSHRP(15)	Dist. from rel. pt to shoreline - NW
Col. 71-80	DSHRP(16)	Dist. from rel. pt to shoreline - NNW

Input Line Set 19   Sea breeze data. Omit these input lines if KVORS ≤ 0

Input Line 19A (8E10.3)

Col. 1-10	DSHMT(1)	Distance (m) from met-tower to shoreline - N sector
Col. 11-20	DSHMT(2)	Dist. from met-tower to shore. - NNE sector
Col. 21-30	DSHMT(3)	Dist. from met-tower to shore. - NE
Col. 31-40	DSHMT(4)	Dist. from met-tower to shore. - ENE
Col. 41-50	DSHMT(5)	Dist. from met-tower to shore. - E
Col. 51-60	DSHMT(6)	Dist. from met-tower to shore. - ESE
Col. 61-70	DSHMT(7)	Dist. from met-tower to shore. - SE
Col. 71-80	DSHMT(8)	Dist. from met-tower to shore. - SSE

Input Line 19B (8E10.3)

Col. 1-10	DSHMT(9)	Distance (m) from release point to shoreline - S sector
Col. 11-20	DSHMT(10)	Dist. from met-tower to shore. - SSW sector
Col. 21-30	DSHMT(11)	Dist. from met-tower to shore. - SW
Col. 31-40	DSHMT(12)	Dist. from met-tower to shore. - WSW
Col. 41-50	DSHMT(13)	Dist. from met-tower to shore. - W
Col. 51-60	DSHMT(14)	Dist. from met-tower to shore. - WNW
Col. 61-70	DSHMT(15)	Dist. from met-tower to shore. - NW

Col. 71-80	DSHMT(16)	Dist. from met-tower to shore. - NNW

Input Line 20 (I5,5X,7E10.3)

Valley data. Omit this input line if KVORS ≥ 0

Col. 5	IDTVAL	Lowest delta-T stability for in-valley flows (e.g.; set IDTVAL = 4 if in-valley flows occur only with stabilities D, E, F and G)
Col. 11-20	WSVAL	Highest hourly wind speed beyond which in-valley flows cannot be sustained (m/sec). Defaults to the highest wind speed defined in Input Line Set 3 if not defined.

Input Line 21 (16I5) Valley data. Omit this input line if KVORS ≥ 0

Col. 5	IVALSC(1)	Valley orientation identification for the N sector. Set IVALSC(1) = 1 if the N sector is up-valley, IVALSC(1) = 2 if it is down-valley, or IVALSC(1) = 3 if it is in a cross-valley location. Entries not equal to 1 or 2 default to 3.
Col. 10	IVALSC(2)	Valley orientation ident. - NNE sector
Col. 15	IVALSC(3)	Valley orientation ident. - NE sector
Col. 20	IVALSC(4)	Valley orientation ident. - ENE sector
Col. 25	IVALSC(5)	Valley orientation ident. - E sector
Col. 30	IVALSC(6)	Valley orientation ident. - ESE sector
Col. 35	IVALSC(7)	Valley orientation ident. - SE sector
Col. 40	IVALSC(8)	Valley orientation ident. - SSE sector
Col. 45	IVALSC(9)	Valley orientation ident. - S sector
Col. 50	IVALSC(10)	Valley orientation ident. - SSW sector
Col. 55	IVALSC(11)	Valley orientation ident. - SW sector
Col. 60	IVALSC(12)	Valley orientation ident. - WSW sector
Col. 65	IVALSC(13)	Valley orientation ident. - W sector

Col. 70	IVALSC(14)	Valley orientation ident. - WNW sector
Col. 75	IVALSC(15)	Valley orientation ident. - NW sector
Col. 80	IVALSC(16)	Valley orientation ident. - NNW sector

Input Line 22 (I5,5X,7E10.3)

Time intervals for accidental releases. Omit this input line if KOPT=1 or 2 in Input Line 2. Typical time intervals of interest are 1, 2, 8, 16, 72 and 624 hrs.

Col. 5	NACCT	Number of time values at which accident X/Q's and D/Q's will be calculated (maximum 6)
Col. 11-20	ACCTIM(1)	First time value of interest (hours)
Col. 21-30	ACCTIM(2)	Second time value of interest (hours)
.		
.		
Col. ---	ACCTIM(NACCT)	Last time value of interest (hours)

Input Line 23 (20A4) Start of Receptor Data

Col. 1-80	TITL	Any alphanumeric characters to indicate the start of receptor data. The information on this input line does not appear in the printout. This input line is required whether or not there is receptor data in the input. (Note: you may omit the receptor data sets if you are only interested in the joint frequency distributions, for instance)

Input Line Set 24 Data for the first set of receptors of interest (if any). Note that each receptor set can have as many as 16 receptors, each at its own distance from the release point. However, for accidental releases, the overall site analyses will be carried out only if there is a receptor in each sector.

Input Line 24A (A1,A10)

Col. 1	ISTART	Enter a '*' in this column; it identifies the start of a new set of receptors.
Col. 2-11	RIDENT	Receptor identification, as would apply to all the receptors in this set; e.g.: 'SITE BNDRY', 'NEARST COW', '2.0 MILES'. Note that you can use only 10 characters, and that this information will appear as a heading in the

summary tables; hence, RIDENT must be unique to each receptor set. See Cols. 61-80 of Input Line 24B for receptor-specific information.

Input Line 24B (A3,1X,I1,I5,F10.3,5F8.3,2A10)

Data for first receptor in this set

Col. 1-3	ISCT	Downwind sector in which the receptor is located, left-justified; e.g.: N, WSW, SE
Col. 5	KPRT	Printout control option for this receptor, as follows: (a) 0 = Do not provide intermediate results for this receptor in the printout (b) 1 = Provide intermediate results for this receptor in the printout (such as the X/Q values for each entry in the joint frequency distribution) Defaults to 0 if KPRINT = 0 in Input Line 2.
Col. 10	IVALOC	Receptor location in the valley, as follows: (a) 0 = Open terrain analyses and off-valley receptors (b) 1 = Receptors in up-valley locations (c) 2 = Receptors in down-valley locations Note that there is no relationship between this parameter and parameter IVALSC in Input Line 21. For instance, sector E may be identified as a cross-valley sector (at the release point), but the valley may meander into this sector at some distance from the release point, in which case a receptor in the E sector may indeed be within the valley.
Col. 11-20	DIST	Straight-line distance (m) from the release point to the receptor in the specified sector (Note: For the Murphy and Campe building make model at close-in receptors, enter the distance from the surface of the building causing the wake to the receptor).
Col. 21-28	HTERN	Terrain height at the receptor of interest (meters above the release point grade) Note:

(a) In line with regulatory guidance, (Reg. Guide 1.111) select the maximum terrain height between the release point and the receptor

(b) Negative terrain heights automatically exclude the receptor from the analysis; to exclude a receptor, simply do not include it in the set of receptors of interest

Col. 29-36	RCF	Recirculation correction factor for this receptor; this information will be used only if KCF=2 in Input Line 2. Defaults to unity if not provided.
Col. 37-44	VWIDTH	Valley width at the receptor of interest (m); defaults to 0 for off-valley receptors.
Col. 45-52	VSLOPE	Valley slope (0.1 to 90 degrees) at the receptor of interest; defaults to 0 for off-valley receptors. Note: A zero slope is equivalent to a flat terrain.
Col. 53-60	VDIST	Receptor distance (m) along the valley; leave blank only for non-valley cases. Set DIST-5% $\leq$ VDIST $\leq$ DIST+5% in Input Line 24A for receptors exposed only to valley flows at all times; the X/Q's and D/Q's will be based entirely on the valley models. For other distances, the open-terrain models will be used for non-valley flows. Defaults to DIST if not provided.
Col. 61-80	DESCR	Receptor description (for general information, such as pathway). Note: to produce a tape7 file in the proper format for input to YODA, the data should consist of 3 variables, PTH(1) through PTH(3), entered as 2X,2A6,F6.4 within columns 61-80 where:

PTH(1) = pathway code 1, a description used by ATMODOS to determine the active environmental pathways

PTH(2) = pathway code 2 (same as above)

PTH(3) = occupancy correction factor for use in ATMODOS

<u>Input Lines 24C-24X</u> These input lines are similar to Input Line 24B for the other receptors of interest located in different sectors. There is no need to include sectors of no interest. If a sector is entered twice, the latest entry

will be used. You will run into problems if you misspell the sector name in Cols. 1-3.

Input Line Sets 25-Last — Data for the remaining sets of receptors, as described for the first receptor set in Input Line Set 24. There is no limit to the number of receptors in the accident mode. For continuous and intermittent releases, the software can currently handle up to a maximum of 99 receptor sets (i.e., a maximum of 99x16 individual receptors, one at each of 99 distances in each sector).

ATTACHMENT 10.1

MARKUPS

ER SECTION 1.3.2, STATE AGENCIES – IDAHO DEPARTMENT OF WATER RESOURCES

ER SECTION 3.4.6.1, PUBLIC WATER SUPPLY AND WATER RIGHTS

ER TABLE 3.4-3, ANTICIPATED PEAK PLANT WATER CONSUMPTION

ER SECTION 4.4.5, GROUND AND SURFACE WATER USE

ER SECTION 5.1.4, WATER RESOURCES

ER SECTION 7.2.2.7, OTHER IMPACTS OF PLANT OPERATION

ER SECTION 8.8, NONRADIOLOGICAL IMPACTS – WATER RESOURCES disposes of hazardous waste must obtain a hazardous waste permit from the Idaho Waste Management & Remediation Division. It is anticipated that small volumes of hazardous waste will be temporarily stored at the facility for eventual off-site disposal. The facility will generate small quantities of hazardous waste that are not expected to be greater than 1,000 kg (2,200 lbs) per month and is not planning to store these wastes in excess of 180 days (see ER Section 3.12, Waste Management). As a result, the facility will not require a hazardous waste Treatment, Storage, and Disposal Permit (40 CFR Part 262) (CFR, 2008h), but will file for a US EPA Hazardous Waste Identification Number as a Small Quantity Generator with the Idaho Department of Environmental Quality under Administrative Code 58.01.05 (IDAPA, 2008f).

The facility is committed to pollution prevention and waste minimization practices and will incorporate RCRA pollution prevention goals, as identified in 40 CFR 261 (CFR, 2008v). A Pollution Prevention Waste Minimization Plan will be developed to meet the waste minimization criteria of NCR, EPA, and state regulations. The Pollution Prevention Waste Minimization Plan will describe how the facility design procedures for operation will minimize (to the extent practicable) the generation of radioactive, mixed, hazardous, and non-hazardous solid waste.

<u>Idaho Department of Water Resources</u>

The Idaho Department of Water Resources (IDWR) is responsible for guiding, controlling, and planning the use and conservation of Idaho's water and energy resources. It is responsible for water allocation, water rights adjudication, surface water protection, and groundwater protection. IDWR also is responsible for water well permitting

The use of groundwater will be covered by a 1961 water right appropriation that will be transferred to the property for use as industrial water. The water transfer will occur concurrently with the purchase of the property by AES and will change the original water use from agriculture to industrial use. The primary point of diversion is expected to be from the existing agricultural well, Lava Well 3, near the center of Section 13, or a replacement well. The water will be assigned to other points of diversion to allow for the use of water from another well if the primary well should happen to fail. The original 1961 appropriation will decrease to approximately 1,713 m^3/d (452,500 gal/d) for industrial use and 147 m^3/d (38,800 gal/d) for seasonal irrigation use.

The predicted daily water consumption of the EREF is anticipated to be approximately 68,200 L/d (18,000 gal/d) and the peak water consumption rate is anticipated to be ~~47~~ 42 L/s (~~739~~ 664 gal/min) (i.e., equivalent to the normal and peak water usage rates given in m^3/min (gal/min) in Table 3.4-2, Anticipated Normal Plant Water Consumption, and Table 3.4-3, Anticipated Peak Plant Water Consumption. The peak water usage is developed based on the conservative assumption that all water users are operating at maximum demand simultaneously. This peak water usage is used to size the piping system and pumps. The normal annual water usage rate will be 24,870,000 L/y (6,570,000 gal/yr), which is a small fraction (i.e., about 4%) of the water appropriation value of 625,000,000 L/yr (165,000,000 gal/yr) for industrial use. Given that the normal annual water usage rate for the EREF is a small fraction of the appropriation value, momentary usages of water beyond the expected normal water usage rate is expected to be well within the water appropriation value for the EREF.

The IDWR has statutory responsibility for all water wells. A drilling permit must be obtained from the IDWR before the construction of any well greater than 5.5 m (18 ft) in depth. The drilling permit is valid for two months from the approval date for the start of construction. The well is required to be constructed by a driller currently licensed in the State of Idaho, who must maintain a copy of the drilling permit at the drilling site. Wells must also comply with Idaho's well construction standards found at IDAPA 37.03.09 (IDAPA, 2008h). AES will apply for drilling permits for a proposed water production well and for additional groundwater monitoring wells.

wells that produce an average daily usage of about 76,000 m^3/d (20,000,000 gal/d) and maximum usage of 220,000 m^3/d (58,000,000 gal/d). The City of Pocatello obtains drinking water from the ESRP and the tributary Portneuf Aquifer through a system of 21 water supply wells. These wells provide an average of 57,160 m^3/d (15,000,000 gal/d) (IDC, 2008a).

The use of groundwater by the EREF will be covered by a 1961 water right appropriation that will be transferred to the property for use as industrial water. The water transfer will occur concurrently with the purchase of the property by AES and will change the original water use from agriculture to industrial use. The primary point of diversion will be from the existing agricultural well, Lava Well 3, near the center of Section 13, or a replacement well. The water will be assigned to other points of diversion to allow for the use of water from another well if the primary well should happen to fail. The original 1961 appropriation will decrease to approximately 1,713 m^3/d (452,500 gal/d) for industrial use and 147 m^3/d (38,800 gal/d) for seasonal irrigation use. The predicted daily water consumption of the EREF is anticipated to be approximately 68.2 m^3/d (18,000 gal/d) and the peak water consumption rate is anticipated to be 47 L/s (739 gpm). 42 664 The normal annual water usage rate for the EREF will be 24,870,000 L/yr (6,570,000 gal/yr), which is a very small fraction (i.e., about 4%) of the water appropriation value of 625,000,000 L/yr (165,000,000 gal/yr) for industrial use. The peak water usage is developed based on the assumption that all water users are operating simultaneously. Furthermore, the peak water usage assumes that each water user is operating at maximum demand. This combination of assumptions is very unlikely to occur during the lifetime of the EREF. Nevertheless, the peak water usage is used to size the piping system and pumps. Given that the normal annual water usage rate for the EREF is a very small fraction of the appropriation value, momentary usages of water beyond the expected normal water usage rate are expected to be well within the water appropriation value for the EREF.

3.4.6.2 Regional Groundwater Use

The SRP Aquifer is relied upon for drinking water and irrigation throughout southeastern Idaho (Garabedian, 1992)(Lindholm, 1996). A breakdown of the water withdrawals by use from the SRP Aquifer is provided in Table 3.4-8, Total Groundwater Withdrawals from the SRP Aquifer for Irrigation, Public-Supply, and Self-Supplied Industrial Water Uses in 2000. The data in this table indicate that irrigation is the primary use, accounting for 97% of the total withdrawals in 2000 (Maupin, 2005). Public water supply accounts for 3% of the total withdrawals, and industrial uses amount to a fraction of 1% (Maupin, 2005).

At the current time, about 1.2 million ha (3 million ac) of the SRP are irrigated farmlands. About one third of the irrigation water is pumped from the SRP Aquifer and two thirds from surface water diversions (DGI, 2008). Irrigation with groundwater is possible because of high rates of water yield from the basaltic units of the SRP Aquifer.

3.4.6.3 Idaho National Laboratory

The INL is a significant user of groundwater in the general area of the proposed site. The ESRP Aquifer is the source of all the water used at INL. In 2007, the INL pumped 3.97E+06 m^3 (1.05E+09 gal) from a total of 29 production wells at 8 facilities (INL, 2008). The water uses at the INL include drinking water for employees and water for use in chemical processing, facilities operations, wastewater treatment, and environmental remediation (ATSDR, 2004).

Table 3.4-3 Anticipated Peak Facility Water Consumption (Page 1 of 2)

Peak Potable Water Consumption	No. of Fixtures	Basis		Flow Rate	
				GPM	L/s
OSB		Fixture Units	Total Fixtures		
Sinks	10	3	30		
WC	10	5	50		
Urinals	5	4	20		
Showers	10	2	20		
JC	2	3	6		
Total OSB			**126**	**45**	**2.8**
Admin					
Sinks	8	3	24		
WC	8	5	40		
Urinals	5	4	20		
JC	1	3	3		
Total Admin			**87**	**40**	**2.5**
CAB					
Sinks	5	3	12		
WC	4	5	20		
Urinals	3	4	12		
Showers	3	2	6		
JC	1	3	3		
Total CAB			**53**	**30**	**1.9**
Security Bldgs					
Sinks	3	3	9		
WC	3	5	15		
Urinals	2	4	8		
Showers	2	2	4		
JC	1	3	3		
Total Security Bldgs.			**39**	**25**	**1.6**
Gate Houses (2)					
Sinks	2	3	6		
WC	2	5	10		
Urinals	2	4	8		
JC	2	3	6		
Total Gate Houses			**30**	**20**	**1.3**
Visitor Center					
Sinks	4	3	12		
WC	3	5	15		
Urinals	2	4	8		
JC	1	3	3		
Sinks – Kitchen	1	3	3		
Dishwasher – Kitchen	1	1.5	2		
Handwash – Kitchen	1	2	2		
Total visitor Center			**45**	**27**	**1.7**
Warehouses (2)					
Sinks	4	3	12		
WC	4	5	20		
Urinals	2	4	8		
JC	2	3	6		
Total Warehouses			**46**	**27**	**1.7**

Table 3.4-3 Anticipated Peak Facility Water Consumption
(Page 2 of 2)

Peak Potable Water Consumption	No. of Fixtures	Basis		Flow Rate	
				GPM	L/s
Peak Process Water Consumption					
DI Water Make Up				75	4.7
~~Total Peak Process Water~~				~~75~~	~~4.7~~
Fire Protection (Two 680 m^3 (180,000 gal) for water tanks				375	23.7
	Total Peak Flow			~~739~~ 664	~~47~~ 42

Notes:
1. WC - Water Closet
2. JC - Janitorial Closet

The use of groundwater will be covered by a 1961 water right appropriation that will be transferred to the property for use as industrial water. The water transfer will occur concurrently with the purchase of the property by AES and will change the original water use from agriculture to industrial use. The primary point of diversion is expected to be from the existing agricultural well, Lava Well 3, near the center of Section 13, or a replacement well. The water will be assigned to other points of diversion to allow for the use of water from another well if the primary well should happen to fail. The original 1961 appropriation will decrease to approximately 1,713 m^3/d (452,500 gal/d) for industrial use and 147 m^3/d (38,800 gal/d) for seasonal irrigation use. The predicted daily water consumption of the EREF is anticipated to be approximately 68.2 m^3/d (18,000 gal/d) and the peak water consumption rate is anticipated to ~~47~~ 42 L/s (~~739~~ 664 gal/min). The normal annual water usage rate for the EREF will be 24,870,000 L/yr (6,570,000 gal/yr), which is a very small fraction (i.e., about 4%) of the water appropriation value of 625,000,000 L/yr (165,000,000 gal/yr) for industrial use. The peak water usage is developed based on the assumption that all water users are operating simultaneously. Furthermore, the peak water usage assumes that each water user is operating at maximum demand. This combination of assumptions is very unlikely to occur during the lifetime of the EREF. Nevertheless, the peak water usage is used to size the piping system and pumps. Given that the normal annual water usage rate for the EREF is a very small fraction of the appropriation value, momentary usages of water beyond the expected normal water usage rate is expected to be well within the water appropriation value for the EREF.

The closest and largest municipalities that rely on the ESRP Aquifer for drinking water are Idaho Falls in Bonneville County and Pocatello in Bannock County. Idaho Falls is upgradient of the proposed site according to regional hydrologic maps (Ackerman, 2006) and Pocatello is on the opposite side of the Snake River from the proposed EREF. Therefore, any groundwater consumption at the proposed EREF will not impact groundwater availability for these municipalities.

For both peak and normal usage rates, the needs of the proposed EREF facility should be readily met by the on-site groundwater pumping wells. The impacts to water resources on site and in the vicinity of the proposed EREF are expected to be negligible.

4.4.6 Identification of Impacted Ground and Surface Water Users

The locations of known groundwater users within a 1.6-km (1.0-mi) radius of the site boundary are shown on Figure 4.4-2, Water Wells in the Vicinity of the EREF. These locations were obtained from the Idaho Department of Water Resources (IDWR, 2008c). There are two irrigation (agricultural) wells located within the site boundaries. These wells are part of the water right appropriation described in ER Section 4.4.5, Ground and Surface Water Use. There is also one domestic well located near the southeast corner of the site. This domestic well is located approximately 1.21 km (0.75 mi) from the site boundary and is cross-gradient to the groundwater flowpath beneath the proposed facility footprint. The well is labeled as a domestic well by the IDWR, but there are no structures near the well. This domestic well is used to irrigate several crop fields. There are also three IDWR observation wells shown on Figure 4.4-2, Water Wells in the Vicinity of the EREF, approximately 3.2 km (2.0 mi) from the site boundary; two of the wells are hydrologically upgradient of the proposed EREF site and one is downgradient. The water right appropriation associated with the EREF property transfer defines the amount of water allowed for use and is less than the current irrigation appropriation. As a result, the impact of groundwater withdrawals during operation of the EREF is expected to be less than current impacts from irrigation practices.

- Estimated transportation distance from the originating site to the destination.
- Treatment and packaging procedure for radioactive wastes.
- Radiological dose equivalents for incident-free scenarios to the public and workers.
- Impacts of operating transportation vehicles on the environment (radioactive material released from a truck accident).
- Non-radioactive impacts (fatalities from traffic accidents, health effects from exposure to truck emissions).

Impacts related to the transport of radioactive material are addressed in Section 4.2.7, Radioactive Material Transportation. The radioactive materials that will be transported to and from the EREF by truck within the scope of the environmental impacts previously evaluated by the Nuclear Regulatory Commission (NRC) are determined to have a small to moderate impact on overall traffic. Because these impacts have been addressed in previous NRC environmental impact statements (NUREG-0170; NUREG-1790) (NRC, 1977a; NRC, 2005b), no additional mitigation measures are proposed (Section 5.2.2, Transportation).

5.1.3 Geology and Soils

The potential impacts to the geology and soils have been characterized in Section 4.3, Geology and Soils Impacts. Although construction activities may cause short-term increases in soil erosion and dust generation at the site, no substantive impacts will exist related to excavation activities during construction.

The operation phase of the proposed facility will not involve additional disruption of the local bedrock and therefore, is expected to have no impact on the site geology. Also, during operation of the proposed facility, BMPs will be used to manage stormwater runoff. Mitigation measures associated with these impacts are listed in Section 5.2.3, Geology and Soils.

5.1.4 Water Resources

The potential impacts to the water resources have been characterized in Section 4.4, Water Resources Impacts. No substantive impacts will exist related to the following:

- Impacts on surface water and groundwater quality
- Impacts of consumptive water uses (e.g., groundwater depletion) on other water users and adverse impacts on surface-oriented water users resulting from facility activities. The EREF water supply will be obtained from on-site groundwater supply wells. The wells could supply up to 1,713 m^3/day (452,500 gal/day) for industrial use and up to 147 m^3/day (38,800 gal/day) for seasonal irrigation under the AREVA Enrichment Services (AES) water appropriation. The predicted daily water consumption for operation of the EREF is expected
42 to be approximately 68.2 m^3/day (18,000 gal/day) and peak water requirements are expected to be ~~47~~ L/s (~~739~~ gal/min). The normal annual water usage rate will be
664 24,870,000 L/yr (6,570,000 gal/yr), which is a very small fraction (i.e., about 4%) of the water appropriation value of 625,000,000 L/yr (165,000,000 gal/yr) for industrial use. The peak water usage is developed based on the assumption that all water users are operating simultaneously. Furthermore, the peak water usage assumes that each water user is operating at maximum demand. This combination of assumptions is very unlikely to occur during the lifetime of the EREF. Nevertheless, the peak water usage is used to size the piping system and pumps. Given that the normal annual water usage rate for the EREF is a

boundary (North), is 0.0142 mSv/yr (1.42 mrem/yr). The annual dose equivalent (2000 hrs/yr) at the nearest actual off-site work location (Southwest at 4.0 km (2.5 mi)) is estimated to be <1E-12 mSv/yr (<1E-10 mrem/yr) and that to the nearest actual residence (8,766 hrs/yr) at over 8 km (5 mi) from facility structures, is less than <1E-12 mSv/yr (<1E-10 mrem/yr).

These dose equivalents due to normal operations are small fractions of the normal background radiation range of 2.0 to 3.0 mSv (200 to 300 mrem) dose equivalent that an average individual receives in the U.S., and within regulatory limits.

7.2.2.7 Other Impacts of Plant Operation

The EREF water supply will be from on-site wells. The anticipated normal water usage rate for the EREF is 68.2 m^3/d (18,000 gal/d) and the peak water usage requirement is ~~47~~ 42 L/sec (~~739~~ 664 gpm). The normal annual water usage rate will be 24,870,000 L/yr (6,570,000 gal/yr), which is a very small fraction (i.e., about 4%) of the water appropriation value of 625,000,000 L/yr (165,000,000 gal/yr) for industrial use. The appropriation for seasonal irrigation use will be 147 m^3/d (38,800 gal/d). The peak water usage is developed based on the assumption that all water users are operating simultaneously. Furthermore, the peak water usage assumes that each water user is operating at maximum demand. This combination of assumptions is very unlikely to occur during the lifetime of the EREF. Nevertheless, the peak water usage is used to size the piping system and pumps. Given that the normal annual water usage rate for the EREF is a very small fraction of the appropriation value, momentary usages of water beyond the expected normal water usage rate is expected to be well within the water appropriation value for the EREF.

Non-hazardous and non-radioactive solid waste is expected to be approximately 70,307 kg (155,000 lbs)] annually. It will be collected and disposed of off-site by a County licensed solid waste disposal contractor and disposed of in a licensed landfill that has adequate capacity to accept EREF non-hazardous waste.

The EREF is expected to generate approximately 146,500 kg (323,000 lbs) of low-level waste annually. In addition, the EREF is expected to generate approximately 5,062 kg (11,160 lbs) of hazardous wastes and 100 kg (220 lbs) of mixed waste annually. These wastes will be collected, inspected, volume-reduced, and transferred off-site to licensed low-level waste facilities.

7.2.2.8 Decommissioning

The plan for decommissioning is to decontaminate or remove all materials promptly from the site that prevent release of the facility for unrestricted use. This approach avoids the need for long-term storage and monitoring of wastes on site. Only building shells and the site infrastructure will remain. All remaining facilities, including site basins, will be decontaminated where needed to acceptable levels for unrestricted use. Excavations and berms will be leveled to restore the land to a natural contour.

Radioactive wastes will be disposed of in licensed low-level radioactive waste disposal sites. Hazardous wastes will be treated or disposed of in licensed hazardous waste facilities.

Depleted UF_6, if not already sold or otherwise disposed of prior to decommissioning, will be disposed of in accordance with regulatory requirements.

Following decommissioning, all parts of the facility and site will be unrestricted to any specific type of use.

the placement of most utility installations will be along highway easements. Therefore, the impacts to land use would be small.

Transportation Impacts

Impacts from construction and operation on transportation will include the generation of fugitive dust, changes in scenic quality, added environmental noise and small radiation dose to the public from the transport of UF_6 feed and product cylinders, as well as low-level radioactive waste.

Dust will be generated to some degree during the various stages of construction activity. The amount of dust emissions will vary according to the types of activity. AES estimated that fugitive dust emissions are expected to be below the National Ambient Air Quality Standards (CFR, 2008nn).

Impacts to visual and scenic resources from construction of the highway entrances and access roads would include the presence of construction equipment and dust. Although construction equipment would be out of character with the current uses and features of the site and the surrounding properties, road and road access construction would be relatively short-term. Additionally, construction equipment would not be tall, thereby minimizing the potential for the equipment to obstruct views, and dust suppression mitigations would be used to minimize visual impacts. Therefore, impacts to visual resources from construction of the highway entrances and access roads would be small.

Noise levels from construction of the highway entrances would be louder and of longer duration during the day than existing noise generated by traffic along U.S. Highway 20. However, these elevated noise levels would occur only during the construction of the highway entrances and a short portion of the access roads. Noise levels would be heard on adjacent properties as well, including on portions of the WSA. These areas, in general, are used for grazing and few visitors or users would likely be present on a regular basis along the WSA. Overall impacts from noise generated by construction of the highway entrances and access roads, therefore, would be small.

Water Resources

The EREF water supply will be obtained from on-site wells. The anticipated normal water usage rate for the EREF is 68.2 m^3/d (18,000 gal/d) and the peak water usage ~~requirement~~ rate is ~~4,061 m³/d (1.07 E+06 gal/d)~~ 42 L/S (664 gpm). The average annual water usage rate is 2.49 E+04 m^3/yr (6.57 E+06 gal/yr), which is below the water appropriation value of 6.25 E+05 m^3/yr (1.65 E+08 gal/yr).

Liquid effluents consists of Stormwater runoff and treated domestic sanitary sewage. The EREF design precludes operational process discharges from the plant to surface or groundwater at the site. All liquid effluents are discharged to either the Stormwater Detention Basin or the Cylinder Storage Pad Retention basins.

The Site Stormwater Detention Basin will collect stormwater runoff from areas of the facility that do not involve cylinder storage activities. These areas include parking lots, roofs, roads, and diversions from unaltered areas around the facilities. The detention basin will be unlined and designed to contain runoff for a volume equal to a 24-hour, 100-year return frequency rain storm of 5.7 cm (2.24 inch) rainfall. The design capacity of the basin, maintaining a freeboard of 0.6 m (2 ft), is approximately 32,835 m^3 (26.6 acre-ft). The basin will have approximately 49,600 m^3 (40.2 acre-ft) of storage capacity available with 0.3 m (1 ft) of freeboard for unlikely extreme events. It will also be designed to discharge post-construction peak flow runoff rates from the outfall that are equal to or less than the pre-construction runoff rates from the site area.

ATTACHMENT 10.2-1

EREF REFERENCE

Hackett, et. al., 2002

Volcanic Hazards of the Idaho National Engineering and Environmental Laboratory, Southeast Idaho

William R. Hackett,[1] Richard P. Smith,[2] and Soli Khericha[3]

ABSTRACT

Potential volcanic hazards are assessed, and hazard-zone maps are developed for the Idaho National Engineering and Environmental Laboratory (INEEL) and adjacent areas. The basis of the hazards' assessment and zonation is the past volcanic history of the INEEL region, assuming that late-Quaternary volcanism is representative of future volcanism. The most significant hazards to INEEL facilities are related to basaltic volcanism, chiefly lava flows, which move slowly and threaten property by inundation or burning. Other hazards are volcanic gases and tephra, and the ground disturbance associated with the intrusion of dikes beneath the volcanic zones. Several volcanic zones in the INEEL area contain most of the volcanic vents and fissures of the region and are the most probable sites of future INEEL volcanism.

Volcanic-recurrence estimates are given for each of the volcanic zones based on the geochronology of the lava flows and the lithologic investigations of cogenetic volcanic deposits and magma-induced deformation. Probabilities of basaltic volcanism within the INEEL volcanic zones range from 6×10^{-5} per year (16-17 Ka interval between eruptions) for the axial volcanic zone near the southern INEEL boundary and the Arco volcanic-rift zone near its western boundary to 1×10^{-5} per year (average 100-Ka interval between eruptions) for the Howe-East Butte volcanic rift zone, a geologically old and poorly defined feature of the central INEEL.

Maps identify hazard zones for basaltic lava flows, tephra and gas, and extensional deformation associated with dike intrusion. The maps are useful in land-use planning, site selection, and safety analysis. The potential effects of ground deformation, tephra, and gases are largely restricted to near-vent areas within the volcanic zones, but lava flows may travel far from their sources. The statistics of INEEL lava flow lengths and areas are used to define two lava-flow hazard zones, which are more extensive than zones for tephra, gases, and ground deformation. The zone of high lava-flow hazard is within 10 km of volcanic vents younger than 400 Ka.

A site-specific volcanic-hazard assessment for the Central Facilities Area, south-central INEEL indicates that the probability of lava inundation is 1×10^{-6} per year, if no mitigation is possible, and 4×10^{-7} per year if mitigation is attempted.

Key words: basaltic volcanism, volcanic hazards, volcanic-hazard zone maps, eastern Snake River Plain, Idaho National Engineering and Environmental Laboratory

INTRODUCTION

In this paper we discuss the characteristics, frequency, and magnitude of volcanic phenomena in the area of the Idaho National Engineering and Environmental Laboratory (INEEL). We use INEEL geologic data, together with information from analog regions such as Iceland and Hawaii, to construct hazard-zone maps for lava flows, tephra and gas, and ground deformation associated with the intrusion of basaltic dikes. Interpretation of the local

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Hackett, W.R., R.P. Smith, and Soli Khericha, 2002, Volcanic hazards of the Idaho National Engineering and Environmental Laboratory, southeast Idaho, *in* Bill Bonnichsen, C.M. White, and Michael McCurry, eds., Tectonic and Magmatic Evolution of the Snake River Plain Volcanic Province: Idaho Geological Survey Bulletin 30, p. 461-482.

geology, particularly the record of late-Quaternary volcanism, is the basis for estimating the frequency and magnitude of future INEEL volcanic events, on the premise that "the past is the key to the future." Kuntz and others (1992) and Kuntz (1992) give essential information about eastern Snake River Plain (SRP) regional geology, and recent summaries of INEEL geology include Hackett and Smith (1992) and Kuntz and others (1994). Previous volcanic-hazard assessments of the INEEL area include Kuntz (1978), Kuntz and Dalrymple (1979), and the Volcanism Working Group (1990). These assessments have been outdated by subsequent information, are insufficiently quantitative, or address only specific INEEL localities. In this paper, we give a quantitative assessment of the entire INEEL area.

Volcanic hazards have been evaluated for the INEEL because critical facilities and long-term waste-storage sites have more stringent performance requirements than residential dwellings, and because the regulations governing such facilities demand that all potentially hazardous phenomena be examined in the interests of safety. We have designed the scope and format of this assessment to accommodate future INEEL geologic information. In particular, new geochronologic data might lead to a revision of the recurrence estimates. Recurrence estimates for the INEEL volcanic zones in turn are the basis of probabilistic volcanic-hazard and volcanic-risk assessments for existing or planned INEEL facilities.

Although at times the two terms are used interchangeably, there is a difference between "hazard" and "risk" (Fournier D'Albe, 1986; Reiter, 1990). "Volcanic hazards" describe the potential for dangerous phenomena associated with volcanism. Direct hazards result from eruptions of magma onto the land surface (e.g., lava flows) or into the atmosphere (e.g., volcanic ash or gases). Indirect hazards are attributed to the events that accompany such eruptions, the secondary effects of eruptions, or the underground movement of magma that does not erupt (e.g., dike-induced tensile fissuring and faulting). "Probabilistic volcanic-hazards assessment," the focus of this paper, addresses the probabilities of specific volcanic phenomena occurring within defined source areas. In addition, we develop a site-specific probabilistic volcanic hazards assessment for the Central Facilities Area (CFA) of the south-central INEEL. Here we estimate the annual probability of inundation by lava flows at that site.

"Volcanic risk" describes the extent of losses to people, property, or environment due to occurrences of particular volcanic phenomena. A "probabilistic volcanic-risk assessment" is therefore a quantitative statement concerning the impact or consequences of particular volcanic phenomena. Although we have not addressed the consequences of lava inundation, our assessment is a necessary first step in developing probabilistic volcanic-risk assessments of INEEL facilities.

Our general approach to volcanic-hazards assessment follows Blong (1984) and Latter (1989), with additional information on lava-flow hazards from Fink (1990) and Kilburn and Luongo (1994). Observations of active volcanoes in the analog regions of Hawaii (Decker and others, 1987) and Iceland (Sigurdsson, 1980; Gudmundsson, 1987) also help with understanding the potential effects of future volcanism at the INEEL. We model our quantitative volcanic-hazards assessment after Mullineaux and others (1987) and Wright and others (1992) for the Hawaiian Islands, and our conceptual framework is also influenced by a qualitative study of Iceland (Imsland, 1989).

VOLCANIC GEOLOGY OF THE INEEL AREA

The INEEL is located near the northern margin of the eastern SRP (Figure 1), a region that underwent explosive silicic volcanism during its early development, between about 7 and 4.3 Ma (Pierce and Morgan, 1992). Younger volcanism of the past 4 Ma has largely involved the effusion of basaltic lava flows (Figure 2).

The general characteristics of volcanism in the INEEL area are summarized in Table 1. Early volcanism of the region may be related to the Yellowstone mantle plume, a proposed source of heat and magma that has passed beneath southern Idaho during the past 15 Ma, leaving the 600-km-long SRP in its wake (Pierce and Morgan, 1992; Smith and Braile, 1993). As the North American continent drifted southwestward, the mantle plume left a trail of large silicic eruptive centers that become progressively younger to the northeast and culminate in the Quaternary Yellowstone Plateau volcanic field. The main products of the early explosive eruptions were voluminous and widespread silicic ash-flow tuffs. Beneath the INEEL area, voluminous silicic ash-flow tuffs and lava flows were emplaced about 6.5 to 4.3 Ma (Morgan and others, 1984; Pierce and Morgan, 1992). The present Yellowstone plume is considered to underlie northwestern Wyoming, where it is marked by geophysically anomalous crust and upper mantle (Smith and Christiansen, 1980), by regional uplift of the Yellowstone Plateau, by voluminous silicic volcanism of the Yellowstone Plateau volcanic field during the past 2.1 Ma (Hildreth and others, 1991), and by the present-day high heat flow and geothermal features of the Yellowstone caldera.

The observed, regional space-time pattern of early silicic volcanism on the eastern SRP and the apparent

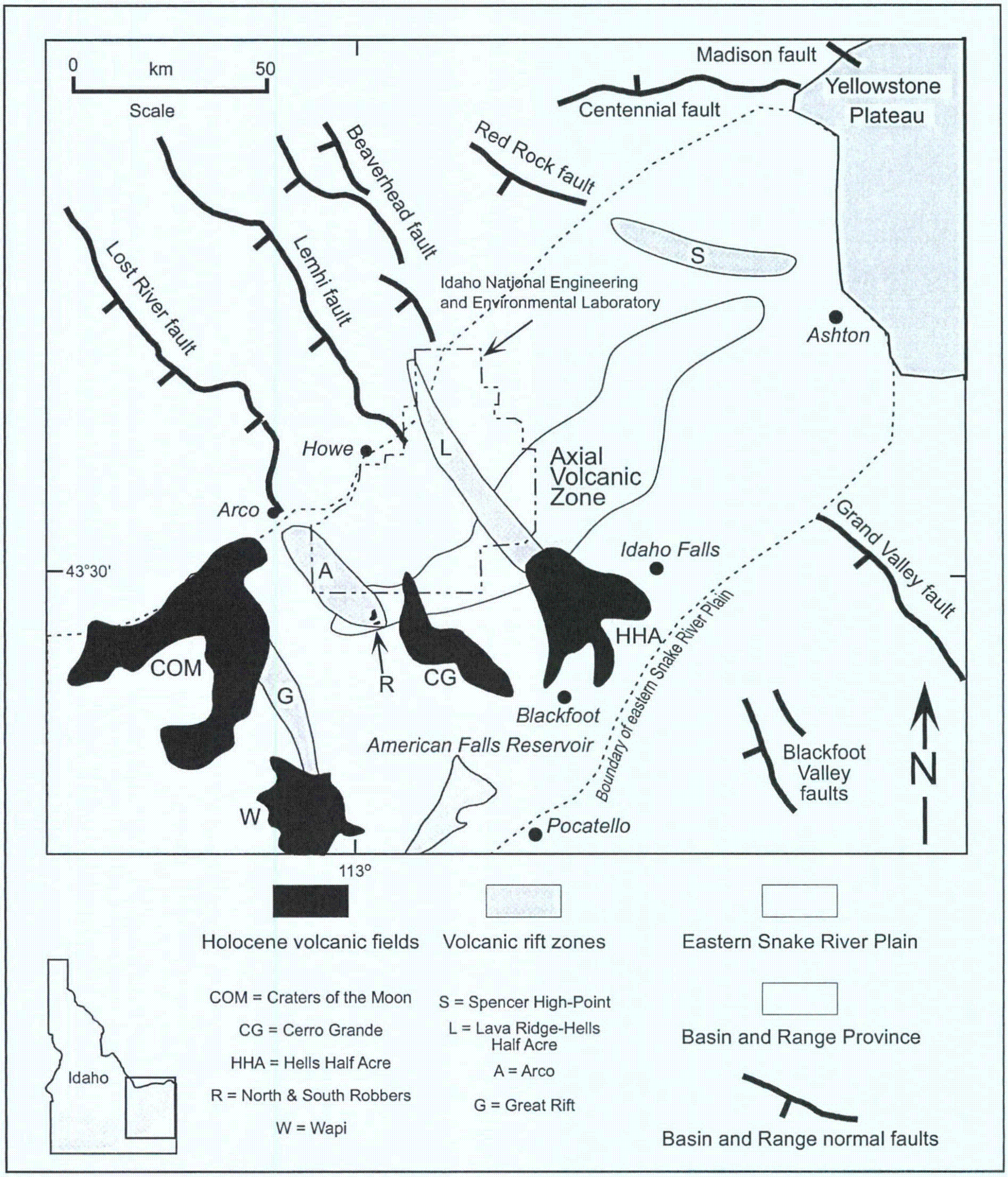

Figure 1. Index map of the eastern SRP, showing INEEL, population centers, and major volcanic and tectonic elements of the region.

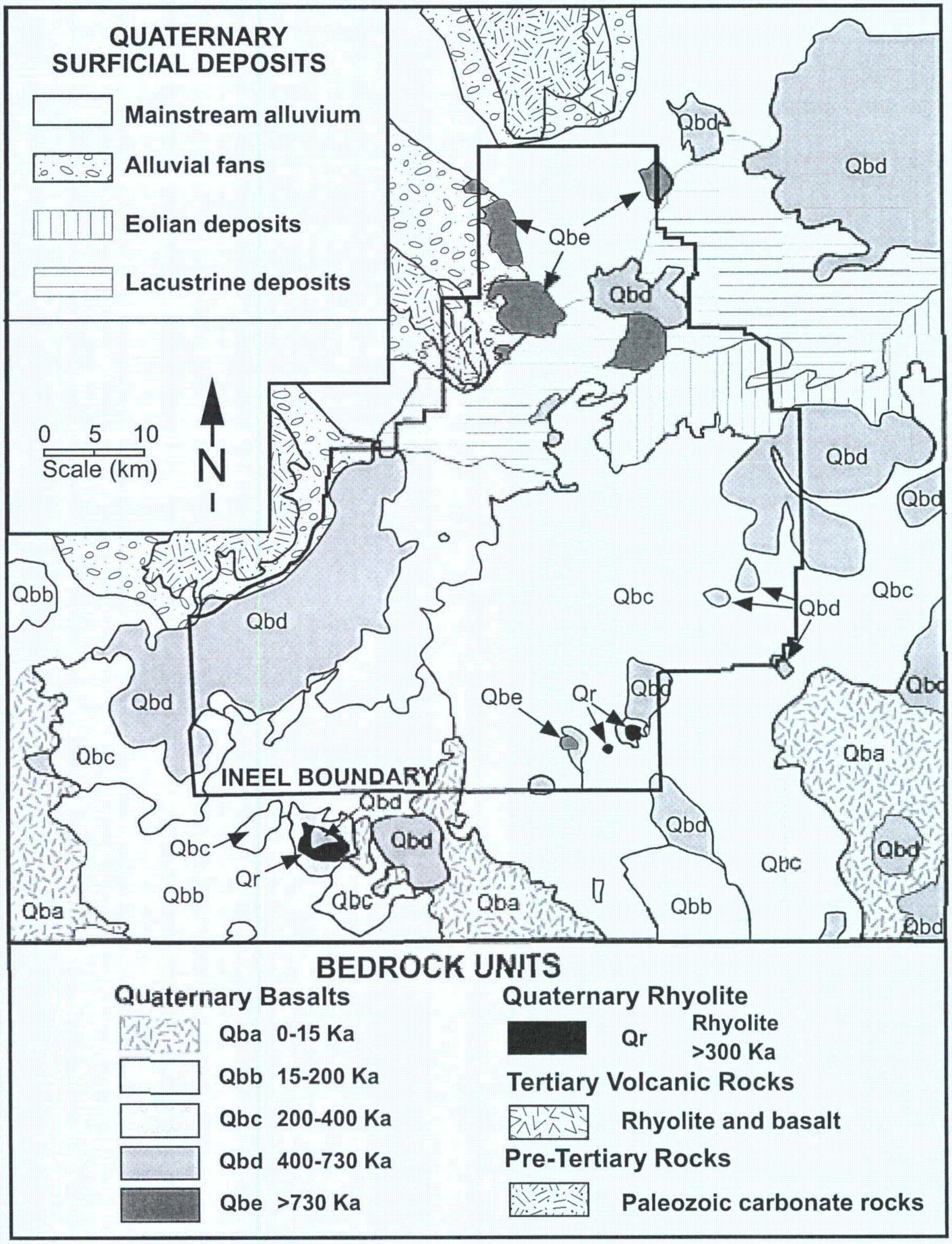

Figure 2. Generalized geologic map of the INEEL area (adapted from Kuntz and others, 1994; Scott, 1982). Quaternary basaltic lava-flow groups Qba through Qbe are based on whole-rock K-Ar (Kuntz and others, 1994) and radiocarbon dates (Kuntz and others, 1986).

Table 1. Characteristics of volcanism in the INEEL area. See Figure 1 for map distribution of volcanic zones and related features.

	Caldera Formation	Rift-Zone Volcanism	Axial-Zone Volcanism	Areas Between Volcanic Zones
Magma Types	Rhyolite (viscous and gas-rich)	Basalt (fluid and gas-poor)	Basalt and subordinate rhyolite	Basalt (and minor rhyolite?)
Volcanic Style and Products	Highly explosive; voluminous pumice and fine ash blankets entire regions	Mild and effusive; erupts mainly lava flows from fissures, low shield volcanoes, and small tephra cones	As per rift zones, but also local rhyolite domes and intrusions (Big Southern, Middle, East buttes) with local explosive phenomena	As per volcanic rift zones and axial volcanic zone
Stratigraphy	Calderas filled with as much as several km of welded, silicic ash-flow tuffs, lava flows, and volcaniclastic sediment [Heise Volcanic Group]	Piles of 1- to 30-m-thick basalt lava flows and minor inter-bedded sediment; total lava thickness as much as 1 km in INEEL area [Snake River Group]	Basaltic lava flows and dispersed small tephra cones; isolated rhyolite domes and intrusions [Snake River Group]	Fine clastic sediment of fluvial, lacustrine, and eolian origin; fewer lava flows than near volcanic rift zones [Snake River Group]
Tectonics and Physical Configuration	Collapse: broad, oval depressions, 10-100 km wide and 1-2 km deep, ringed by inward-dipping fractures	Extensional: NW-trending belts of open fissures, monoclines, small normal faults, and basaltic vents	Extensional, but magma-induced fissures or faults are rare; a diffuse, NE-trending, volcanic highland along the ESRP axis	Subsidence(?): broad, low topographic basins between extensional and constructional volcanic highlands; seldom disturbed by magma intrusion
Geologic Age in INEEL Area	6.5-4.3 Ma, now covered by younger basaltic lava [2.1-0.6 million years on Yellowstone Plateau]	Surficial INEEL basalts: 1.2-0.05 Ma, most are 0.7-0.1 Ma. Inception of major basaltic volcanism occurred about 4 Ma.	Basalt: >1 Ma (Middle Butte) to 5.4 Ka (Hell's Half Acre). Rhyolite: >1 Ma (near East Butte) to 300 Ka (Big Southern Butte)	As per volcanic rift zones
Quaternary Eruption Frequency	None in INEEL area; Quaternary calderas closest to INEEL occur on Yellowstone Plateau	Low; one eruption per 17 Ka to 100 Ka (see Table 3)	Low: one basaltic eruption per 16 Ka (see Table 3); one rhyolitic intrusion or dome every 200 Ka or longer	Very low; by definition less frequent than within rift zones; one eruption per 100 Ka or longer

northeastward migration of the early silicic volcanic centers have three implications for INEEL volcanic-hazards assessment. First, the available evidence from the Quaternary Yellowstone Plateau volcanic field suggests that major silicic eruptions were separated by about 500 Ka (annual probability less than 2×10^{-6}). Second, explosive silicic volcanism associated with plume passage in the INEEL area took place 6.5 to 4.3 Ma. Recurrence intervals during that period were approximately 700 Ka, and about six recurrence intervals have therefore elapsed since the most recent caldera-forming eruptions of the INEEL area. Third, during the past 4.3 Ma, the major centers of explosive silicic volcanism have migrated to the Yellowstone region, several hundred kilometers northeast of the INEEL. Together, these three factors imply that the INEEL is unlikely to be significantly affected by future, explosive silicic volcanism (Volcanism Working Group, 1990).

During approximately the past 4.3 Ma, the eastern SRP has been repeatedly inundated by basaltic lava flows, which today largely cover the earlier silicic deposits. Much of the 2,315-square-km tract of the INEEL is underlain by basaltic lava flows, either exposed on the present land surface or lying beneath Quaternary sediment of alluvial, eolian, and lacustrine origin (Scott, 1982; Kuntz and others, 1994). Deep boreholes on the INEEL have intersected up to 1 km of late-Tertiary and Quaternary basalt lava flows and interbedded sedimentary deposits overlying Neogene silicic tuffs (Hackett and Smith, 1992). Unlike the early silicic volcanism, no systematic eastward migration of basaltic volcanism is apparent on the SRP, and Holocene lava flows occur across the province. No eruptions have occurred on the eastern SRP during recorded history, but basaltic lava flows of the Hell's Half Acre lava field erupted near the southern INEEL boundary as recently as 5.4 Ka, and eruptions occurred as recently as 2.1 Ka along the Great Rift, 30 km southwest of the INEEL (Kuntz and others, 1986).

Isolated volcanic domes of Quaternary rhyolite also occur on the eastern SRP. The domes were emplaced between about 1.4 and 0.3 Ma along the northeast-trending, central topographic axis of the eastern SRP (Kuntz and others, 1994). They are composed of fractured, lithoidal rhyolite and are surrounded by talus, alluvial-fan deposits, and younger basaltic lava flows.

Five groups of Quaternary basaltic lava flows have been mapped in the INEEL area (Figure 2), based on geologic field relations, geochronology (whole-rock potassium-argon, radiocarbon, and paleomagnetism), degree of weathering, and thickness of sediment cover (Kuntz and others, 1994). Quaternary volcanic rocks, chiefly basaltic lava flows, are exposed over approximately 58 percent of the INEEL and the adjacent land area, and they occur in the subsurface across most of the eastern SRP. Figure 3 shows the relative areas of subaerially exposed Quaternary volcanic rocks in the INEEL region. Several aspects of Figures 2 and 3 are relevant to INEEL volcanic-hazards assessment. More than two-thirds of the subaerially exposed basaltic lava and all of the silicic lava of the INEEL land surface and adjacent areas are older than 200 Ka (Figure 3: map units Qbc, Qbd, Qbe and Qr). No Holocene vents occur on the INEEL, but Holocene basaltic lava flows (Qba) cover 12 percent of the eastern SRP in the INEEL area and have erupted from vents along the axis of the eastern SRP as recently as 5.4 Ka. A minuscule percentage of the INEEL area is occupied by silicic volcanic domes (map unit Qr), and these isolated features occur along the axis of the eastern SRP near the southern INEEL boundary. Relative to basaltic volcanism, future silicic volcanism and its related hazards are, therefore, expected to be infrequent and to affect small areas of the axial volcanic zone.

Volcanic vents are not randomly distributed on the eastern SRP but occur within several volcanic zones (Figure 1). The axial volcanic zone is a northeast-trending, constructional-volcanic highland. Volcanic vents are also abundant in the southern parts of several northwest-trending volcanic rift zones where they merge with the axial volcanic zone. Volcanic rift zones are the surface expressions of underlying dike swarms. During ascent, dikes orient themselves perpendicular to the direction of least horizontal compressive stress, and magma pressure forces overlying rocks apart, forming northwest-trending belts of extensional deformation above the dikes. The resulting structural features include tensile fissures up to a meter wide and several hundred meters long, and normal-fault scarps and monoclines up to 10 m high and several km long (Smith and others, 1989; Hackett and Smith, 1992; Kuntz and others, 1992). The volcanic rift zones are also marked by linear arrays of fissure-fed basaltic lava flows,

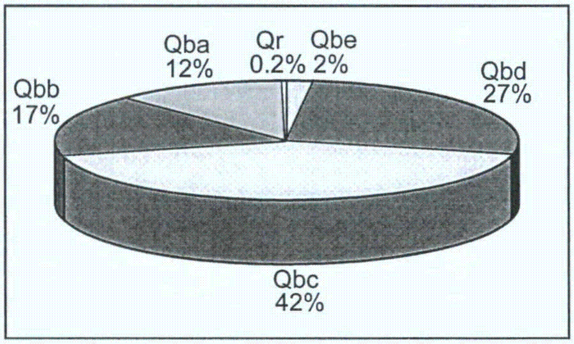

Figure 3. Relative areas of exposed Quaternary volcanic materials in the INEEL region. See Figure 2 for description of map units.

small-shield volcanoes, pyroclastic cones, and collapse craters. The volcanic and structural features of eastern SRP volcanic rift zones are generally similar to those of the Hawaiian and Icelandic rift zones. The eastern SRP volcanic rift zones are more diffuse than those of Hawaii, and their northwest trend conforms with the regional, northeast-southwest extension of the eastern SRP and the adjacent Basin and Range Province, rather than the radial pattern resulting from intrusive and gravitational forces during the growth of huge Hawaiian shield volcanoes. The axial volcanic zone of the eastern SRP has fewer dike-induced fissures and faults than the volcanic rift zones to the north, perhaps because it has a greater number of vents and has been resurfaced more frequently by lava flows. Between the INEEL volcanic rift zones are broad, low-lying basins such as the Big Lost River Sinks of the northern and central INEEL. Borehole data suggest that these basins may have received more late-Quaternary sediment and fewer lava flows than the volcanic zones (Anderson and Lewis, 1989).

The main style of Quaternary eastern SRP basaltic volcanism is Hawaiian, and eruptions typically involved mild effusions of fluid, gas-poor, pahoehoe lava flows from fissures and small shield volcanoes. Many eastern SRP basalt flows are tube fed (Greeley, 1982), as shown by the widespread collapse depressions developed along lava tubes of the region. Strombolian volcanism is marked by small pyroclastic cones on eruptive fissures, many of which occur along the axial volcanic zone. Examples include the summit-forming tephra cone of Cedar Butte and the group of small basaltic tephra cones near Atomic City to the south of the INEEL. Tuff cones and tuff rings, resulting from phreatomagmatic steam explosions during the interaction of basaltic magma with shallow ground water, do not occur in the INEEL area but are found elsewhere on the eastern SRP (Womer and others, 1982; Hackett and Morgan, 1988), probably because the INEEL water table is too deep.

INEEL VOLCANIC HAZARDS

The INEEL area has experienced predominately basaltic volcanism during the past 4.3 Ma, and phenomena associated with basaltic volcanism are, therefore, most important to INEEL hazard assessment. Table 2 outlines the principal hazards associated with eastern SRP basaltic volcanism. Effusion of pahoehoe lava flows (Self and others, 1998) is the most common late-Quaternary phenomenon and, therefore, the most significant hazard on the eastern SRP. Observations of active lava flows in Hawaii (Tilling and Peterson, 1994) indicate that basaltic lava flows on gentle terrain similar to that of the INEEL advance relatively slowly and mainly threaten property by inundation or burning.

Gas release is universally associated with fissuring and eruption, but poisonous or asphyxiating gases are generally serious hazards only within a few hundred meters of active vents. Several kilometers downwind, reactive gases may cause respiratory irritation, affect crops, and cause corrosion. Upon cooling, heavier-than-air gases (carbon dioxide, sulfur, sulfur dioxide, hydrogen fluoride, and hydrogen chloride) may collect in closed topographic depressions. Persistent winds and the broad expanse of most topographic basins on the INEEL mean that volcanic gas is unlikely to be a significant hazard, with the possible exception of the confined basin of the Big Lost River sinks and the Birch Creek sinks in the north-central INEEL (Smith, 1994).

Explosive pyroclastic volcanism and significant tephra fall are rare during mild, Hawaiian-type basaltic eruptions such as those of the eastern SRP. Tephra fallout would involve the deposition of coarse pyroclastic material within a few hundred meters of volcanic vents. Areas of tephra hazard are therefore similar in size and geometry to the areas affected by volcanic gases.

Indirect hazards associated with basaltic volcanism are ground deformation and seismicity associated with dike intrusion beneath volcanic rift zones. Surface fissuring and tumescence occur during dike intrusion with or without the eruption of magma. Tensile fissures on the eastern SRP have widths ranging from 0.1 m to about 1 m, and normal-fault scarps rarely exceed 5 m.

Small- to moderate-magnitude earthquakes also occur during dike intrusion. Most dike-induced seismic events have magnitudes less than 3, and maximum magnitudes are estimated to be less than 5.5 on the eastern SRP (Jackson, 1994; Smith and others, 1996; Hackett and others, 1996).

Future silicic lava domes may erupt along the axial volcanic zone, but the hazardous effects would probably be restricted to a several kilometer radius. Historical observations of active silicic lava domes have shown that such domes commonly produce small-volume pyroclastic flows and tephra-fall deposits as a result of internal explosions and slope failure (Fink, 1990). However, no evidence of such deposits from silicic domes near the INEEL has yet been identified through geologic mapping and borehole investigations. The shallow intrusion of silicic magma during the growth of lava domes may also lead to the uplift of large tracts of land. Middle Butte in the axial volcanic zone is a block of old (Qbe) lava flows that was presumably uplifted by a silicic lava dome that failed to breach the surface (Kuntz and Dalrymple, 1979), and the emplacement of Big Southern Butte raised

Table 2. Hazards associated with basaltic volcanism on the eastern Snake River Plain. Entries are listed from highest to lowest relative hazard.

Phenomenon	Relative Frequency	Size or Area of Influence	Comments
Lava flow	Common	0.1 km^2 to 400 km^2 in area; up to 25 km in length based on sizes of ESRP lava flows of the past 400 Ka	Significant hazard; typical basaltic phenomenon; lava from fissures or shield volcanoes may inundate large areas downslope of vents
Ground deformation: fissuring, faulting, and uplift	Common; associated with virtually all shallow magma intrusion and eruption	Fissuring could affect areas to 2 x 10 km; minor tilting and broad uplift in areas to 5 x 20 km	Significant hazard; due to shallow dike intrusion; "dry" intrusion may occur without lava flows; affects smaller areas than for lava inundation
Volcanic earthquakes	Common; associated with magma intrusion before and during eruption	Maximum M = 5.5 and most events M $\leq$ 4; ground vibration may affect facilities within 25 km	Low to moderate hazard; swarms of shallow earthquakes (< 4 km focal depth) occur as dikes propagate underground
Gas release (toxic and corrosive vapors)	Common; associated with fissuring and lava eruption	Restricted to near-vent areas; may affect several square-km area downwind	Low hazard; local plume of corrosive vapor, downwind from eruptive vent or fissure; cooled vapor may collect in local topographic depressions
Tephra fall (volcanic ash and bombs)	Common	Restricted to near-vent areas; may affect several square-km area downwind	Low hazard; basaltic eruptions are inherently nonexplosive and may form small tephra cones but little fine ash to be carried downwind
Base surge (ground-hugging blast of steam and tephra)	Rare	Effects limited to radius of several km from vent; < 10 km^2 area	Low hazard; steam explosions due to interaction between ascending magma and shallow ground water; water table too deep under most of INEEL (> 200 m)
Tephra flow (ground-hugging flow of hot, pyroclastic material)	Extremely rare	Near vent; may affect area $\leq$ 1 km^2	Very low hazard; as per tephra fall but affecting even smaller areas

a 900-m-thick block of basaltic lava flows on its northern flank (Spear and King, 1982; Fishel, 1993).

None of these volcanic phenomena can be effectively controlled, and the most successful mitigation is avoidance through careful land-use planning and site selection. Once a volcanic vent has become established, the paths of lava flows can usually be predicted using terrain analysis. In some places, lava flows can be diverted with rock-rubble barriers (Barberi and others, 1993). Diversions should be constructed well upslope of threatened facilities, in opportune topographic positions, and not at the facilities themselves. Water has been used to chill and halt advancing lava flow fronts, but this requires enormous quantities of water and energy for pumping. It is generally not feasible to engineer structures to withstand ground fracturing or faulting, or the long-term effects of corrosive gases. Tephra fall is not a significant hazard in the INEEL area, and the mitigation of roof collapse by tephra loading is therefore unwarranted.

DEFINITION, FREQUENCY, AND MAGNITUDE OF VOLCANIC EVENTS

The recurrence estimates of Table 3 are based on the number of magmatic events for each INEEL volcanic zone. A magmatic event is defined as a cogenetic assemblage of intrusive and extrusive features that are the products of a single magma batch. An event occurs within the geologically brief time it takes for a batch of basaltic magma to be injected into the shallow crust and to solidify, generally months to decades. A discrete magmatic event usually produces an assemblage of cogenetic features such as multiple vents along a common eruptive fissure, several lava flows, and a belt of dike-induced extensional structures that may form with or without eruptive products. Interpreting each lava flow, vent, or fissure as the unique product of a discrete volcanic eruption is geologically incorrect and yields inappropriately short recurrence intervals, but this procedure is useful to establish bounding conditions for volcanic recurrence. Equating each lava flow, vent, or deformation feature as the product of a single magmatic event would shorten the preferred recurrence estimates of Table 3 by factors of 1.5 to 3.

To the geologic map data of Kuntz and others (1994), we have added our own field, aerial-photographic, and petrographic investigations of selected vent areas on the axial volcanic zone and the southern Arco volcanic rift zone. We conclude that the geologic field relations as mapped at 1:100,000 scale by Kuntz and others (1994) are adequate for INEEL volcanic-hazards assessment, because the products of individual eruptions are readily distinguished at that scale. We also find that lava flows from individual shield volcanoes commonly differ from lava flows of other vents in phenocryst content, groundmass mineralogy, and texture. These differences support the idea that the clusters of small shield volcanoes, pyroclastic cones, pit craters, and other vents are generally the cogenetic products of single, compositionally uniform magma batches representing a discrete magmatic event. Most eastern SRP volcanoes are small, monogenetic features, as shown by the field relations and by the overall petrographic uniformity among lava flows from the individual shield volcanoes and vent complexes. In the southern Arco volcanic rift zone, the petrographic similarities and field relations among several of the shield volcanoes suggest that in places several shield volcanoes may be the cogenetic products of a single magma batch. In several places, tensile fissures could not be related to cogenetic volcanic materials and were conservatively interpreted as the products of one noneruptive dike-intrusion event.

Cedar Butte, a large central volcano of the axial volcanic zone (Figure 4; Hayden, 1992), is an exception to the typically monogenetic volcanism of the INEEL area. At this polygenetic eruptive center, several eruption cycles have produced diverse lava compositions, ranging from basalt to rhyolite, and pyroclastic as well as effusive volcanic materials, suggesting a complex magma system that evolved either by protracted differentiation of a single batch of parental magma or by magma-reservoir replenishment.

Geologic and geophysical observations during historical rift-zone volcanism in Hawaii and Iceland show that dike intrusion, ground deformation, and lava effusion are cogenetic phenomena that develop during geologically brief eruptive periods of several weeks to a decade or so (Hackett and others, 1996). The inference that multiple lava flows and vents on the eastern SRP formed during geologically brief periods is further supported by paleomagnetic data from drill cores of INEEL lava flows (Champion and others, 1988) and by radiocarbon dates from Holocene lava flows in Craters of the Moon lava field (Kuntz and others, 1986; 1988).

RECURRENCE ESTIMATES

The recurrence estimates for INEEL volcanic zones and boreholes given in Table 3 are based chiefly on the geochronology and geologic map data of Kuntz and others (1994), and are derived by dividing the number of volcanic events into the age range of volcanism. Estimates have been rounded off to avoid implying undue precision and are expressed as frequencies of eruption and as annual probabilities of occurrence. Eruptive periods are separated by an average of about 2 Ka for some parts of the Great Rift, giving a recurrence of 5×10^{-4} per year. Future eruptions of the Great Rift would have little or no impact upon the INEEL, but these data are included because this volcanic rift zone is thoroughly studied and has been frequently active during the past 15 Ka. Its 2-Ka recurrence interval serves as a bounding value of shortest recurrence for the eastern SRP region.

Northwest-trending volcanic rift zones of the INEEL area merge with the axial volcanic zone (Figure 1). The shortest recurrence intervals (greatest annual probabilities of eruption) for INEEL volcanic zones are approximately 16 Ka (6×10^{-5} per year) for the axial volcanic zone and the Arco volcanic rift zone. The axial volcanic zone has the greatest number of volcanic vents of the INEEL volcanic zones and includes four Holocene lava fields. It is a constructional volcanic highland along the axis of the eastern SRP, apparently resulting from a greater magma supply at the center of the volcanic province. The axial volcanic zone includes relatively few dike-induced extensional structures in comparison with the volcanic rift zones. The Arco volcanic rift zone contains more vents than other volcanic rift zones of the INEEL area, and also the greatest number of dike-induced fissures and faults. Together, the Arco and axial volcanic zones account for more than two-thirds of the vents and dike-induced structures of the INEEL area.

Table 3. Estimated volcanic-recurrence intervals and corresponding annual eruption probabilities (in parentheses) for volcanic zones and boreholes of the INEEL area.

Volcanic Zone or Borehole	**Data Sources**	**Time Interval of Volcanism**	**Number of Vents, Fissures, or Flow Groups**	**Comments**	**Estimated Recurrence Interval**
Great Rift (25 km southwest of INEEL)	Kuntz and others, 1986, 1988	2.1–15 Ka (radiocarbon dating)	>100 vents; 8 Holocene eruptive periods (each lasting a few decades or centuries, and each including multiple flows and cones)	No impact on INEEL; most recently and frequently active of all ESRP rift zones; thus provides minimum recurrence for entire ESRP; most probable area of future ESRP volcanism	2 Ka (5×10^{-4}/year)
Axial Volcanic Zone (southern INEEL)	Kuntz and others, 1986, 1994	5–730 Ka (K-Ar dating, radiocarbon, paleomagnetic data)	73 vents and fissure sets; 4 Holocene lava fields, 3 of them shared by volcanic rift zones. 45 cogenetic vent and fissure groups	Could affect much of southern INEEL; most recently and frequently active of all volcanic zones that could impact INEEL	16 Ka (6.2×10^{-5}/year)
Arco Volcanic Rift Zone (southwestern INEEL)	Kuntz, 1978; Smith and others, 1989; Kuntz and others, 1994	10–600 Ka (radiocarbon, K-Ar and thermoluminescence dating, paleomagnetic data)	83 vents and fissure sets; 2 Holocene lava fields. 35 cogenetic vent and fissure groups	Volcanism could affect southwestern INEEL	17 Ka (5.9×10^{-5}/year)
Lava Ridge-Hell's Half Acre Volcanic Rift Zone (includes Circular Butte/Kettle Butte volcanic rift zone) (north and eastern INEEL)	Kuntz and others, 1986, 1994	5 Ka–1.2 Ma (K-Ar dating, radiocarbon, paleomagnetic data)	48 vents and fissure sets; 1 Holocene lava field: Hell's Half Acre. 30 cogenetic vent and fissure groups	Could affect northern and eastern INEEL; extremely long eruptive history; includes oldest and youngest basalts in the INEEL area	40 Ka (2.5×10^{-5}/year)
Howe-East Butte Volcanic Rift Zone (central INEEL)	Kuntz, 1978, 1992; Golder Associates, 1992	230–730 Ka (K-Ar dating; paleomagnetic data)	7 vents and fissure sets; no Holocene features. 5 cogenetic vent and fissure groups	Old, poorly exposed, and sediment-covered; identified in part by subsurface geophysical anomalies	100 Ka (1.0×10^{-5}/year)
Borehole NPR SITE E (south-central INEEL)	Champion and others, 1988	230–640 Ka (K-Ar dating; paleomagnetic data)	9 lava-flow groups (each group contains multiple lava flows, erupted over a short time)	Dates from 600-foot interval of subsurface lavas give recurrence estimate consistent with surficial geology of the area	45 Ka (2.2×10^{-5}/year)
Borehole RWMC 77-1 (southwestern INEEL)	Kuntz, 1978; Anderson and Lewis, 1989	100–565 Ka (K-Ar and TL dating; paleomagnetic data)	11 lava-flow groups (each group contains multiple lava flows, erupted over a short time)	Dates from 600-foot interval of subsurface lavas give longer recurrence interval than nearby Arco and Axial zones, reflecting flow-group (subsurface) vs. vent-counting (surface geology) methods.	45 Ka (2.2×10^{-5}/year)

[1] 16 vent/fissure groups in overlap zone of Axial Volcanic Zone and Arco Volcanic Rift Zone are divided between the two zones. 17 vent/fissure groups in overlap zone of Axial Volcanic Zone and Lava Ridge-Hell's Half Acre Volcanic Rift Zone are divided between the two zones.

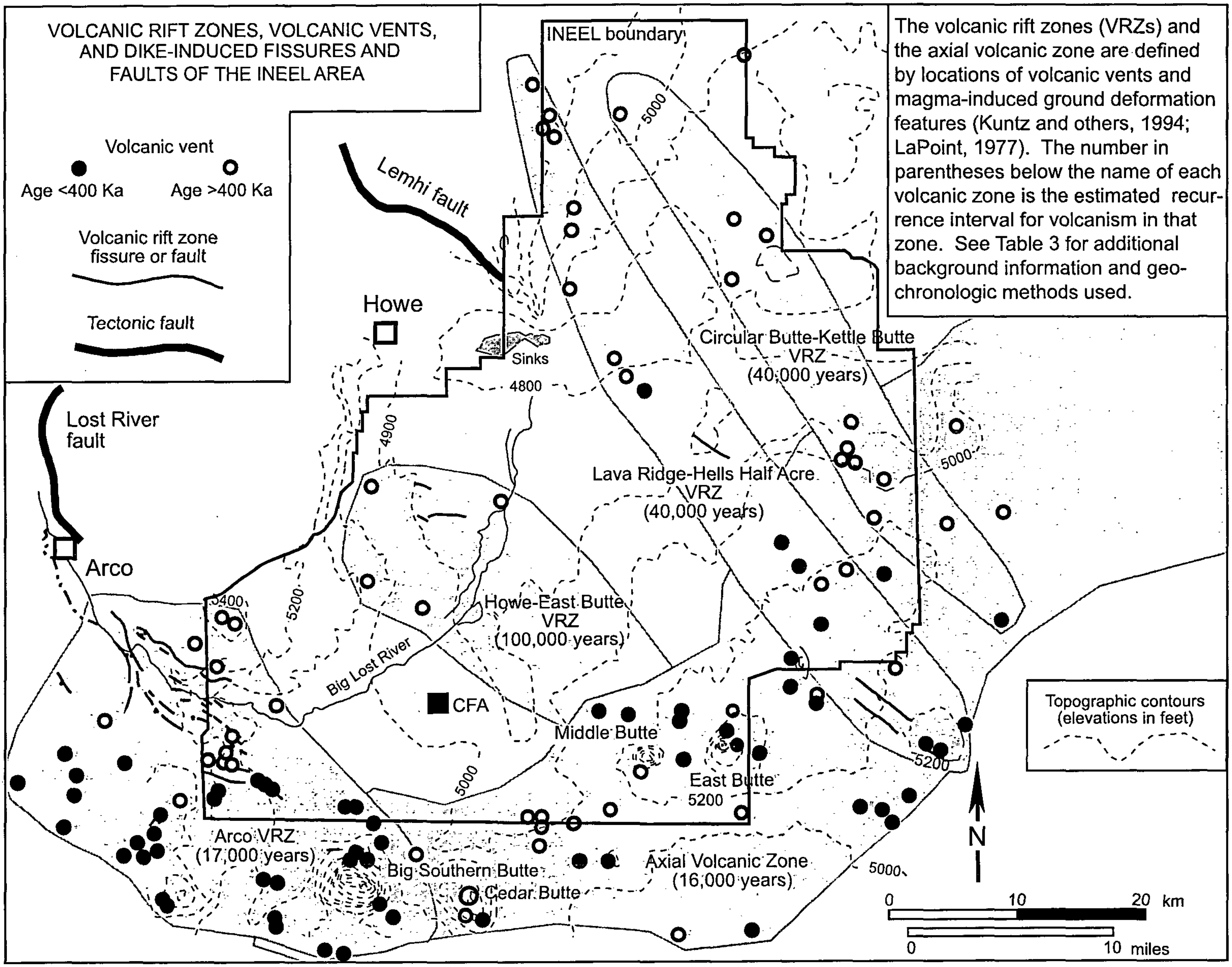

Figure 4. Map of the INEEL area, showing volcanic-vent locations and estimated recurrence intervals for the volcanic zones (gray-filled regions). Filled square shows the location of the Central Facilities Area.

We have combined the Circular Butte-Kettle Butte volcanic rift zone of Kuntz and others (1992) and the Lava Ridge-Hell's Half Acre volcanic rift zone into a single entity. They are diffuse, adjacent features with similar physiographic characteristics, periods of eruptions, and recurrence. Although the number of vents is similar to the Arco volcanic rift zone, the 40-Ka recurrence estimate for the Lava Ridge-Hell's Half Acre volcanic rift zone is longer because the lava flows of its northern part erupted about 1.2 Ma and are among the oldest known from INEEL surface outcrops.

The Howe-East Butte volcanic rift zone, included in Table 3, is identified by Kuntz and others (1992) but is poorly expressed in the INEEL surficial geology. In its northern part, this volcanic rift zone has a few vents and fissures developed in lava flows older than about 400 Ka. In contrast to other eastern SRP volcanic rift zones, its central part is not a topographic highland but a basin containing Big Lost River sediment and younger lava flows from other volcanic zones. The Howe-East Butte volcanic rift zone is marked by a large, northwest-trending, positive aeromagnetic anomaly (Zietz and others, 1978), which may represent a subsurface dike swarm. We therefore interpret the feature as an old volcanic rift zone now largely covered by younger volcanic and sedimentary deposits. Although all Howe-East Butte volcanic vents are older than 400 Ka (Kuntz and others, 1994), the time interval of 230-730 Ka given in Table 3 allows for fissuring and volcanism as young as 230 Ka. This is because the Howe-East Butte volcanic rift zone merges with the axial volcanic zone to the south, and 230 Ka is the age of young vents in this area of the axial volcanic zone. Nonetheless, the 100-Ka estimated recurrence for the Howe-East Butte volcanic rift zone is the longest of any INEEL volcanic zone.

Expansion of the time intervals of volcanism to the present (zero Ma) would be a valid consideration for the INEEL volcanic zones, because hazard assessments are necessarily concerned with the potential effects of future volcanism. This would not substantially change the recurrence estimates for the INEEL volcanic zones because most of them, except the Howe-East Butte volcanic rift zone, include lava flows younger than about 12 Ka.

The northern parts of the Arco- and the Lava Ridge-Hell's Half Acre volcanic rift zones contain fewer and older volcanic vents than their southern parts near the axial volcanic zone, and volcanic recurrence within these rift zones decreases northward. The recurrence estimates reported for the Arco- and for the Lava Ridge-Hell's Half Acre volcanic rift zones represent average values.

Borehole data are shown in Table 3 for comparison with the surface volcanic zones. Borehole recurrence estimates generally conform with those based upon surface geology, although different methods are used. For example, in the NPR Site E borehole, nine basaltic lava-flow groups are separated by sedimentary interbeds. Paleomagnetic data indicate that the lava-flow groups were emplaced within relatively brief periods of centuries to a few millennia, during the 400-Ka-dated interval of the borehole. Each lava-flow group may, therefore, be interpreted as the product of one or a few closely spaced magmatic events, perhaps representing the lava flows from several coalesced shield volcanoes. Nine eruption cycles (lava-flow groups) per 400 Ka gives the 45-Ka recurrence estimate for this borehole. A more detailed dimensional analysis of late Quaternary lava-flow groups in INEEL boreholes is used by Wetmore and others (1997) to derive an INEEL borehole-based recurrence interval of about 19 Ka (5.3×10^{-5} per year).

EVENT MAGNITUDE

To constrain event magnitude and to provide a quantitative basis for establishing INEEL lava-flow hazard zones, we used the map data of Kuntz and others (1994) to measure the lengths and areas of basaltic lava flows from the four youngest Quaternary basaltic lava-flow groups, representing volcanism of the past 750 Ka. Only flows with dimensions not obscured by younger deposits were measured, and a statistical compilation is given in Table 4.

No subaerially exposed lava flow of the INEEL area has traveled farther than about 30 km from its source. The 50th-percentile flow length is 10 km, and the length distribution is strongly skewed toward short flows. The average INEEL lava flow of the past 750 Ka covered about

Table 4. Statistical summary of late Quaternary INEEL basaltic lava-flow lengths and areas. Lava flows were measured from the geologic-map data of Kuntz and others (1994) and LaPoint (1977).

	Length (km)	Area (km^2)
Minimum	0.1	0.5
Maximum	31	400
Range	30.9	399.5
Mean	12.4	96.5
Median	10	70
Standard Deviation	7.9	94.2
Number of Flows	46	43

96 square km. Most of the flows are equant, reflecting a tendency to spread laterally on the gently sloping, low-relief terrain.

The magnitude of dike-induced ground deformation is defined as the surface area disturbed by extensional faults and fissures associated with the shallow intrusion of a basaltic dike. Hackett and others (1996) and Smith and others (1996) compile the results of numerical modeling, physical modeling, field observations of deformation during active dike intrusion in Hawaii and Iceland, and field measurements of magma-induced extensional features on the eastern SRP. They show that deformation is largely restricted to narrow belts above intruded basaltic dikes, generally less than 1 km wide and 5 km long (total area of 5 square km), and that the cumulative fault displacement or tensile fracturing associated with intrusion of one several-meter-thick basaltic dike is less than a few meters.

Although coarse pyroclastic material is produced at the onset of nearly all eastern SRP basaltic eruptions, most such material is deposited less than a few hundred meters from vents along a common eruptive fissure up to several kilometers in length. Tephra cones of the Craters of the Moon lava field to the southwest of the INEEL are among the most imposing volcanic features on the eastern SRP. Many are composed of evolved lava having a silica content greater than 50 percent, are about 100 m high, and cover an area of about 1 square km (Kuntz and others, 1988). During an unusual phreatomagmatic event on the eastern SRP, southwest winds deposited several centimeters of basaltic ash up to 1.5 km downwind from the eruptive fissure at the Holocene King's Bowl lava field (Greeley and King, 1977; Kuntz and others, 1988). More representative of the INEEL area are six small basaltic tephra cones, each less than 20 m high and 200 m in diameter, within a 15-square-km area of the axial volcanic zone near Atomic City and the southern INEEL boundary (Kuntz and others, 1992, 1994). Thus, for typical eastern SRP basaltic eruptions, significant effects of tephra fall and toxic or corrosive gases will be limited to areas within 500 m of vents.

Volcanic gas may also be liberated from both eruptive and noneruptive fissures during shallow dike intrusion and would likely be carried northeasterly by prevailing eastern SRP winds. As with ground deformation, the area affected by tephra and gas is anticipated to be a narrow, northwest-trending belt of about 5 square km, developed above and to the northeast of an ascending basaltic dike. Thus, for dike-induced deformation and for tephra and gas, the affected areas are estimated to be about one-twentieth of the area inundated by the average INEEL lava flow.

INEEL HAZARD-ZONE MAPS

Volcanic-hazard zones are founded on the assumption that future eruptions will be similar in style, magnitude and location to those of the recent geologic past, as reconstructed from the INEEL geologic record. The quantitative approach used here incorporates several primary and secondary criteria, including (1) the location and density (number per unit area) of dike-induced fissures and most recent lava flows; (2) volcanic recurrence, estimated from event counts within each of the INEEL volcanic zones and the absolute chronology of the volcanic materials (Figure 4); and (3) distance from volcanic vents or zones, relative to median lava-flow length. Additional criteria include the topographic gradients and barriers that could affect the paths of lava flows or collect volcanic gas, and the prevailing wind directions that would affect the dispersal of gas and fine tephra.

Volcanic-hazard zonation maps are shown for lava flows (Figure 5), tephra fall and volcanic gases (Figure 6), and ground deformation associated with basaltic-dike intrusion (Figure 7). The hazard zone maps show areas in which the level of hazard differs from that of adjacent areas. The level of hazard may vary considerably within a zone, either gradually or abruptly. Direct volcanic hazards (lava flows, tephra, and gases) decrease gradually across zones and away from vents, but abrupt changes may occur along sharp topographic features. The degree of hazard changes gradually rather than abruptly across most zone boundaries, and zones would be most accurately rendered by contours or gradational changes in shading rather than as sharp lines. The zone boundaries are intended to show that differences in hazard exist and to facilitate description of the zones. In spite of these limitations, the hazard zone maps and associated volcanic-recurrence data are useful for land-use planning, site selection, safety analysis, and long-range mitigation planning for volcanic hazards.

LAVA-FLOW HAZARD ZONES

The length statistics of late-Quaternary basaltic lava flows (Table 4) are used to delineate hazard zones for lava inundation from vents within the INEEL volcanic zones (Figure 5). Hazard zone 1 (highest hazard) for lava flows is defined as being within 10 km of a vent or fissure younger than 400 Ka (map units Qba, Qbb, Qbc; Kuntz and others, 1994). Ten km is the median or 50th-percentile length of late Quaternary lava flows (Table 4), meaning that random sites within zone 1 are statistically expected to be inundated by about 50 percent of lava flows that may erupt from nearby sources. The general probability of inundation at the outer limit of zone 1 is, therefore, less than or equal to half the annual eruption probability for its adjacent source volcanic zone, ignoring topographic and other site-specific factors. Later, we give a detailed hazard analysis that incorporates these factors for a specific INEEL site. Hazard zone 2 is an area of lower hazard, defined as being within 20 km (the 80th-percentile lava-flow length) of a vent or fissure younger than 400 Ka. Thus, on a statistical basis, less than 20 percent of erupted lava flows are expected to reach the outer limits of hazard zone 2. Areas beyond hazard zone 2 should be inundated by fewer than 20 percent of future lava flows and have probabilities of inundation that are generally about an order of magnitude smaller than the recurrence values for nearby volcanic zones.

The lava-flow hazard zones are truncated in the northern and western INEEL, owing to the topographic effects of mountain ranges near the northwestern INEEL boundary, to the south-sloping alluvial surfaces issuing from intermontane valleys, and to the Big Lost River channel of the central INEEL. Areas outside zone 2 are sufficiently distant or upslope from the volcanic zones to be considered low-hazard areas, beyond the range of most lava flows.

TEPHRA-FALL AND VOLCANIC-GAS HAZARD ZONE

Tephra fall and gas emission are expected to accompany all volcanic eruptions, and gas emission from fissures would accompany dike intrusion even in the absence of lava eruption; our estimated recurrence for tephra and gas emission is therefore the same as for lava flows and dike-induced deformation (Table 3). Tephra deposits, however, constitute a very small part of the total volume of basalt on the eastern SRP (Kuntz and others, 1992) and as discussed earlier, the areas affected by tephra fall are much smaller than the areas inundated by affiliated lava flows. We indicate tephra and gas-hazard zones (Figure 6) within areas 0.5 km southwest and 2 km northeast of vents and fissures younger than 400 Ka within the INEEL volcanic zones. We estimate hazard zones for tephra and gases from future silicic lava-dome eruptions along the center of the axial volcanic zone to be about twice these dimensions (5-km radius). This estimate also includes pyroclastic-flow hazard due to the slope failure and explosions that are typical of silicic lava domes (Blong, 1984; Williams and McBirney, 1979). A separate zone for silicic tephra and gases is not shown within the axial volcanic zone but exists as part of the basaltic-tephra hazard zone for that area. An area of volcanic-gas hazard is indicated in the north-central INEEL, near Test Area North (TAN), within a topographic depression that could trap dense volcanic gas.

GROUND-DEFORMATION HAZARD ZONE

The widespread occurrence of fissure-erupted lava flows and the magma-induced extensional structures of eastern SRP volcanic rift zones indicate that most basaltic eruptions on the eastern SRP were fed by northwest-trending dikes. Ground deformation is expected to accompany all shallow dike-intrusion events, with or without volcanic eruption. The recurrence of ground-deformation phenomena is, therefore, considered equal to or greater than lava-flow recurrence within the INEEL volcanic zones (Table 3). As discussed earlier, the severity of vertical offset and ground fissuring will vary according to the number of dikes and their aggregate thickness, but will generally not exceed 1-2 m of vertical offset or horizontal extension within a few hundred meters of the intruding basaltic dike. The hazardous areas are therefore restricted to the volcanic zones and are substantially smaller than the hazard zones for lava inundation. We define areas within 1 km of Qb a, b, or c (post-400-Ka) vents, and all areas with magma-induced fissures and faults as constituting the zone of ground-deformation hazard (Figure 7). The Arco volcanic rift zone includes many such deformation features associated with fissure-fed lava flows and small pyroclastic cones, indicating repeated dike intrusions in the area. Some of the fissures of the northern Arco volcanic rift zone maybe of tectonic origin and related to the Lost River fault. For purposes of analyzing volcanic hazards, we take a conservative approach by assuming all of these fissures to have been induced by magma. Although generally lacking ground-deformation features, much of the axial volcanic zone is also included as part of the ground-deformation hazard zone, because it can reasonably be inferred that fissures formed but were covered by cogenetic lava flows from the many vents in the area.

Magma-induced fissures and faults of the INEEL area have not been dated, but the ages of host volcanic rocks serve to limit the maximum ages of fissures. We have conservatively assumed that magma-induced fissures without a clear cogenetic relationship to mapped volcanic materials are equivalent in age to a younger lava-flow group than the host rocks. For example, most dike-induced faults and fissures of the northern Arco volcanic rift zone are developed in lava flows older than 400 Ka, but some could have formed during the past 400 Ka and are therefore included as young vents in defining lava-flow hazard zone 1. The isolated fissures mapped near the Naval Reactors Facility (NRF) by Golder Associates (1992) occupy the northern part of the poorly defined Howe-East Butte volcanic rift zone, trend east-west, have no clear relationship to volcanic materials of the area,

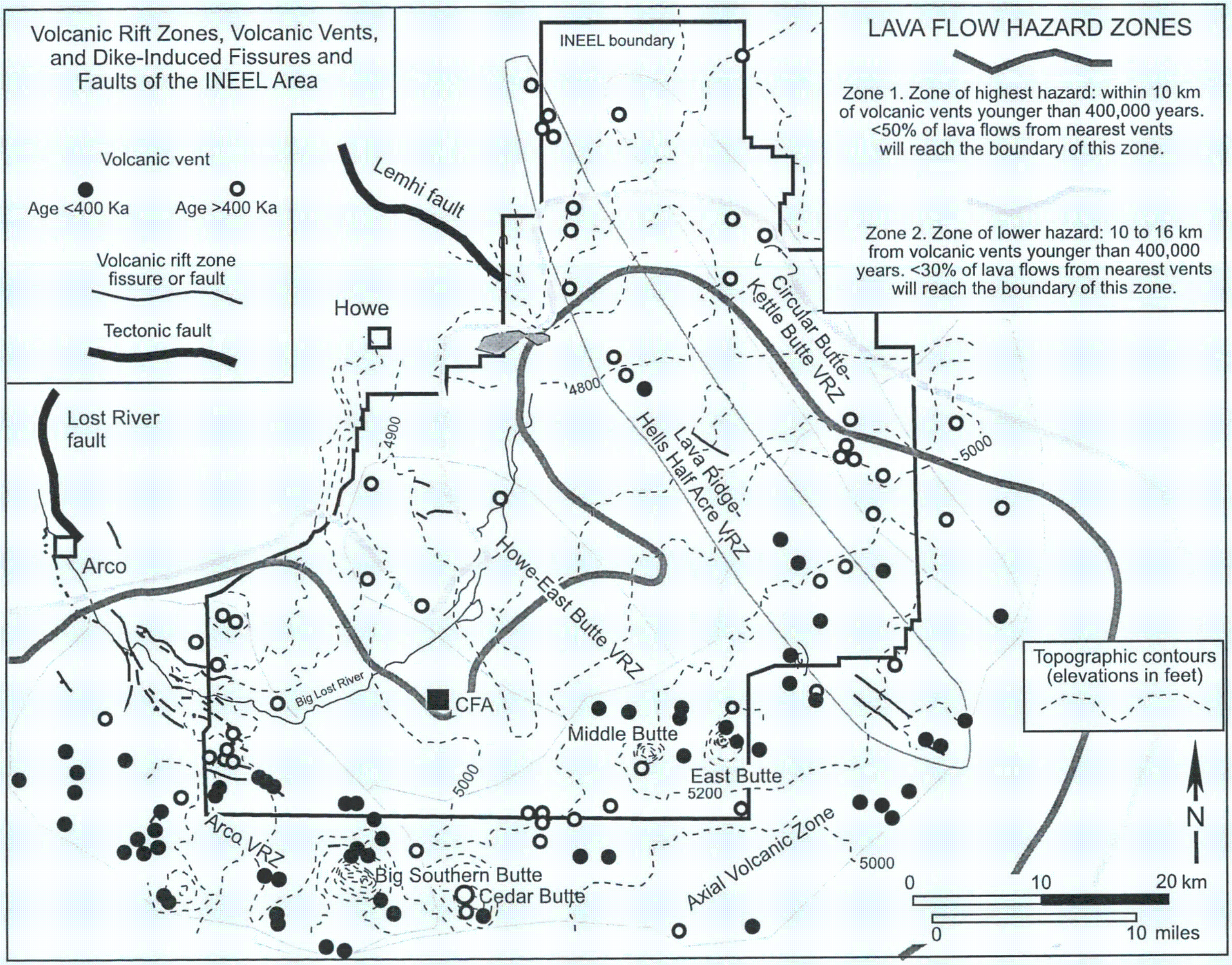

Figure 5. Lava flow hazard-zone map of the INEEL area. Filled square shows the location of the Central Facilities Area.

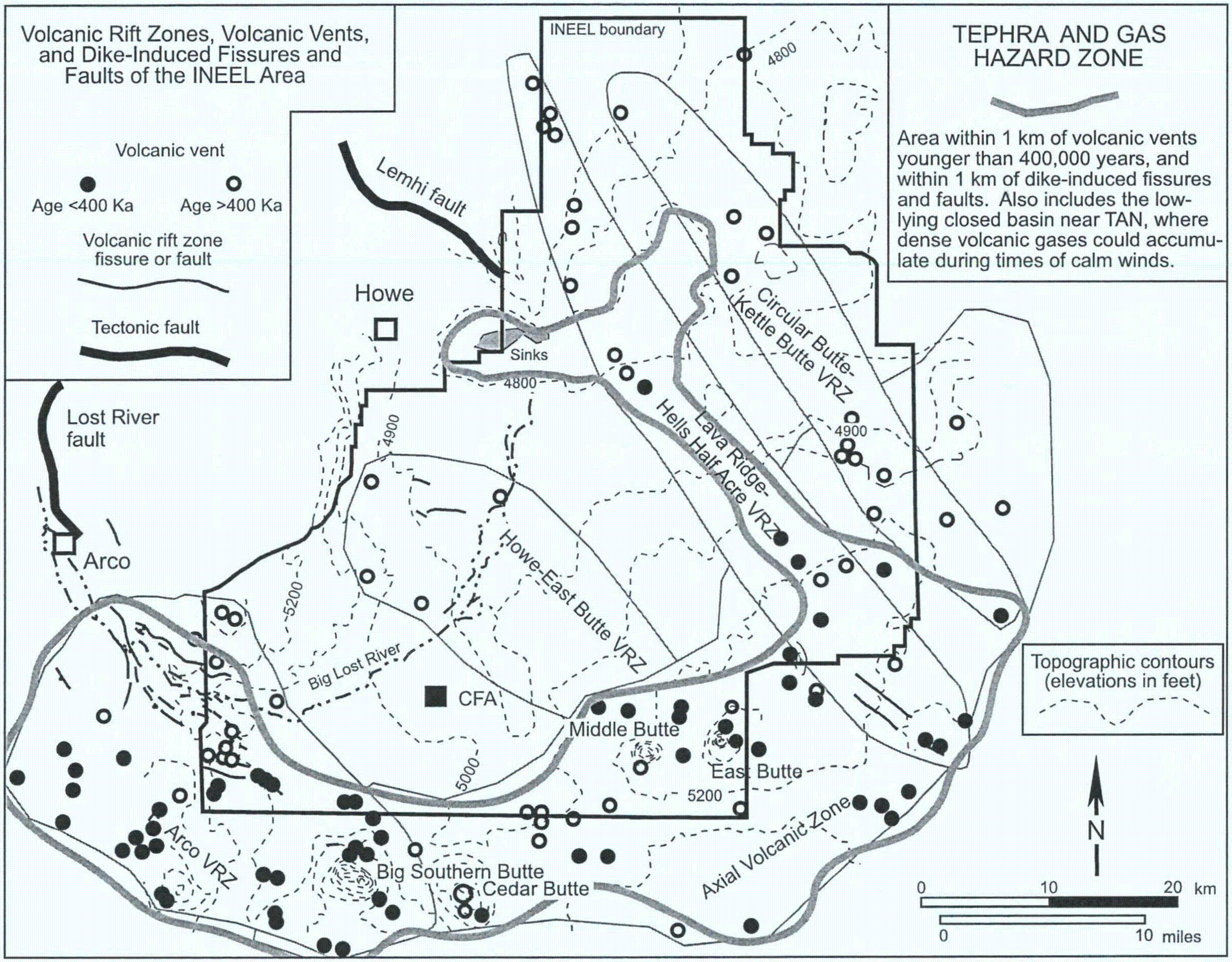

Figure 6. Tephra and gas hazard-zone map of the INEEL area. Filled square shows the location of the Central Facilities Area.

and may be related to basin subsidence rather than dike intrusion. Although these fissures are included in this hazard assessment, we do not consider them to be a likely site of future volcanism.

VOLCANIC-HAZARD ASSESSMENT OF THE CENTRAL FACILITIES AREA

The Central Facilities Area (CFA; Figure 8) is a cluster of buildings and other facilities located on the southwestern INEEL, about 15 km from vents of the volcanic zones to the west and south, and within a topographic basin about 100 m lower in elevation than the surrounding volcanic highlands. Given its distance and physiographic setting, the CFA seems unlikely to be impacted by tephra, gas or dike-induced ground deformation, but the CFA could be inundated by future lava flows from the adjacent volcanic zones. We therefore give a site-specific probabilistic hazard assessment for lava-flow inundation of the CFA.

The parameters needed to estimate the probability of lava inundation are the recurrence intervals of the volcanic source zones, the topographic setting of the CFA and the volcanic zones, the statistics of the lengths and areas of lava flows, the distance from CFA to potential sources of lava flows, the warning time prior to inundation, and the probability of successful mitigation.

We illustrate our approach with an event tree (Figure 9). The event tree is an inductive-logic modeling tool used to identify and depict the chains of events that may result in some outcome of interest, in this case an outcome important as a hazard. The event-tree modeling process begins with an initial condition which may lead to several end-states, depending on the results of subsequent events. The events can be processes, functions, conditions, mitigators, or barriers that are relevant to the outcome of interest. Event-tree branches represent decision points in modeling the combinations of events. Upward branches represent success or the achievement of a desired outcome. Downward branches represent failures of functions or barriers, or the absence of some relevant condition. Application of the event tree uses binary branching (i.e., success vs. failure, condition present vs. condition not present). Each node represents the universe of possible functional or conditional states. Therefore, the probabilities of all the possible states must sum to one. Probabilities are assigned to each event-tree branch, and the probability of each event sequence is the product of the branch probabilities.

"Eruption" is the initial condition, and the 6×10^{-5} per year recurrence value expresses the probability of volcanism at a random location within the Arco volcanic rift zone and the axial volcanic zone (Table 3), which we express as one value because of the nearly identical recurrence estimates.

The second event, "lava flows away from CFA," concerns vent location and topography relative to CFA, which lies outside the volcanic zones. On figure 8, we identify a "critical volcanic source area," which is the region that might send lava flows on a path toward the site. The critical volcanic source area is defined on its southern margin by a topographic divide. Lava flows erupting south of this divide will flow south, away from the CFA. Topographic analysis also shows that lava flows originating from any place on the axial volcanic zone northeast of East Butte will not flow toward CFA. The critical volcanic source area encompasses 660 square km, or 0.29 of the total 2,270 square-km area of the combined Arco and axial volcanic zones.

The third event, "lava stops short of CFA," addresses the probability of lava reaching CFA. If lava reaches CFA, total inundation is assumed; advanced warning and mitigation are addressed later. The CFA is located about 10 km (the 50th-percentile lava-flow length, Table 4) from the critical volcanic source area, and most of the young vents within the source area lie within 20 km (the 80th-percentile lava-flow length). We use the 70th-percentile distance of 16 km as an average distance from inferred lava-flow sources to the CFA. By statistical definition only 30 percent of lava flows from that distance will reach the CFA.

The fourth event addresses warning time for mitigation, and there is considerable uncertainty in deriving this parameter. We assume that 80 percent of lava flows would give at least 1 month advanced warning, and we consider 1 month to be adequate for effective mitigation by the removal of property or the construction of barriers. We justify this by analogy with the active basaltic rift zones of Iceland and Hawaii, where magma usually takes several weeks, commonly several months, to ascend to the surface from upper-mantle source regions. Based on seismic-velocity investigations, the inferred source of magma beneath the eastern SRP is 50-200 km deep, and ascending magma from those depths would be readily tracked by the INEEL seismic network. A second aspect of advanced warning involves lava-flow velocity, or the time to reach CFA after the onset of eruption. Observed basaltic lava flows on low-relief terrain such as the southern INEEL generally move at rates less than several kilometers per day. Tilling and Peterson (1994) summarize field observations of active lava flows from the east rift zone of Kilauea, Hawaii, and find that the average rate of advance of broad lava-flow fronts to be 5 km per day. Fink and Zimbelman (1986) also observed Hawaiian pahoehoe

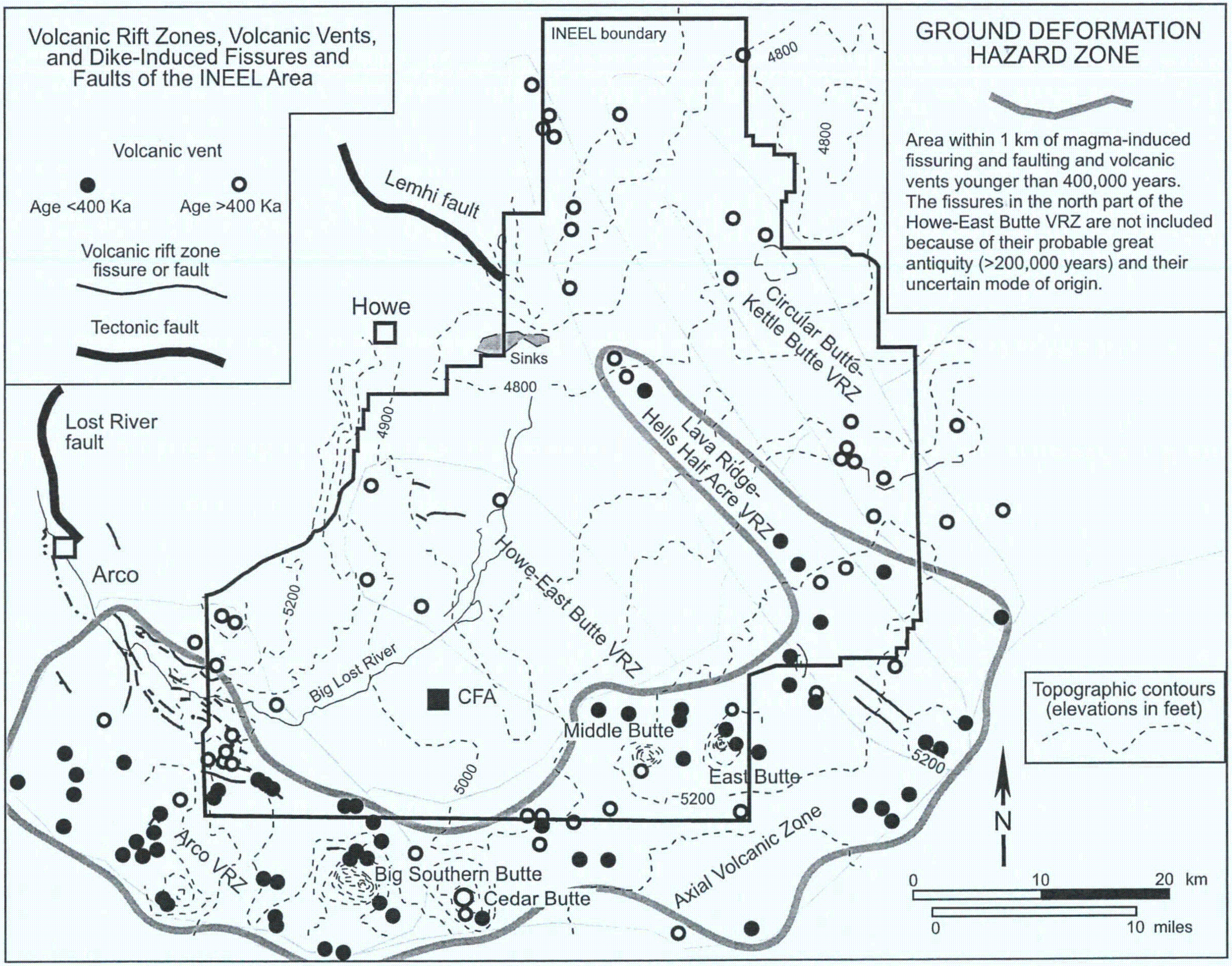

Figure 7. Ground deformation hazard-zone map of the INEEL area. Filled spuare shows the location of the Central Facilities Area.

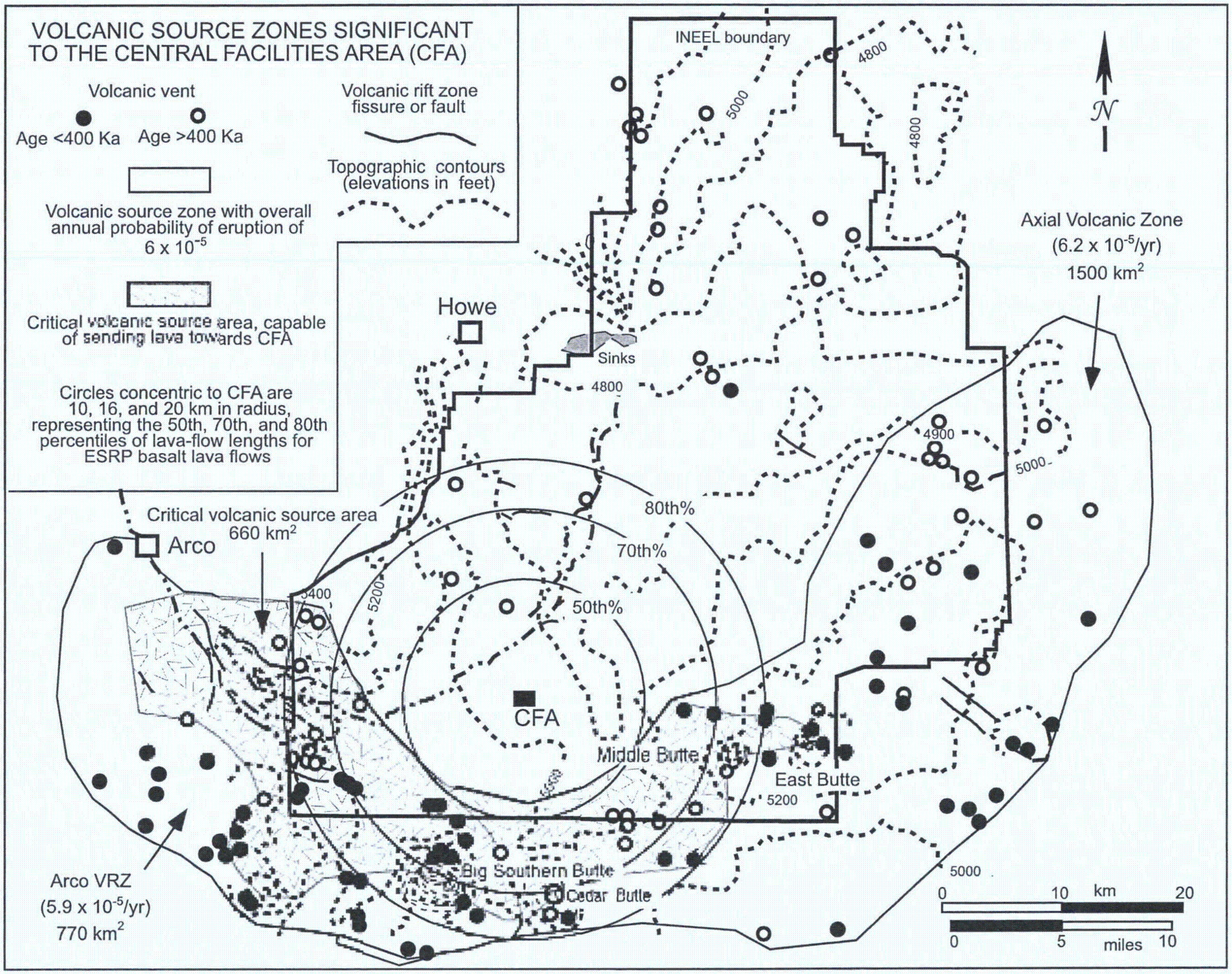

Figure 8. Volcanic source zones significant to the Central Facilities Area (CFA), INEEL.

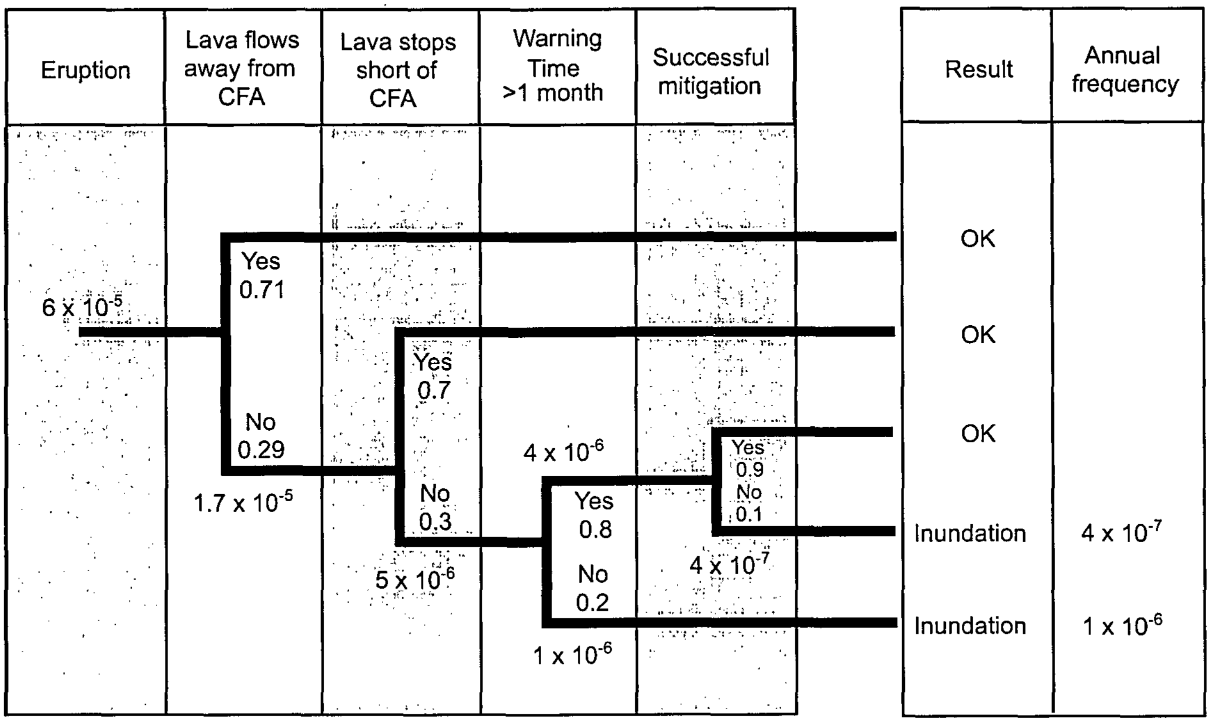

Figure 9. Volcanism event tree for lava-flow inundation of the Central Facilities Area (CFA), INEEL.

flow velocities on terrain similar to that of the INEEL to average 5 km per day. Hon and others (1994) give an average velocity of about 1 km per day for typical pahoehoe sheet flows in Hawaii. Bullard (1962) describes basaltic lava flows from several Hawaiian and Mexican volcanoes and cites near-source velocities of about 1 km per hour during the early stages of eruption, about 400 m per day after the flows had spread on gentle terrain, and as low as 1 m per day in the final stages, weeks or months after onset.

Assuming a rate of 2 km per day, it would take a lava flow about a week to travel the 16-km distance from the center of a nearby volcanic zone to the CFA. Together with several weeks of precursory seismic warning, our analysis suggests that about 1 month of advanced warning of lava inundation is probable. For event 4, our chosen probability of 0.2 assumes that only 20 percent of lava flows will fail to give 1 month of warning.

The fifth event addresses the probability of successful mitigation, given 1 month or more of warning. We assume that mitigation would be unsuccessful only 10 percent of the time. Potential actions (Barberi and others, 1993) include the removal of materials, the construction of earthen berms around CFA facilities, the building of earthen berms in the flow path to slow or divert the lava, the cooling of the lava-flow front with water sprays near critical facilities, and the use of explosives at or near the vent area to route the lava elsewhere.

Results are expressed as annual frequencies on the right of Figure 9. If no mitigation is possible, the estimated frequency of CFA property damage due to lava inundation is 1×10^{-6} per year. If mitigation is attempted, the estimated frequency is 4×10^{-7} per year.

ACKNOWLEDGMENTS

We thank Suzette Jackson for discussions of magma-induced faulting and seismicity. Scott Hughes, Jennifer Parker, and Rachel Lawrence helped with field work and the measurement of lava flows. Corey Atwood helped with statistical calculations. Our assessment would not have been possible without several decades of field and laboratory work by Mel Kuntz and colleagues at the U.S. Geological Survey. Constructive reviews by Mel Kuntz, Craig White, and Roger Stewart improved the presentation. Our work was performed for the U.S. Department of Energy, under DOE contract no. DE-AC07-94ID13223.

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ATTACHMENT 10.2-2

EREF REFERENCE

Water Rights Transfer Correspondence

State of Idaho
DEPARTMENT OF WATER RESOURCES
900 N. Skyline Dr., Suite A • Idaho Falls, Idaho 83402-1718
Phone: (208) 525-7161 • Fax: (208) 525-7177 • Web Site: www.idwr.idaho.gov
EASTERN REGION

C. L. "BUTCH" OTTER
Governor

DAVID R. TUTHILL, JR.
Director

May 21, 2008

AREVA NC INC.
4800 HAMPDEN LN STE 1100
BETHESDA MD 20814

RE: Notice of Security Interest in a Water Right 35-2642

Dear Water Right Holder(s):

The department acknowledges receipt of correspondence adding a security interest to the above referenced water. The department has modified its records to reflect the Notice of Security Interest and has enclosed a computer-generated report for your records.

Please note that as of July 1, 1996, water right owners are required to report any change of water right ownership and any change of mailing address of the owner of a water right to the department. Notice of the change must be provided to the department within 120 days of the change. Change reporting forms are available from any office of the department.

Please feel free to contact this office if you have any questions regarding this matter.

Sincerely,

Bobby Kern

Bobby Kern
Office Specialist II
900 N Skyline Dr. Ste A
Idaho Falls, ID 83402
(208) 525-7161

cc: Gold Emblem Farms

IDAHO DEPARTMENT OF WATER RESOURCES

Water Right Report 35-2642

WATER RIGHT NUMBER: 35-2642

Owner Type	Name and Address
Security Interest	AREVA NC INC 4800 HAMPDEN LANE STE 1100 BETHESDA, MD 20814
Current Owner	GOLD EMBLEM FARMS PO BOX 51780 IDAHO FALLS, ID 83405
Original Owner	WEST WIND FARMS C/O JAY BROWN 1780 CARMEL DR IDAHO FALLS, ID 83402 (208)523-2176

Priority Date: 02/14/1961

Basis: Decreed

Status: Active

Source	Tributary
GROUND WATER	

Beneficial Use	From To	Diversion Rate	Annual Volume
IRRIGATION	4/01 to 10/31	7.180 CFS	2,400.00 AF
	Total Diversion:	7.180 CFS	2,400.00 AF

Location of Point(s) of Diversion

GROUND WATER BONNEVILLE County	NW1/4NE1/4NW1/4	Sec. 23,	Twp 03N,	Rge 35E, B.M.
GROUND WATER BONNEVILLE County	SW1/4NW1/4SE1/4	Sec. 22,	Twp 03N,	Rge 35E, B.M.

Place of Use

IRRIGATION

Twp Rge Sec	NE				NW				SW				SE				Totals
	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
03N 35E 14					30.5	30.5	30.5	39.0	39.0	30.5	30.5	39.0					269.5
03N 35E 15													5.0	5.0	36.0	36.0	82.0
03N 35E 22	25.0	25.0	36.0	36.0	5.0	5.0	36.0	36.0	29.0	29.0	37.0	37.5	38.0	29.0	37.5	33.0	474.0
03N 35E 23					39.0	30.5	39.0	39.0	39.0	39.0	30.5	30.5					286.5

Total Acres: 1112

IDAHO DEPARTMENT OF WATER RESOURCES

Water Right Report 35-2642

Conditions of Approval:

1. RIGHT NO. 35-07203 IS ALSO DIVERTED THROUGH POINTS OF DIVERSION DESCRIBED ABOVE.
2. USE OF THIS RIGHT WITH RIGHT NO. 35-07203 IS LIMITED TO A TOTAL COMBINED ANNUAL DIVERSION VOLUME OF 4448 AF.
   USE OF THIS RIGHT WITH RIGHT NO. 35-07203 IS LIMITED TO A TOTAL COMBINED DIVERSION RATE OF 14.52 CFS.
3. C18 THIS PARTIAL DECREE IS SUBJECT TO SUCH GENERAL PROVISIONS NECESSARY FOR THE DEFINITION OF THE RIGHTS OR FOR THE EFFICIENT ADMINISTRATION OF THE WATER RIGHTS AS MAY BE ULTIMATELY DETERMINED BY THE COURT AT A POINT IN TIME NO LATER THAN THE ENTRY OF A FINAL UNIFIED DECREE. SECTION 42-1412(6), IDAHO CODE.
4. USE OF THIS RIGHT WITH RIGHT NO. 35-07203 IS LIMITED TO THE IRRIGATION OF A COMBINED TOTAL OF 1112 ACRES IN A SINGLE IRRIGATION SEASON.
   THIS RIGHT IS LIMITED TO THE IRRIGATION OF 600 ACRES WITHIN THE PLACE OF USE DESCRIBED ABOVE IN A SINGLE IRRIGATION SEASON.

Remarks:

IDAHO DEPARTMENT OF WATER RESOURCES

Water Right Report 35-2642

Comments:

1. TAYLOR 8/12/1993 COPIED FROM REMARKS
Comment: THIS RIGHT IS LIMITED TO THE IRRIGATION OF 600 ACRES WITHIN THE PLACE OF USE DESCRIBED ABOVE. COPIED FROM REMARKS THIS RIGHT IS LIMITED TO THE IRRIGATION OF 600 ACRES WITHIN THE PLACE OF USE DESCRIBED ABOVE.

2. AJONES 2/10/1998 CHANGED OWNERSHIP
Comment: CHANGED OWNERSHIP PER REQUEST.

3. AJU10-DS 2/26/1998 CONDITION H02/H03 UPDATE
Comment: CONDITION CODES H02 AND H03 ADDED IF NOT ALREADY PART OF RECORD.

4. AJU21-DS 5/12/1998 AJU21 CONDITION UPDATE
Comment: DELETED CONDITION CODE(S) H02 H03

5. AJU10-DS 6/15/1998 AJU10 CONDITION UPDATE
Comment: CONDITION CODE(S) A07 ADDED IF NOT ALREADY PART OF RECORD THRU

6. GTAYLOR 10/23/1998 TRANSFER #5221
Comment: THIS RIGHT WAS MODIFIED AFTER THE DIRECTOR'S REPORT WAS FILED BASED ON TRANSFER #5221.

7. AJU21-DS 2/19/1999 AJU21 CONDITION UPDATE
Comment: DELETED CONDITION CODE(S) A07

8. croberts 9/13/2005 POD
Comment: Correlated PODID 490161 from SpatialDataID 237574 to SpatialDataID 237568

9. dcarlson 1/2/2007 POU
Comment: Updated Shape

10. dcarlson 1/2/2007 POU
Comment: Updated Shape

11. dcarlson 1/2/2007 POU
Comment: Updated Shape

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IDAHO DEPARTMENT OF WATER RESOURCES

Water Right Report 35-2642

Comment: Updated Shape

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IDAHO DEPARTMENT OF WATER RESOURCES

Water Right Report 35-2642

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IDAHO DEPARTMENT OF WATER RESOURCES

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IDAHO DEPARTMENT OF WATER RESOURCES

Water Right Report 35-2642

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IDAHO DEPARTMENT OF WATER RESOURCES

Water Right Report 35-2642

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SubCase:

SubCase Number: 35-2642
Class: 1
SF5 Filed Date:
Special Master Recom Signed Date: 11/13/2001
Attorney Assigned: SARA C DENISTON
Adjudication Agent:
Basis of Claim:
Date Filed: 6/2/1999 Objection Status: Active
Date Filed: 8/24/1998 Objection Status: Active
Date Filed: 8/24/1998 Objection Status: Active
Date Filed: 6/2/1999 Objection Status: Active

<u>Water Supply Bank:</u>

COPY

CC:
SHAKIR
MALMAN
WARNER

AREVA

BY FEDEX

Mr. Ernie Carlsen
Idaho Department of Water Resources
Eastern Regional Office
900 North Skyline Drive, Suite A
Idaho Falls, Idaho 83402-6105

November 21, 2008

RE: AREVA Water Rights Transfer Application

Dear Mr. Carlsen:

Enclosed on behalf of AREVA NC Inc. is an Application for Transfer of Water Rights and a change in nature and place of use. This application is being made in conjunction with AREVA's proposed Eagle Rock Enrichment Facility. You should also find an original Power of Attorney signed by our Chief Executive Officer authorizing me to sign the application on behalf of AREVA NC Inc., and, a check in the amount of Two Hundred Fifty Dollars ($250.00) in payment of the application fee.

AREVA has made every effort to be complete and accurate in its application. The analysis in the application demonstrates that there should be no hydrologic effects on the Eastern Plain Snake River Aquifer that would exceed the existing impacts to the aquifer from existing uses. In fact, it demonstrates that there can be an expected net positive gain of water to the aquifer resulting after the proposed ground water transfer is completed.

AREVA is prepared to work with the Department to address any questions you may have in an expeditious and professional manner. Please feel free to contact me directly if you should have any questions or need additional information.

I look forward to meeting you and working with your staff.

Sincerely,

Robert W. Poyser
Vice President
AREVA Inc.

AREVA, INC.

One Bethesda Center, 4800 Hampden Lane, Suite 1100, Bethesda, MD 20814
Tel., 301 841 1600 - Fax: 301 841 1611 - www.areva.com

AREVA

POWER OF ATTORNEY

AREVA NC INC., a Delaware corporation, with offices at 4800 Hampden Lane, Suite 1100, Bethesda, Maryland 20814, hereby makes, constitutes and appoints

ROBERT W. POYSER

as its true and lawful attorney-in-fact, to do all things necessary for effecting the transfer of water or water rights in the state of Idaho, as well as any matters related thereto.

Said attorney-in-fact is specifically empowered to do, but not limited to, the following acts in the name and on behalf of AREVA NC Inc.:

> Execute, acknowledge and deliver any and all documents pertaining to said water or water rights, including assignments, state required forms for transfer of water rights, and any other documents required or deemed desirable by said attorney-in-fact to be executed, including any documents related to the Purchase Option Agreement dated April 30, 2008, by and between AREVA NC Inc and Gold Emblem Farms, as amended from time to time.

Giving and granting to said attorney-in-fact full power and authority to do and perform all and every act and thing whatsoever requisite and necessary, or which he deems desirable, to be done in and about the aforesaid water rights and related Purchase Option Agreement, and hereby ratifying and confirming all that said attorney-in-fact may or shall lawfully do or cause to be done by virtue hereof.

IN TESTIMONY WHEREOF, this Power of Attorney has hereunto been executed for and on behalf of AREVA NC Inc. by Jacques Besnainou, President and Chief Executive Officer of AREVA NC Inc., on November 21, 2008

Witness: [signature]

AREVA NC INC.

By: [signature]
Jacques Besnainou
Title: President and Chief Executive Officer

STATE OF MARYLAND)
)
COUNTY OF MONTGOMERY)

On this 21st day of November, 2008, before me, the undersigned officer, personally appeared JACQUES BESNAINOU, known to me (or satisfactorily proven) to be the person whose name is subscribed to within the instrument and acknowledged that he executed the same for the purposes therein contained.

In Witness hereof I hereunto set my hand and official seal.

[signature]

Name: JOHN KENDALL
Notary Public — Notary Public, Montgomery County, Maryland
My Commission Expires: My Commission Expires December 4, 2010

[SEAL]

Form 222 06/08

Page __________ of ______________ Transfer No. ________________

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
APPLICATION FOR TRANSFER OF WATER RIGHT

PART 1

Name of Applicant AREVA NC Inc. Robert Poyser, Vice President, AREVA Inc. Phone (301) 841-1668; c (202)345-2590

Mailing Address 4800 Hampden Lane, Suite 1100, Bethesda, Maryland 20814 Email robert.poyser@areva.com

c/o Keith C. Wilson Email kwilson@rockymountainenvironmental.com
Rocky Mountain Environmental Associates, Inc., 482 Constitution, Suite 303,
Idaho Falls, ID 83402 (208) 524-2353 Fax (208) 524-1795
c/o Erika Malmen Email EMalmen@perkinscoie.com
Perkins Coie LLP, 251 East Front Street, Suite 400
Boise, ID 83702 (208) 343-3434 Fax (208) 343-3232

A. PURPOSE OF TRANSFER

1. ☒ Change Point of Diversion ☐ Add diversion point(s) ☒ Change Place of use
 ☒ Change Nature of Use ☒ Change Period of Use ☐ Other ____________

2. Describe the reason for the proposed changes: Applicant purchased an option to acquire a portion of water right 35-2642 in order to construct and operate a uranium enrichment facility.

B. DESCRIPTION OF RIGHT(S) OR PORTION THEREOF, AFTER THE REQUESTED CHANGE

1.

Right Number	Priority	Amount	Nature of Use	Period of Use
35-2642	02/14/1961	0.70 cfs	Industrial	01/01 to 12/01
		0.06 cfs	Irrigation	04/01 to 10/31

2. Total amount of water being transferred 0.76 cubic feet per second and/or ___________ acre-feet per annum.
3. Source of water Ground water tributary to ___
4. Point(s) of Diversion:

Lot	¼	¼	¼	Sec.	Twp.	Rge.	County	Local Name for Diversion
		NE	SW	13	3N	34E	BONNEVILLE	GW-AG
		NE	SW	13	3N	34E	BONNEVILLE	GW5
		NW	NW	15	3N	34E	BONNEVILLE	GW2
		SW	NE	22	3N	34E	BONNEVILLE	GW4
		NW	NW	23	3N	34E	BONNEVILLE	GW1
		NW	SW	24	3N	34E	BONNEVILLE	GW3
		SW	SW	25	3N	34E	BONNEVILLE	GW-D

5. Lands irrigated or place of use: I = Industrial

Twp	Rge	Sec	NE ¼				NW ¼				SW ¼				SE ¼				Totals
			NE ¼	NW ¼	SW ¼	SE ¼	NE ¼	NW ¼	SW ¼	SE ¼	NE ¼	NW ¼	SW ¼	SE ¼	NE ¼	NW ¼	SW ¼	SE ¼	
3N	34E	13	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	
		14	I	I	I	I	I	I	I	I	I	I	I	I	I/0.6	I/0.6	I/0.6	I/0.7	2.5
		15	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	
		21	I	I	I	I													
		22	I	I	I	I	I	I	I	I								I	
		23	I	I	I	I	I	I	I	I	I		I	I	I	I	I	I	
		24		I			I	I	I	I	I	I	I	I	I	I	I		
		25					I	I	I	I	I	I	I	I					
		26	I	I	I	I	I			I	I					I	I/2.5	I	2.5

Total Acres 5.0

Rocky Mountain Environmental

PART 1

6. General Information:

a. Description of diversion system: Seven wells/pumps with mainlines to industrial facility and an irrigation system.

b. Are the lands from which you propose to transfer the water right subject to any liens, deeds of trust, mortgages, or contracts? ☒ Yes ☐ No. If yes, provide a notarized statement from the holder of the lien, deed of trust, mortgage or contract agreeing to the proposed changes. See Attachment # 1 (Instrument # 1309922)

c. Describe the affect on the land now irrigated if the place of use is changed pursuant to this transfer: There will be no effect on the land currently irrigated pursuant to rights 35-2642 and 35-7203, because the concurrent transfer filed by Gold Emblem replaces the acres in this transfer (See Attachment # 3 – Graphic Overview). The concurrent transfer by Gold Emblem will result in the drying up of 168.5 acres currently irrigated pursuant to right 35-8078.

d. Remarks: This transfer involves (1) separation of 168.5 acres of water right number 35-2642 from supplemental water right 35-7203; (2) change in place of use and points of diversion for that portion (168.5 acres) of water right 35-2642 resulting in a unitary water right of 163.5 acres for industrial-use water and 5 acres irrigation-use water at the facility; (3) change nature of use of the 163.5 acres of Irrigation to Industrial Use at 0.70 cfs and 506.8 afa; and (4) change the period of use for Industrial to year round use (01/01-12/31). Industrial use will include use for a patented uranium enrichment process, heating and cooling, and domestic use (cleaning, culinary, showers, and bathroom facilities) for approximately 1000 employees. The five acres of irrigation-use water will be used for grounds maintenance. The irrigation place of use is a preliminary description with the final designated place of use to be identified upon completion of the facility structures. The "Change in Nature of Use" calculations are included as Attachment # 2.

In order that no injury or enlargement result from this transfer, a companion transfer application filed concurrently herewith by Gold Emblem Farms will transfer 168.5 acres of water right 35-8078 to replace acres transferred from water right 35-2642, resulting in the irrigation of the same acres as are currently irrigated pursuant to water rights 35-2642 and 35-7203 (see Attachment # 3 – Graphic Overview.)

Although the instant and companion transfers offset one another, alleviating the need for the use of the transfer tool analysis (ESPA Analysis Spreadsheet), an ESPA Analysis is included with this transfer application as "Attachment # 4."

Because the relevant transaction is an option to purchase real property, including water right number 35-2642, Applicant and Gold Emblem Farms respectfully request that a condition precedent to effective transfer, as contemplated in this transfer application and the companion transfer application filed concurrently herewith by Gold Emblem Farms, be the closing of the transaction contemplated in the April 30, 2008 Real Property Purchase Option Agreement between Applicant and Gold Emblem Farms, a Memorandum of which is filed in the records of Bonneville County, Idaho as Instrument Number 1298615 (Attachment # 5). Applicant will notify IDWR in writing upon closing, at which time both the approved instant transfer and approved companion transfer will take full force and effect.

ACTION OF THE DIRECTOR, DEPARTMENT OF WATER RESOURCES

This is to certify that I have examined Application for Transfer of Water Right No. ________________

And said application is hereby ____________________, subject to the following limitations and conditions:

Witness my hand this ________ day of ____________________, 20__

____

for the Director

Rocky Mountain ENVIRONMENTAL

Page __________ of _____________ Transfer No. _______________

APPLICATION FOR TRANSFER OF WATER RIGHT
PART 2

A. DESCRIPTION OF RIGHT AS RECORDED

WATER RIGHT NO. 35-2642

Owner Type	Name and Address		
Current Owner	GOLD EMBLEM FARMS	PO BOX 51780	IDAHO FALLS, ID 83405
Security Interest	AREVA NC INC	4800 HAMPDEN LANE STE 1100	BETHESDA, MD 20814

Priority Date: 02/14/1961 Basis: Decreed Status: Active

Source	Tributary
GROUND WATER	

Beneficial Use	From	To	Diversion Rate	Volume
IRRIGATION	4/01	10/31	7.18 CFS	2400 AFA
Total Diversion			7.18 CFS	

Location of Point(s) of Diversion:

GROUND WATER	SWNWSE	Sec. 22	Township 03N	Range 35E	BONNEVILLE County
GROUND WATER	NWNENW	Sec. 23	Township 03N	Range 35E	BONNEVILLE County

Place of Use Legal Description: IRRIGATION BONNEVILLE County

Township	Range	Section	Lot	Tract	Acres	Lot	Tract	Acres	Lot	Tract	Acres	Lot	Tract	Acres
03N	35E	14		NENW	30.5		NWNW	30.5		SWNW	30.5		SENW	39
				NESW	39		NWSW	30.5		SWSW	30.5		SESW	39
		15		NESE	5		NWSE	5		SWSE	36		SESE	36
		22		NENE	25		NWNE	25		SWNE	36		SENE	36
				NENW	5		NWNW	5		SWNW	36		SENW	36
				NESW	29		NWSW	29		SWSW	37		SESW	37.5
				NESE	38		NWSE	29		SWSE	37.5		SESE	33
		23		NENW	39		NWNW	30.5		SWNW	39		SENW	39
				NESW	39		NWSW	39		SWSW	30.5		SESW	30.5

Total Acres: 1112 IRRIGATION Use: Acre Limit: 600

Conditions of Approval:

1.	C18	THIS PARTIAL DECREE IS SUBJECT TO SUCH GENERAL PROVISIONS NECESSARY FOR THE DEFINITION OF THE RIGHTS OR FOR THE EFFICIENT ADMINISTRATION OF THE WATER RIGHTS AS MAY BE ULTIMATELY DETERMINED BY THE COURT AT A POINT IN TIME NO LATER THAN THE ENTRY OF A FINAL UNIFIED DECREE. SECTION 42-1412(6), IDAHO CODE.
2.		USE OF THIS RIGHT WITH RIGHT NO. 35-07203 IS LIMITED TO A TOTAL COMBINED ANNUAL DIVERSION VOLUME OF 4448 AF. USE OF THIS RIGHT WITH RIGHT NO. 35-07203 IS LIMITED TO A TOTAL COMBINED DIVERSION RATE OF 14.52 CFS.
3.		USE OF THIS RIGHT WITH RIGHT NO. 35-07203 IS LIMITED TO THE IRRIGATION OF A COMBINED TOTAL OF 1112 ACRES IN A SINGLE IRRIGATION SEASON. THIS RIGHT IS LIMITED TO THE IRRIGATION OF 600 ACRES WITHIN THE PLACE OF USE DESCRIBED ABOVE IN A SINGLE IRRIGATION SEASON.
4.		RIGHT NO. 35-07203 IS ALSO DIVERTED THROUGH POINTS OF DIVERSION DESCRIBED ABOVE.

Decreed Date: 01/31/2002 Combined Acres Limit: 1112 Combined Volume Limit: 4448
Combined Rate Limit: 14.52

- Describe any other water rights used for the same purpose as described above: 35-7203

Rocky Mountain ENVIRONMENTAL

Page ________ of ________ Transfer No. ________

PART 2

- To your knowledge, has any portion of this water right undergone a period of five or more consecutive years of non-use? NO If yes, describe ________

B. DESCRIPTION OF PORTION OF RIGHT BEING TRANSFERRED 35-2642 Portion

(if the entire right is to be changed by the applicant, omit part B and C.)

1. Amount 2.02 cfs for IRRIGATION purposes from 04/01 to 10/31
2. Points of Diversion:

Lot	¼	¼	¼	Sec.	Twp.	Rge.	County	Local Name for Diversion
	SW	NW	SE	22	03N	35E	BONNEVILLE	
	NW	NE	NW	23	03N	35E	BONNEVILLE	

3. Lands irrigated or place of use:

Twp	Rge	Sec	NE ¼				NW ¼				SW ¼				SE ¼				Totals
			NE ¼	NW ¼	SW ¼	SE ¼	NE ¼	NW ¼	SW ¼	SE ¼	NE ¼	NW ¼	SW ¼	SE ¼	NE ¼	NW ¼	SW ¼	SE ¼	
3N	35	22																29.5	29.5
		23									39	39	30.5	30.5					139.0

Total Acres 168.5

C. DESCRIPTION OF UNCHANGED PORTION OF RIGHT *(omit if there is no change)* 35-2642 Remaining Portion

1. Amount 5.16 cfs for IRRIGATION purposes from 04/ 01 to 10/31
2. Point(s) of Diversion:

Lot	¼	¼	¼	Sec.	Twp.	Rge.	County	Local Name for Diversion
	SW	NW	SE	22	03N	35E	BONNEVILLE	
	NW	NE	NW	23	03N	35E	BONNEVILLE	

3. Lands irrigated or place of use: 431.5 acres within 943.5 (1112)* acres

Twp	Rge	Sec	NE ¼				NW ¼				SW ¼				SE ¼				Totals
			NE ¼	NW ¼	SW ¼	SE ¼	NE ¼	NW ¼	SW ¼	SE ¼	NE ¼	NW ¼	SW ¼	SE ¼	NE ¼	NW ¼	SW ¼	SE ¼	
3N	35E	14					30.5	30.5	30.5	39	39	30.5	30.5	39					269.5
		15													5	5	36	36	82.0
		22	25	25	36	36	5	5	36	36	29	29	37	37.5	38	29	37.5	3.5	444.5
		23					39	30.5	39	39									147.5

Total Acres 943.5 (1112)*

* Use of the remaining 431.5 acres of 35-2642, the concurrent transfer of 168.5 acres from 35-8078, and 35-7203 will be limited to the irrigation of a combined total of 1112 acres in a single irrigation season.

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
PART 2

A. DESCRIPTION OF RIGHT AS RECORDED

WATER RIGHT NO. 35-7203 (Associated Water Right)

Owner Type	Name and Address		
Current Owner	GOLD EMBLEM FARMS	PO BOX 51780	IDAHO FALLS, ID 83405

Priority Date: 01/13/1972 Basis: Decreed Status: Active

Source	Tributary
GROUND WATER	

Beneficial Use	From	To	Diversion Rate	Volume
IRRIGATION	4/01	10/31	8 CFS	3379.9 AFA
Total Diversion			8 CFS	

Location of Point(s) of Diversion:

GROUND WATER	SWNWSE	Sec. 22	Township 03N	Range 35E	BONNEVILLE County
GROUND WATER	NWNENW	Sec. 23	Township 03N	Range 35E	BONNEVILLE County

Place of Use Legal Description: IRRIGATION BONNEVILLE County

Twnship	Range	Section	Lot	Tract	Acres	Lot	Tract	Acres	Lot	Tract	Acres	Lot	Tract	Acres
03N	35E	14		NENW	30.5		NWNW	30.5		SWNW	30.5		SENW	39
				NESW	39		NWSW	30.5		SWSW	30.5		SESW	39
		15		NESE	5		NWSE	5		SWSE	36		SESE	36
		22		NENE	25		NWNE	25		SWNE	36		SENE	36
				NENW	5		NWNW	5		SWNW	36		SENW	36
				NESW	29		NWSW	29		SWSW	37		SESW	37.5
				NESE	38		NWSE	29		SWSE	37.5		SESE	33
		23		NENW	39		NWNW	30.5		SWNW	39		SENW	39
				NESW	39		NWSW	39		SWSW	30.5		SESW	30.5

Total Acres: 1112

Conditions of Approval:

1.	C18	THIS PARTIAL DECREE IS SUBJECT TO SUCH GENERAL PROVISIONS NECESSARY FOR THE DEFINITION OF THE RIGHTS OR FOR THE EFFICIENT ADMINISTRATION OF THE WATER RIGHTS AS MAY BE ULTIMATELY DETERMINED BY THE COURT AT A POINT IN TIME NO LATER THAN THE ENTRY OF A FINAL UNIFIED DECREE. SECTION 42-1412(6), IDAHO CODE.
2.		USE OF THIS RIGHT WITH RIGHT NO. 35-02642 IS LIMITED TO A TOTAL COMBINED ANNUAL DIVERSION VOLUME OF 4448 AF. USE OF THIS RIGHT WITH RIGHT NO. 35-02642 IS LIMITED TO A TOTAL COMBINED DIVERSION RATE OF 14.52 CFS.
3.		USE OF THIS RIGHT WITH RIGHT NO. 35-02642 IS LIMITED TO THE IRRIGATION OF A COMBINED TOTAL OF 1112 ACRES IN A SINGLE IRRIGATION SEASON.
4.		RIGHT NO. 35-02642 IS ALSO DIVERTED THROUGH POINTS OF DIVERSION DESCRIBED ABOVE.

Decreed Date: 01/31/2002 Combined Acres Limit: 1112 Combined Volume Limit: 4448
Combined Rate Limit: 14.52

Rocky Mountain ENVIRONMENTAL

Page __________ of ______________ Transfer No. ______________

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
PART 2

A. DESCRIPTION OF RIGHT AS RECORDED

WATER RIGHT NO. 35-8078 (Associated Water Right)

Owner Type	**Name and Address**		
Current Owner	GOLD EMBLEM FARMS	PO BOX 51780	IDAHO FALLS, ID 83405

Priority Date: 01/14/1983 Basis: License Status: Active

Source	**Tributary**
GROUND WATER	

Beneficial Use	**From**	**To**	**Diversion Rate**	**Volume**
IRRIGATION	4/01	10/31	7.58 CFS	2752 AFA
Total Diversion			7.58 CFS	

Location of Point(s) of Diversion:

GROUND WATER	NESW	Sec. 13	Township 03N	Range 34E	BONNEVILLE County

Licensed Diversion Capacity: 7.58

Place of Use Legal Description: IRRIGATION BONNEVILLE County

Township	Range	Section	Lot	Tract	Acres	Lot	Tract	Acres	Lot	Tract	Acres	Lot	Tract	Acres
03N	34E	13		NENE	34		NWNE	34		SWNE	40		SENE	34
				NENW	34		NWNW	34		SWNW	34		SENW	40
				NESW	40		NWSW	34		SWSW	34		SESW	40
				NESE	34		NWSE	40		SWSE	40		SESE	34
		24		NWNE	34									
				NENW	40		NWNW	34						

Total Acres: 688

Conditions of Approval:

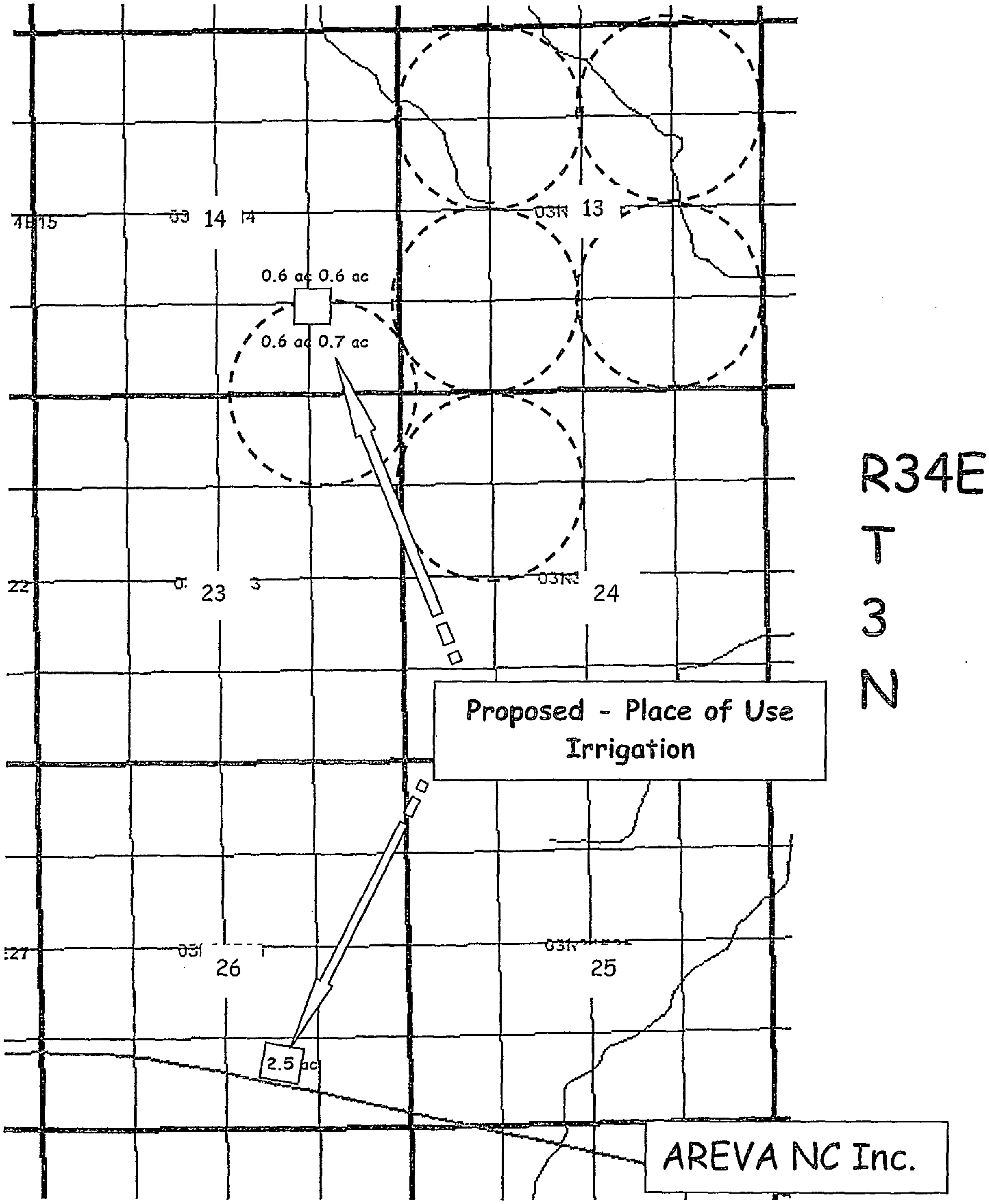
1.	R31	This right when combined with all other rights shall provide no more than .02 cfs per acre nor more than 4.0 afa per acre for irrigation of the lands above.
2.	R55	This right is for the use of trust water and is subject to review 20 years after the issuance of the permit to determine availability of water and to re-evaluate the public interest.
3.	R56	Diversion and use of water under this right is subject to an annual use fee if rules are subsequently promulgated which provide for the submittal of the fee.

Licensed Date: 09/25/1997

Page ____________ of ______________ Transfer No. ________________

PART 3

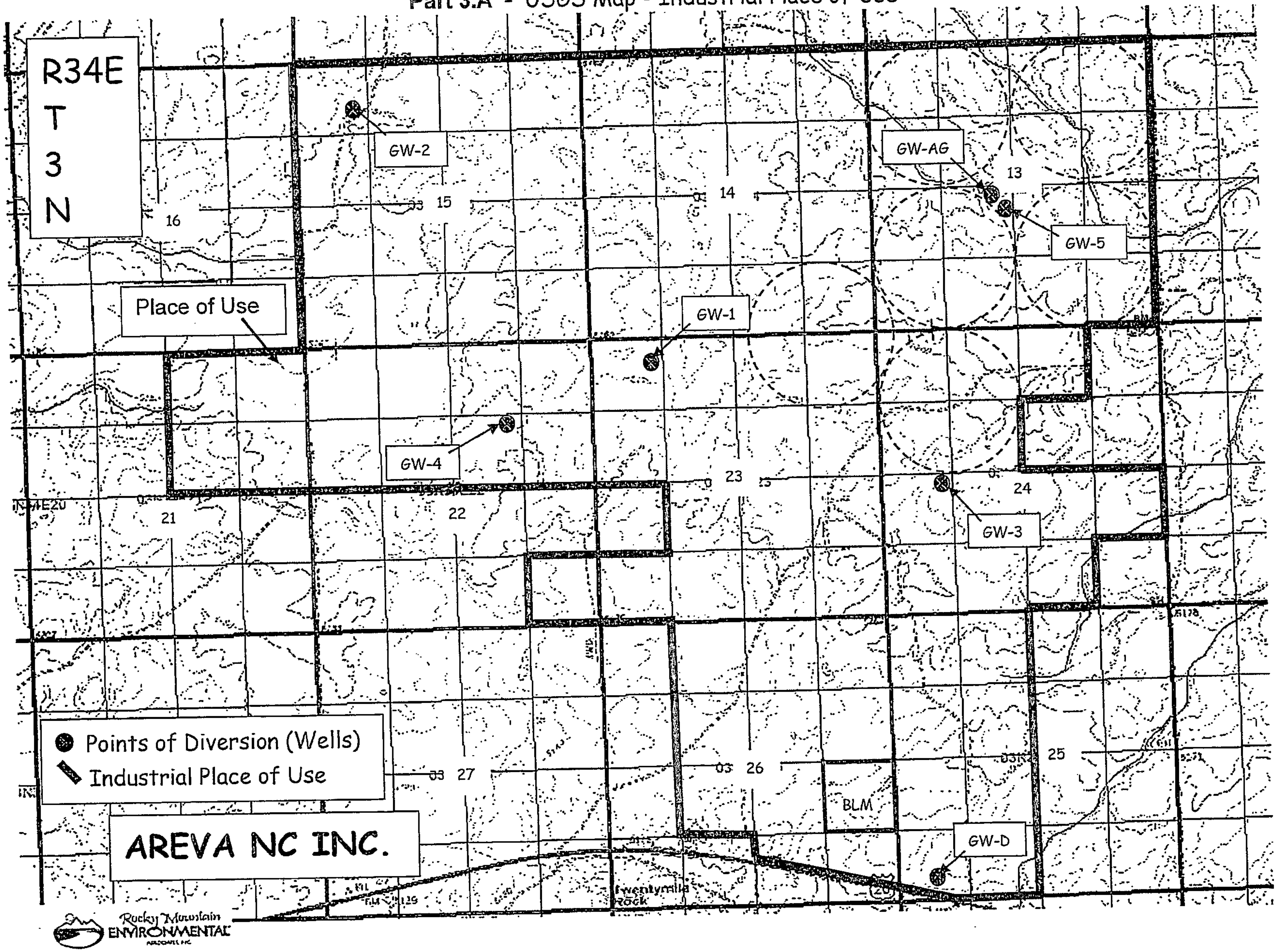
A. Draw a map or attach a USGS map indicating the new point(s) of diversion and/or the new place of use for rights described in part 1. Clearly depict the land by section, township and range number.



Rocky Mountain ENVIRONMENTAL

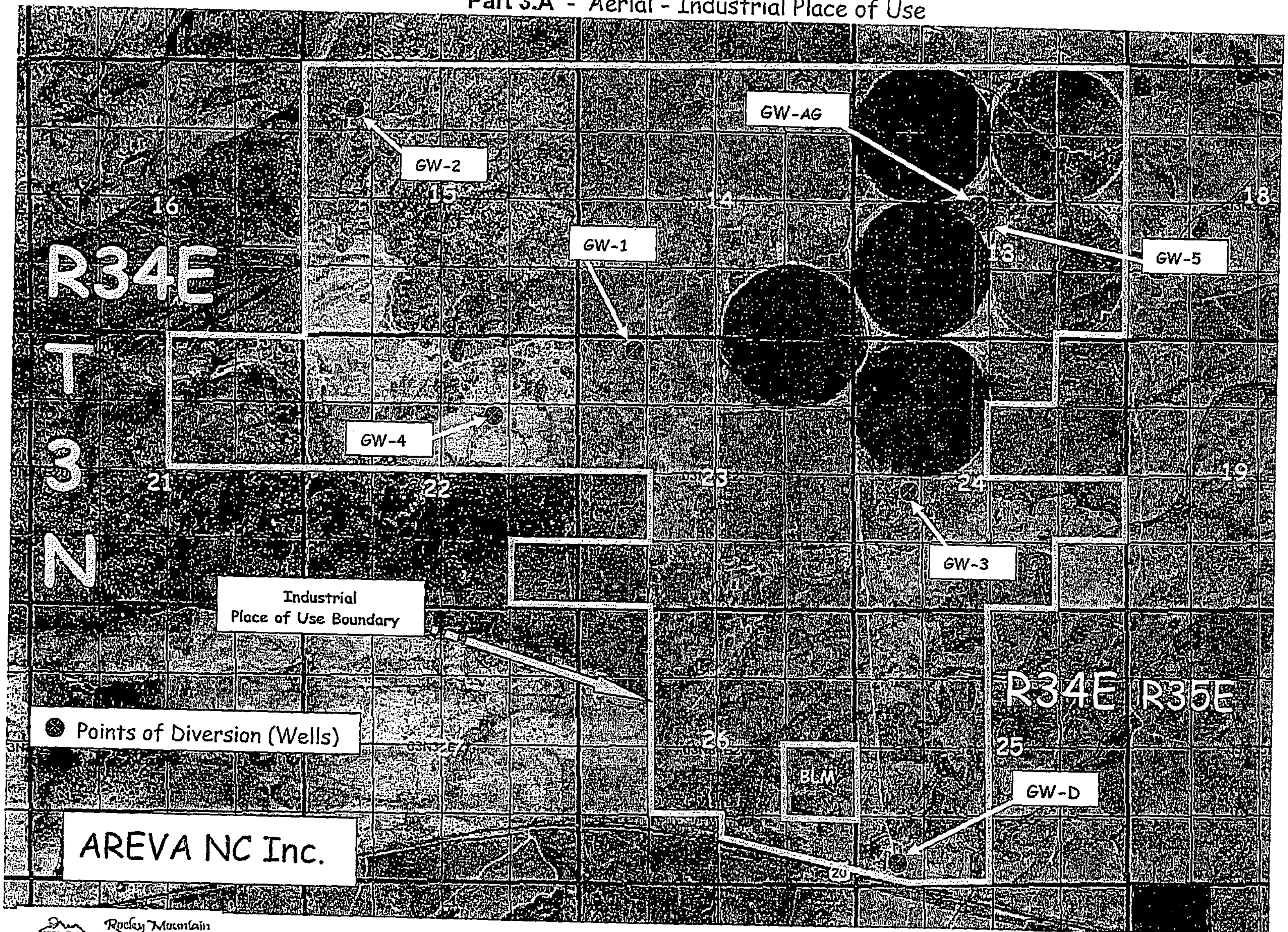
Transfer No. ______________

Part 3.A - USGS Map - Industrial Place of Use



Transfer No. ______________

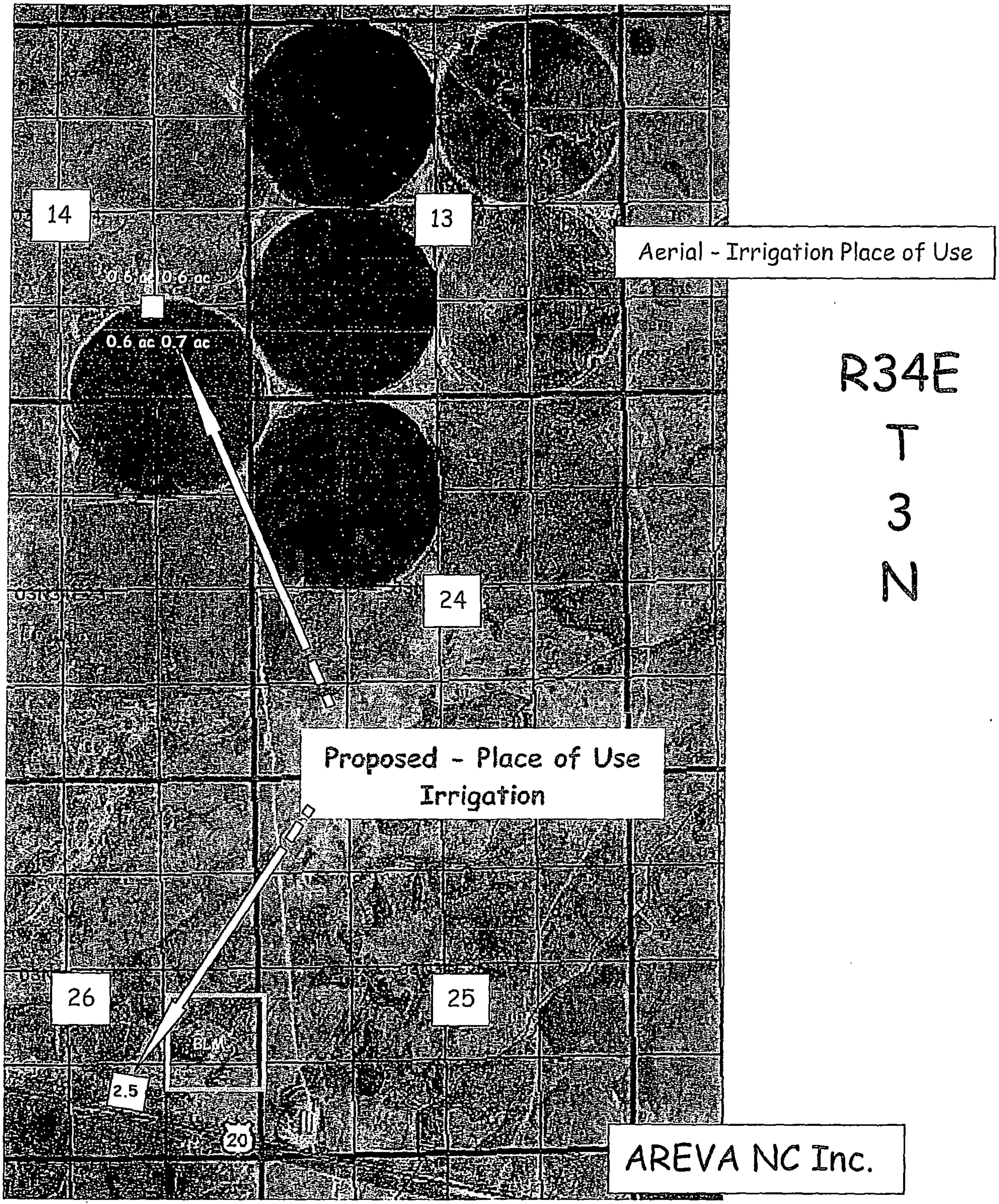
Part 3.A - Aerial - Industrial Place of Use



Rocky Mountain ENVIRONMENTAL

Page ________ of ____________ Transfer No. ____________

PART 3.A



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Rocky Mountain ENVIRONMENTAL

Page __________ of ______________ Transfer No. ________________

PART 3

B. CHANGES IN NATURE OF USE

1. New Nature of Use	Amount (cfs/af-ac)	Hours/days/year	Period of use
INDUSTRIAL	0.70 cfs	24H/365D/YR	01/01 to 12/31

2. Quantity and quality of return flows and location of discharge: There will be no return flows or discharge as the use will be 100% consumptive.

3. Describe effects on other water uses resulting from the proposed change: There will be no effect on other water uses as the consumptive volume on the original place of use of 35-2642 and 35-7203 will remain the same upon completion of the instant and companion transfer for a portion of 35-8078. However, the ESPA Spreadsheet (Attachment #3) indicates a net positive hydrologic effect, a reduction in depletion of the aquifer (treated as a form of recharge), within the Eastern Snake River Plain Aquifer (ESPA).

Please refer to "Change in Nature of Use" calculations Attachment # 1, and the ESPA Analysis Attachment #3.

I hereby assert that no one will be injured by such change and that the change does not constitute an enlargement in use of the original right. The information in this application is true to the best of my knowledge.

I understand that any willful misrepresentations made in this application may result in voiding its approval.

AREVA NC INC.

______________________ (Signature of Applicant)

ROBERT W. POYSER

Print Name (and title, if applicable)

[Subscribed an]d sworn to before me this 21 ST day of NOVEMBER, 20 08.

______________________ (Notary Public)

JOHN KENDALL
Notary Public
Montgomery County, Maryland
My Commission Expires December 4, 2010

[My commission expire]s: ______________________

FOR DEPARTMENT USE ONLY

Transfer contains ____________ pages and ____________ attachments

Received by ________________ Date ____________ Protest filed by ______________________________

Prelim check by ________________ Fee __________ ______________________________

Receipted by ____________________ Date __________ ______________________________

Published in ______________________________ Copies of protest forwarded by ________________

Pub. Dates ______________________________ Hearing held by ____________ Date ____________

Watermaster recommendation requested on ___________ Recommended for ☐ approval ☐ denial

______________________ rec'd ______________ By ______________________________

Copy of transfer sent to lien holder ______________________________

Rocky Mountain ENVIRONMENTAL

Attachment # 1 - Instrument # 1309922 (Pg 1 of 2)

RECORDING REQUESTED BY:

Gold Emblem Farms
P.O. Box 51780
78991 South Yellowstone Highway
Idaho Falls, Idaho 83405

Instrument # 1309922
IDAHO FALLS, BONNEVILLE, IDAHO
8-26-2008 12:04:19 No. of Pages: 2
Recorded for: HOLDEN KIDWELL HAHN CRAPO
RONALD LONGMORE Fee: 6.00
Ex-Officio Recorder Deputy
Index to: RELEASE

AFTER FILING MAIL TO:

Gold Emblem Farms
P.O. Box 51780
78991 South Yellowstone Highway
Idaho Falls, Idaho 83405

(Space Above for Recorder's Use)

CONSENT TO TRANSFER AND RELEASE OF MORTGAGE

THIS CONSENT TO TRANSFER AND RELEASE OF MORTGAGE ("Consent"), is made with reference to that certain Real Estate Mortgage dated August 20, 2003, by and between L. Kent Taylor, as mortgagor, and Peggy Jean Taylor ("Taylor), as mortgagee, and recorded as Instrument No. 1125367 in the records of Bonneville County, Idaho (the "Mortgage"), covering certain real property (the "Property") presently owned by Gold Emblem Farms, an Idaho general partnership ("Gold Emblem Farms").

RECITALS

WHEREAS, Idaho Water Right No. 35-2642 is appurtenant to the Property;

WHEREAS, Gold Emblem Farms, or its assigns, has, or will, file an application with the Idaho Department of Water Resources to transfer from the Property a portion of Water Right No. 35-2642 in an amount not to exceed 4 cubic feet per second ("CFS") and 1,337 acre-feet per annum ("AFA"); and .

WHEREAS, simultaneous with the aforementioned transfer, Gold Emblem Farms, or assigns, will transfer all or a portion of Idaho State Water Right No. 35-8078 to the Property.

NOW, THEREFORE, in consideration of the payment of $4,000.00, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Taylor does hereby agree as follows:

Attachment # 1 - Instrument # 1309922 (Pg 2 of 2)

AGREEMENT

1. Consent to Transfer and Release of Mortgage. Taylor does hereby irrevocably consent to transfer from the Property a portion of Water Right No. 35-2642 in an amount not to exceed 4 CFS and 1,337 AFA. Taylor does further agree to the transfer to the Property of all or a portion of Water Right No. 35-8078. Taylor does further unconditionally release from the Mortgage 4 CFS and 1,337 AFA of Water Right No. 35-2642 and further relinquishes any and all right, title and interest Taylor may have in such portion of Water Right No. 35-2642 released herein.

2. Cooperation. Taylor shall cooperate with Gold Emblem Farms, or its assigns, to complete the transfers of Water Right Nos. 35-2642 and 35-8078 as set forth herein, and shall execute any other documents reasonably required therefor.

3. Miscellaneous. Except as set forth herein, the Mortgage remains in full force and effect, and this Consent does not in any way affect the balance of the Property subject to the Mortgage, but releases only 4 CFS and 1,337 AFA of Water Right No. 35-2642 from the Mortgage.

IN WITNESS WHEREOF, the undersigned has executed this Consent as of this 19th day of August, 2008.

Peggy Taylor

Peggy Taylor

STATE OF IDAHO)
) ss.
County of Bonneville)

On this 19th day of August, 2008, before me a notary public in and for said State, personally appeared Peggy Taylor, known or identified to me (or proved to me on the oath of Peggy Taylor) to be the person whose name is subscribed to the within instrument, and acknowledged to me that she executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year in this certificate first above written.

DEAN G. BRANDSTETTER
NOTARY PUBLIC
STATE OF IDAHO

(Seal)

Notary Public for Idaho
Residing at Idaho Falls, Idaho
My commission expires: 5/8/2009

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Rocky Mountain ENVIRONMENTAL

Attachment # 2 Change in Nature of Use (Pg 1 of 6)

Change in Nature of Use

Proposed Project: Transfer a portion of water right 35-2642 and Change Nature of Use.

In order to separate a portion of water right 35-2642 from 35-7203 it is proposed to replace acres of 35-2642 with acres of 35-8078 (see calculations below). This will allow the transfer of a portion of 35-2642 as an individual primary water right without an overlapping right.

WATER RIGHT NO. 35-2642

Priority Date: 02/14/1961 Basis: Decreed Status: Active

IRRIGATION	4/01	10/31	**7.18 CFS**	**2400 AFA**

Conditions:

2.	USE OF **THIS RIGHT WITH RIGHT NO. 35-07203** IS LIMITED TO A TOTAL COMBINED ANNUAL DIVERSION VOLUME OF 4448 AF. USE OF THIS RIGHT WITH RIGHT NO. 35-07203 IS LIMITED TO A TOTAL COMBINED DIVERSION RATE OF 14.52 CFS.
3.	USE OF THIS RIGHT WITH RIGHT NO. 35-07203 IS LIMITED TO THE IRRIGATION OF A COMBINED TOTAL OF 1112 ACRES IN A SINGLE IRRIGATION SEASON. **THIS RIGHT IS LIMITED TO THE IRRIGATION OF 600 ACRES** WITHIN THE PLACE OF USE DESCRIBED ABOVE IN A SINGLE IRRIGATION SEASON.

****

Consumptive Use Determination for 35-2642:

HISTORIC BENEFICIAL USE

From the FSA - Crop Reports*, Alfalfa is the highest historic consumptive use crop and is the basis for the annual volume of consumptive use available for this transfer [Transfer Processing No. 24 (10/30/2002) Section 5d.(5)].

* FSA Records (See Following Pages)

Page __________ of ______________ Transfer No. ________________

Attachment # 2 Change in Nature of Use (Pg 2 of 6)

Consumptive Use Determination for 35-2642 (Cont.):

- - - - - - - - - - - - - - - - - - FSA - CROP REPORTS - - - - - - - - - - - - - - -

FSA-578(02-01-91) REPORT OF ACREAGE PROGRAM YEAR 2003

FARM NUMBER: 598 FARM SUMMARY DATE: 06-30-2003

Operator Name and Address ID

GOLD EMBLEM FARMS PTR 4727
PO BOX 51780
IDAHO FALLS, ID 83405-1780

Original: ________
Revision: ________
Cropland: 1,725.0
Farmland: 1,920.0

NOTE: The authority for collecting the following information is Pub.L 107-76. This authority allows for the collection of information without prior OMB approval mondated by the Paperwork Reduction Act of 1995. The data will be used to determine eligibility for assistance. Furnishing the data is voluntary, however, without it assistance cannot be provided. The data may be furnished to any agency responsible for enforcing the provisions of the Act.

Producer Name	ID	Crop	Share	Crop	Share	Crop	Share	Crop	Share
HOWARD TAYLOR & SONS INC	3960	PTATO	.3804						
GOLD EMBLEM FARMS PTR	4727	PTATO	.6196						
WEST WIND GROUP LLC	5411	ALFAL	1.0000	BARLY	1.0000	FALOW	1.0000	GRASS	1.0000

Crop	Type	Prac	IU	Reported	Determined	Crop	Type	Prac	IU	Reported	Determined	Crop	Type	Prac	IU	Reported	Determi
ALFAL		I	FG	342.9		BARLY	SPR	I	GR	386.8		FALOW		I		94.7	
~~FALOW~~		~~N~~		~~15.0~~		GRASS	NAG	N	GZ	465.0		OFAV		I		420.6	
PTATO	RUS	I	FH	420.6													

OPERATOR'S CERTIFICATION: I certify to the best of my knowledge and belief that the acreage of crops and land uses listed herein are true and correct, and that all required crops and land uses have been reported for the farm as applicable. The signing of this form gives FSA representatives authorization to enter and inspect crops and land uses on the above identified land.

Operator's Signature: William H. Taylor for Gold Emblem Farms Date: June 30 03

This program or activity will be conducted on a nondiscriminatory basis without regard to race, color, religion, national

---

FSA-578(02-01-91) REPORT OF COMMODITIES PROGRAM YEAR 2004

FARM NUMBER: 598 FARM SUMMARY DATE: 06-30-2004

Operator Name and Address ID

GOLD EMBLEM FARMS PTR 4727
PO BOX 51780
IDAHO FALLS, ID 83405-1780

Original: SR
Revision: ________
Cropland: 1,725.0

Producer Name	ID	C/C	Share	C/C	Share	C/C	Share
CARL B TAYLOR	2562	PTATO	.4946				
GOLD EMBLEM FARMS PTR	4727	PTATO	.5054	GRASS	1.0000		
WEST WIND GROUP LLC	5411	WHEAT	1.0000	BARLY	1.0000	FALOW	1.0000

Crop	Type	Prac	IU	Reported	Determined	Crop	Type	Prac	IU	Reported	Determined	Crop	Type	Prac	IU	Reported	Determined
BARLY	SPR	I	GR	558.50		FALOW		N		102.70		GRASS	NAG	N	GZ	465.00	
OFAV		I		248.90		PTATO	RUS	I	FH	248.90		WHEAT	HRS	I	GR	349.90	

Operator's Signature: William H. Taylor Date: June 30, 2004

This program or activity will be conducted on a nondiscriminatory basis without regard to race, color, religion, national origin, sex, age, marital status, or disability.

* FSA Records (Cont. Next Page)

Rocky Mountain ENVIRONMENTAL

Page __________ of ______________ Transfer No. _______________

Attachment # 2 Change in Nature of Use (Pg 3 of 6)

Consumptive Use Determination for 35-2642 (Cont.):

- - - - - - - - - - FSA - CROP REPORTS (CONT.)- - - - - - - - - -

FSA-578(02-01-91) REPORT OF COMMODITIES PROGRAM YEAR 2005

FARM NUMBER: 598 FARM SUMMARY DATE: 08-17-2005

Operator Name and Address ID Original: [illegible]

GOLD EMBLEM FARMS PTR 4727 Revision: ________

PO BOX 51780

IDAHO FALLS, ID 83405-1780 Cropland: 1,725.0

Crop Type Prac IU	Reported	Determined	Crop Type Prac IU	Reported	Determined	Crop Type Prac IU	Reported	Determined
BARLY SPR I GR	682.80		FALOW N	87.10		GRASS NAG N GZ	535.10	
OFAV I	360.00		PTATO RUS I FH	360.00		WHEAT HRS I GR	60.00	

Operator's Signature Carl Taylor Date 08/17/05

This program or activity will be conducted on a nondiscriminatory basis without regard to race, color, religion, national origin, sex, age, marital status, or disability.

FSA-578(02-01-91) REPORT OF COMMODITIES PROGRAM YEAR 2006

FARM NUMBER: 598 FARM SUMMARY DATE: 07-05-2006

Operator Name and Address ID Original: JL

GOLD EMBLEM FARMS PTR 4727 Revision: ________

PO BOX 51780

IDAHO FALLS, ID 83405-1780 Cropland: 1,754.6

Producer Name	ID	C/C	Share	C/C	Share	C/C	Share	C/C	Share
WEST WIND PTR	7234	WHEAT	1.0000	PTATO	.3342	FALOW	.5508		
CARL B TAYLOR	2562	PTATO	.3315	FALOW	.1738				
GOLD EMBLEM FARMS PTR	4727	PTATO	.3343	BARLY	1.0000	FALOW	.2754	GRASS	1.0000

Crop Type Prac IU	Reported	Determined	Crop Type Prac IU	Reported	Determined	Crop Type Prac IU	Reported	Determined
BARLY SPR I GR	175.00		FALOW I	181.20		GRASS NAG N GZ	480.60	
OFAV I	371.00		PTATO RUS I FH	248.00		PTATO SPC I FH	123.00	
WHEAT HWS I GR	546.80							

Operator's Signature Carl B Taylor Date 7/13/06

This program or activity will be conducted on a nondiscriminatory basis without regard to race, color, religion, national .

SA-578(02-01-91) REPORT OF COMMODITIES PROGRAM YEAR 2007

ARM NUMBER: 598 FARM SUMMARY DATE: 07-02-2007

erator Name and Address ID Original: T.L.

LD EMBLEM FARMS PTR 4727 Revision: ________

BOX 51780

AHO FALLS, ID 83405-1780 Cropland: 1,754.6

Crop Type Prac IU	Reported	Determined	Crop Type Prac IU	Reported	Determined	Crop Type Prac IU	Reported	Determined
BARLY SPR I GR	410.40		FALOW N	180.80		GRASS NAG N GZ	480.60	
OFAV I	408.20		PTATO RUS I FH	96.00		PTATO SPC I FH	312.20	
WHEAT HWS I GR	274.60							

Operator's Signature [illegible] Date 7/18/07

This program or activity will be conducted on a nondiscriminatory basis without regard to race, color, religion, national origin, sex, age, marital status, or disability.

Page ________ of ___________ Transfer No. ______________

Attachment # 2 Change in Nature of Use (Pg 4 of 6)

Consumptive Use Determination for 35-2642 (Cont.):

ET_{Idaho} --- Evapotranspiration and Consumptive Irrigation Water Requirements for Idaho

Data as of 11/05/2008 from @ http://www.kimberly.uidaho.edu/ETIdaho/

Kettle Butte (AgriMet --KTBI)

Alfalfa - less frequent cuttings*

Precipitation Deficit (P_{Def})

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Growing Season[a]	Annual
Mean	mm/day												mm	
Monthly[b]	-0.05	-0.09	0.48	0.65	4.04	6.45	6.25	6.62	4.14	2.90	0.32	-0.17	947	968

Potatoes - cold pack (late harvest)

Precipitation Deficit (P_{Def})

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Growing Season[a]	Annual
Mean	mm/day												mm	
Monthly[b]	-0.06	0.05	0.50	0.49	0.77	2.50	6.49	6.82	3.97	0.61	0.01	-0.17	632	675

Spring Grain - Irrigated

Precipitation Deficit (P_{Def})

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Growing Season[a]	Annual
Mean	mm/day												mm	
Monthly[b]	-0.10	-0.10	0.31	0.44	2.32	5.72	8.62	4.86	0.48	0.19	-0.04	-0.19	676	693

Consumptive Use Calculations:

Using the Kettle Butte (AgriMet -KTBI) station for Alfalfa - less frequent cuttings*, the Precipitation Deficit (P_{def}) is 947 mm or 3.1 ac-ft/ac. (Data as of 11/05/2008 from http://www.kimberly.uidaho.edu/ETIdaho/, ET_{Idaho} - Evapotranspiration & Consumptive Irrigation, Kettle Butte (AgriMet -KTBI), Alfalfa - less frequent cuttings, Precipitation Deficit.)

Precipitation deficit (P_{Def}) - Alfalfa - less frequent cuttings*:

Growing Season 947 mm = 37.283 ac-in ÷ 12 = 3.107 = 3.1 ac-ft/ac

Consumptive Use = 3.1 ac-ft/ac

Rocky Mountain Environmental

Attachment # 2 Change in Nature of Use (Pg 5 of 6)

Change in Nature of Use Calculations:

Industrial Water Right Requirements:

Assume: Industrial Use is 100% Consumptive
Use will be 24 hours per day 365 days per year.

Required Diversion Rate: **0.70 cfs (452,426 gallons per day)**
(452,426 gal/day)(day/24 hr)(hr/60 min) ÷ (448.8 gal/min/cfs) = 0.70 cfs

Required Diversion Volume:
452,426 gal/day = 1.4 ac-ft per day
(452,426 g/d) ÷ (325,850 g/ac-ft) = 1.3884 ac-ft = 1.4 ac-ft per day.
506.8 ac-ft per annum
(0.70 cfs)(1.9835)(365 days) = 506.78 ac-ft/annum = 506.8 afa
(1.3884 ac-ft/day)(365 days) = 506.76 ac-ft/annum = 506.8 afa

****

Determine Portion 35-2642 required to Change Nature of Use:

Requirements for Industrial Use: 0.70 cfs, 506.8 afa

Acres of 35-2642 to be transferred:
Kettle Butte (AgriMet --KTBI), Precipitation deficit (P_{def}) - Alfalfa - less frequent cuttings
Calculations based on data as of 11/05/2008 from @ http://www.kimberly.uidaho.edu/ETIdaho/

Consumptive use = 3.1 ac-ft/ac (Calculations previous page)
(506.8 afa) ÷ (3.1 ac-ft/ac) = 163.483 ac = 163.5 ac

Transfer Acres of 35-2642 = 163.5 acres

Diversion rate (cfs) 35-2642 to be transferred:
Original water right: 7.18 cfs for 600 ac
Rate/acre = (7.18 cfs ÷ 600 ac) = 0.0119667 cfs/ac

Calculate cfs associated with the 163.5 acres
(0.0119667 cfs/ac)(163.5 ac) = 1.95655 = 1.96 cfs

Transfer Diversion Rate 35-2642 1.96 cfs/163.5 acres/654 afa

Provides for *INDUSTRIAL USE* = 0.70 cfs/506.8 afa

****

Determine Portion of 35-2642 for Irrigation of 5.0 acres:

7.18 cfs/600 ac = 0.0119667 cfs/ac X 5.0 ac = 0.0598 cfs = 0.06 cfs

Transfer Diversion Rate 35-2642 for *Irrigation* = 0.06 cfs & 5.0 acres

Attachment # 2 Change in Nature of Use (Pg 6 of 6)

Change in Nature of Use Analysis:

To split 35-2642 and 35-7203 it is necessary that there will be no expansion/enlargement of either water right. It is proposed to transfer a portion of 35-8078 to replace the transferred part of 35-2642, and to consider water right 35-7203 as an associated right.

Analysis Summary:

a. 35-2642 - Transfer Part: 2.02 cfs, 168.5 ac @ 4.0 af/ac (674 afa)

Irrigation	= 0.06 cfs/ 5.0 ac/ 20.0 afa	= 0.60 cfs/ 20.0 afa/5 acre
Irrigation to Industrial	= 1.96 cfs/163.5 ac/654.0 afa	= 0.70 cfs/ 506.8 afa
Total	= 2.02 cfs/168.5 ac/674 afa	= 0.76 cfs/ 526.8 afa/5 acre

b. 35-2642 - Remaining Part REDUCED: 5.16 cfs, 431.5 ac & 1726 afa (w/in 1112 ac)*
*In combination w/168.5 acres (674 afa) of 35-8078 (Transfer Part) & 35-7203

c. 35-7203 - 8.00 cfs, 1112 acres & 3379.9 afa - Treat as a associated right and make appropriate changes to conditions.

d. 35-8078 - Transfer Part: 1.86 cfs, 168.5 ac @ 4.0 af/ac (674 afa)

e. 35-8078 - Remaining Part REDUCED: 5.72 cfs on 519.5 ac @ 4.0 af/ac (2078 afa)

With the change in nature of use of the 163.5 ac (654 afa) for irrigation to 506.8 afa for industrial use there is a reduction in the 674.0 afa of transferred volume to 526.8 afa (506.8 afa Industrial + 20.0 afa Irrigation) a difference of 147.2 afa.

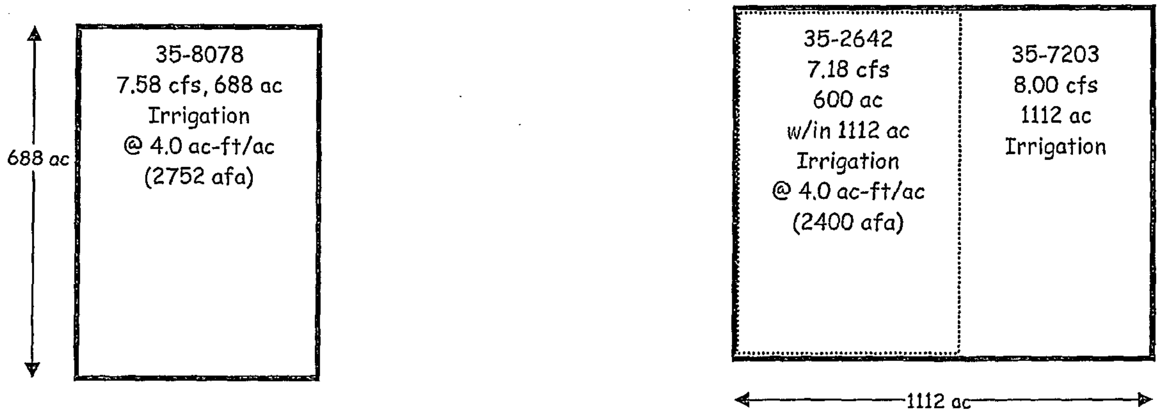
Based on the analysis herein the transfers of 35-2642 and 35-8078 in conjunction with the change in nature of use of a portion of 22-2642 would result in no expansion or enlargement.

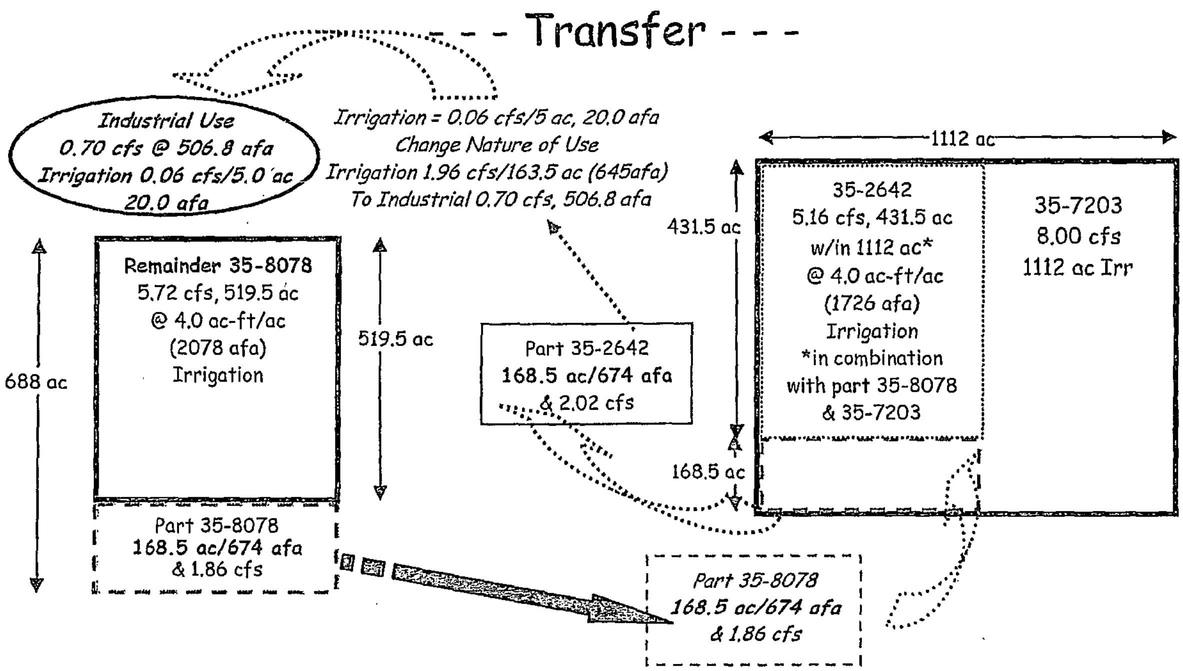
Page ________ of __________ Transfer No. __________

Attachment # 3 – Graphic Overview (Pg 1 of 1)

Graphic Overview of Proposed Transfer:

Original Water Rights 35-2642, 35-7203 & 35-8078:





Page ________ of ____________ Transfer No. ____________

Attachment # 4 – ESPA Analysis (Page 1 of 7)

ESPA Ground Water Rights Transfer Spreadsheet Data Summary

TRANSFER NO:		PREPARED BY:	Rocky Mountain Environmental Associates - Keith C. Wilson
TRANSFER NAME:	AREVA NC 35-2642	DATE:	9/15/2008
		Transfer Tool Version	Version 3.1

WATER RIGHTS INVOLVED:

Group 1 Transfer Rights		Group 2 Add. Mitigation Rights	
Right No.	Priority Date	Right No.	Priority Date
35-2642	02/14/1961		
35-7203	01/13/1972		
35-8078	1/14/1983		

HISTORIC BENEFICIAL USE:

Trans/Mit. Rights (group no.)	Acres to Dry Up (ac)	Beneficial Use (afa/yr)	Total (af/yr)
1	168.5	4.0	654
1	0	4.0	2048
1	168.5	4.0	674

35-7203 considered an associated water right with no reduction in cfs, acres, or volume since 35-8078 will replace the transferred cfs, acres and volume of 35-2642

MODEL CELL LOCATIONS:

	TO WELL	FROM1 WELL	FROM2 WELL	FROM3 WELL
ROW	58	60	58	0
COLUMN	148	151	148	0

	Start Date		End Date		Water Use		Acres	
	Season	Year	Season	Year	Annual (af/yr)	Trimester (af/trimester)	Authorized (acres)	
TO Well (Projected Use)	Spring	2009	Winter	2111	506.8	168.9		35-2642 Trans 168.5 ac & 654 afa to 0.06 cfs/5 ac Irr. & Change Nature of Use of 163.5 ac/654 afa to 0.70cfs & 506.8 afa (01/01-12/1).
					20.0	6.7	5	
FROM1 Well (With Transfer)	Spring	1961	Winter	1972	2400	800	600	
	Spring	1973	Winter	2111	4448	1482.7	1112	
FROM1 Well (W/O Transfer)	Spring	1961	Summer	2111	4448	1482.7	1112	35-7203 No volume, cfs or acres reduction.
FROM2 Well (With Transfer)	Spring	1983	Winter	2008	2752	917.3	688	
	Spring	2009	Winter	2111	2078	692.7	519.5	35-8078 Trans 168.5 ac & 654 afa to Original P/U of 35-7203/2642 Volume & Acres remain the same
FROM2 Well (W/O Transfer)	Spring	1983	Winter	2111	2752	917.3	688	

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Attachment # 4 - ESPA Analysis (Page 2 of 7)

Data Entry Sheet:

ENHANCED GROUND-WATER RIGHTS TRANSFER SPREADSHEET

UNIVERSITY OF IDAHO - IDAHO WATER RESOURCES RESEARCH INSTITUTE

IDAHO DEPARTMENT OF WATER RESOURCES

Irrigation to Change Nature of Use & Irrigation

ENTER STARTING DATE FOR SIMULATION. THEN PUSH "UPDATE DATES" BUTTON		TRANSFER NO:
YEAR	1962	TRANSFER NAME: AREVA
SEASON	Spring	

ENTER CELL LOCATIONS:	'TO' CELL	'FROM1' CELL	'FROM2' CELL	'FROM3' CELL
ROW	58	60	58	0
COLUMN	148	151	148	0

TRIMESTER OF ACTIVITY	TO WELL Projected Use AF/TRIMESTER	FROM1 WELL With Transfer AF/TRIMESTER	FROM1 WELL With w/o Transfer AF/TRIMESTER	FROM2 WELL With Transfer AF/TRIMESTER	FROM2 WELL Without Transfer AF/TRIMESTER
SPR 1962	0	800	800	0	0
SUM 1962	0	1,600	1,600	0	0
WIN 1962	0	0	0	0	0
SPR 1972	0	800	800	0	0
SUM 1972	0	1,600	1,600	0	0
WIN 1972	0	0	0	0	0
SPR 1973	0	1,483	1,483	0	0
SUM 1973	0	2,965	2,965	0	0
WIN 1973	0	0	0	0	0
SPR 1982	0	1,483	1,483	0	0
SUM 1982	0	2,965	2,965	0	0
WIN 1982	0	0	0	0	0
SPR 1983	0	1,483	1,483	917	917
SUM 1983	0	2,965	2,965	1,835	1,835
WIN 1983	0	0	0	0	0
SPR 2008	0	1,483	1,483	917	917
SUM 2008	0	2,965	2,965	1,835	1,835
WIN 2008	0	0	0	0	0
SPR 2009	176	1,483	1,483	693	917
SUM 2009	182	2,965	2,965	1,385	1,835
WIN 2009	169	0	0	0	0
SPR 2111	176	1,483	1,483	693	917
SUM 2111	182	2,965	2,965	1,385	1,835
WIN 2111	169	0	0	0	0

Spring, Summer and Winter trimester values were calculated as follows:

Industrial (01/01-12/31) = 506.8 afa ÷ 3 = 168.93 ac-ft/tri

Irrigation (04/01-10/31) = 20.0 afa (SPR ⅓ = 6.67 ac-ft/tri; Sum ⅔ = 13.33 ac-ft/tri)

SPR = 176 ac-ft/tri = 175.60 ac-ft/tri = (168.93 ac-ft/tri + 6.67 ac-ft/tri)

SUM = 182 ac-ft/tri = 182.26 ac-ft/tri = (168.93 ac-ft/tri + 13.33 ac-ft/tri)

WIN = 169 ac-ft/tri = 168.93 ac-ft/tri

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Attachment # 4 - ESPA Analysis (Page 3 of 7)

Change Ratio Table:

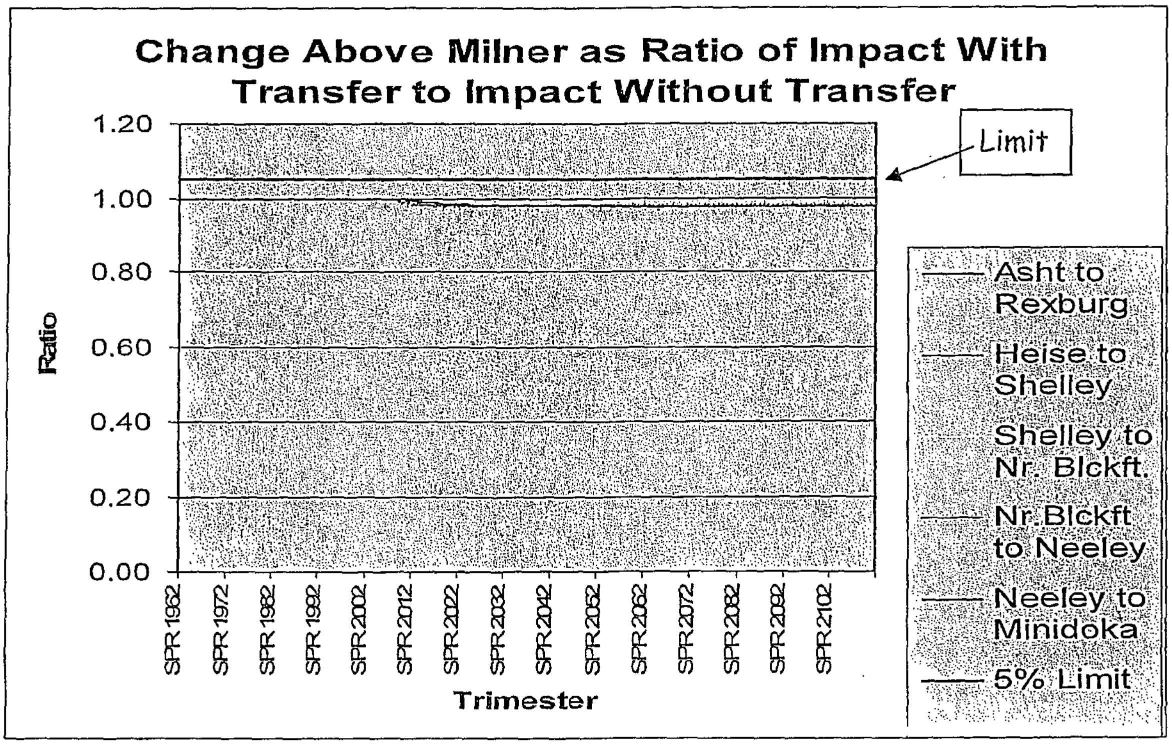
Change Ratio of impact with and without transfer

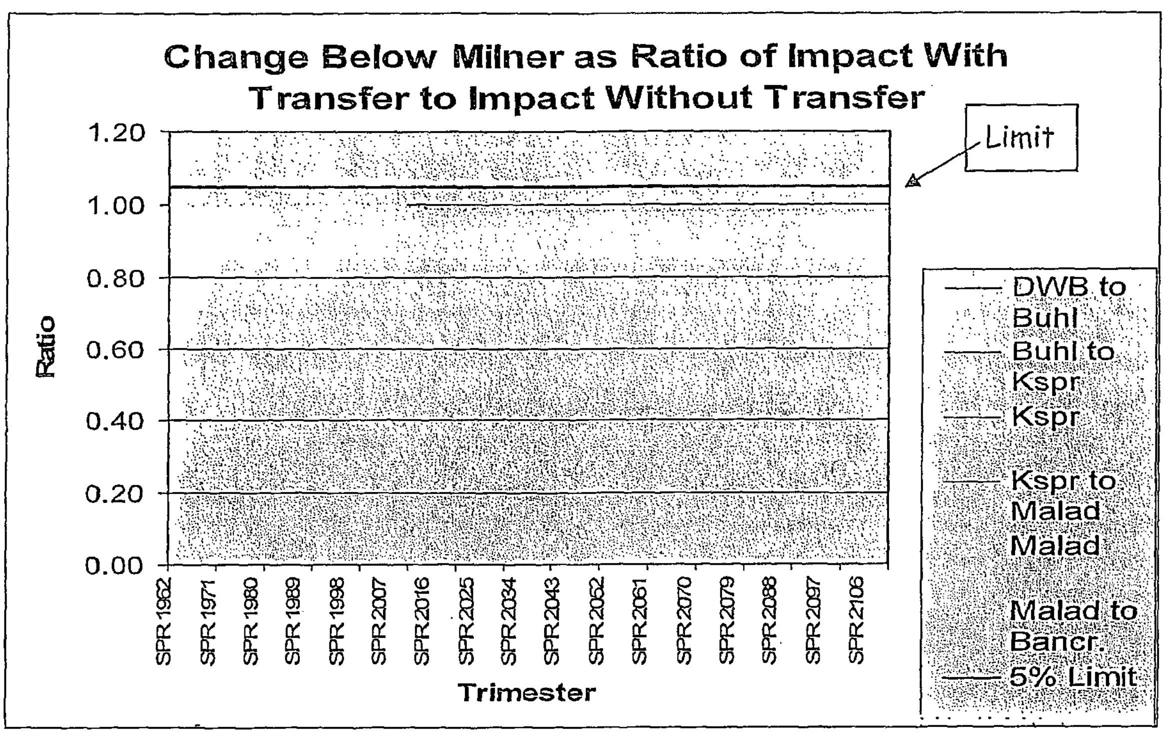
Period	Asht to Rex	Heise to Shelley	Shelley to Nr. Blckft.	Nr.Blckft to Neeley	Neeley to Minidoka	DWB to Buhl	Buhl to Kspr	Kspr	Kspr to Malad	Malad	Malad to Bancr.
SPR 2009	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	100.0%
SUM 2009	1.00	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	100.0%
WIN 2009	1.00	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	100.0%
SPR 2010	1.00	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	100.0%
SUM 2010	1.00	0.99	0.98	0.99	1.00	1.00	1.00	1.00	1.00	1.00	100.0%
WIN 2010	1.00	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	100.0%
SPR 2103	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
SUM 2103	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
WIN 2103	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
SPR 2104	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
SUM 2104	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
WIN 2104	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
SPR 2105	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
SUM 2105	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
WIN 2105	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
SPR 2106	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
SUM 2106	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
WIN 2106	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
SPR 2107	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
SUM 2107	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
WIN 2107	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
SPR 2108	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
SUM 2108	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
WIN 2108	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
SPR 2109	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
SUM 2109	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
WIN 2109	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
SPR 2110	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
SUM 2110	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	98.0%
WIN 2110	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	97.9%
SPR 2111	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	97.9%
SUM 2111	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	97.9%
WIN 2111	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	97.9%

The Change Ratio for each reach has a value less than the maximum allowable hydrologic effect of 1.05 or 5%. A Change Ratio of less than 1.00 represents a net positive effect as a reduction in depletion, and is treated as a form of recharge.

Attachment # 4 - ESPA Analysis (Page 4 of 7)

Change Ratio Graphs:





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Calculated Effects Chart:

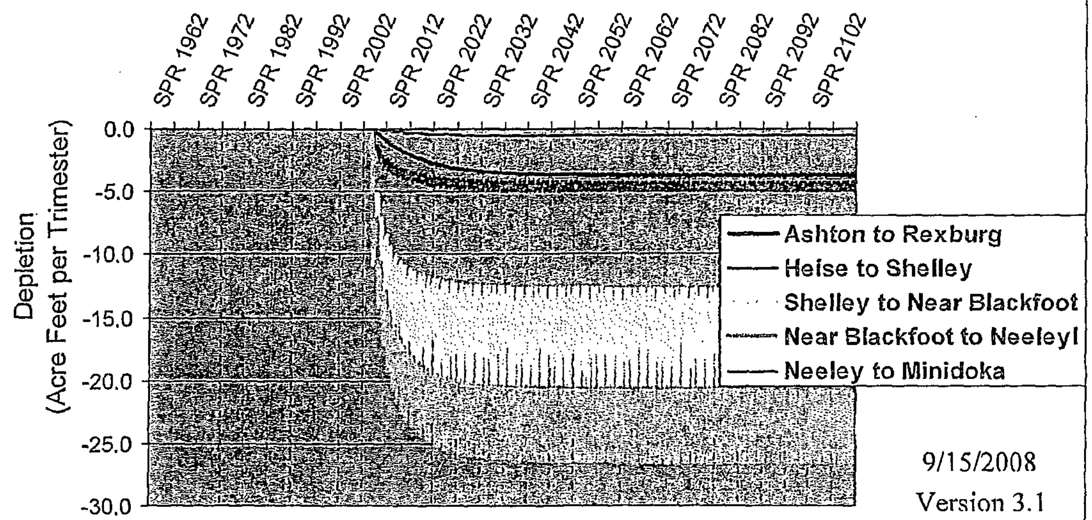
Period	Asht to Rex	Heise to Shelley	Shelley to Nr. Blckft.	Nr.Blckft to Neeley	Neeley to Minidoka	DWB to Buhl	Buhl to Kspr	Kspr	Kspr to Malad	Malad	Malad to Bancr.
SPR 2008	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SUM 2008	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WIN 2008	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPR 2009	0.0	-0.2	-1.7	-1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SUM 2009	-0.2	-1.4	-10.8	-9.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WIN 2009	-0.3	-1.4	-5.5	-7.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPR 2010	-0.4	-1.4	-5.2	-7.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SUM 2010	-0.6	-2.3	-13.6	-14.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
WIN 2010	-0.7	-2.2	-7.8	-11.7	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
SPR 2012	-1.0	-2.4	-8.5	-12.9	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
SUM 2012	-1.2	-3.2	-16.5	-19.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
WIN 2012	-1.2	-3.0	-10.4	-16.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
SPR 2013	-1.3	-2.7	-9.4	-14.5	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0
SUM 2013	-1.4	-3.5	-17.3	-20.6	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0
WIN 2013	-1.5	-3.2	-11.1	-17.4	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0
SPR 2015	-1.7	-3.1	-10.5	-16.6	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0
SUM 2015	-1.8	-3.9	-18.3	-22.5	-0.3	-0.1	0.0	0.0	0.0	0.0	0.0
WIN 2015	-1.9	-3.6	-12.0	-19.1	-0.3	-0.1	-0.1	0.0	0.0	0.0	0.0
SPR 2016	-1.9	-3.3	-10.9	-17.3	-0.3	-0.1	-0.1	0.0	0.0	0.0	0.0
SUM 2016	-2.0	-4.0	-18.6	-23.1	-0.3	-0.2	-0.1	0.0	0.0	0.0	0.0
WIN 2016	-2.1	-3.7	-12.3	-19.7	-0.3	-0.2	-0.1	0.0	0.0	0.0	0.0
SPR 2017	-2.1	-3.4	-11.2	-17.8	-0.3	-0.2	-0.1	0.0	0.0	0.0	0.0
SUM 2017	-2.2	-4.1	-18.9	-23.6	-0.3	-0.2	-0.1	0.0	0.0	0.0	0.0
WIN 2017	-2.2	-3.8	-12.5	-20.1	-0.3	-0.2	-0.1	0.0	0.0	0.0	0.0
SPR 2018	-2.2	-3.5	-11.4	-18.2	-0.3	-0.2	-0.1	-0.1	0.0	0.0	0.0
SUM 2018	-2.3	-4.2	-19.1	-24.0	-0.3	-0.2	-0.1	-0.1	0.0	0.0	0.0
WIN 2018	-2.4	-3.9	-12.7	-20.5	-0.3	-0.2	-0.1	-0.1	0.0	-0.1	0.0
SPR 2109	-3.7	-4.2	-12.7	-20.8	-0.6	-0.6	-0.2	-0.1	0.0	-0.1	0.0
SUM 2109	-3.7	-4.9	-20.3	-26.5	-0.6	-0.6	-0.2	-0.1	0.0	-0.1	0.0
WIN 2109	-3.7	-4.6	-13.9	-22.9	-0.6	-0.6	-0.2	-0.1	0.0	-0.1	0.0
SPR 2110	-3.7	-4.2	-12.7	-20.8	-0.6	-0.6	-0.2	-0.1	0.0	-0.1	0.0
SUM 2110	-3.7	-4.9	-20.3	-26.5	-0.6	-0.6	-0.2	-0.1	0.0	-0.1	0.0
WIN 2110	-3.7	-4.6	-13.9	-22.9	-0.6	-0.6	-0.2	-0.1	0.0	-0.1	0.0
SPR 2111	-3.7	-4.2	-12.7	-20.8	-0.6	-0.6	-0.2	-0.1	0.0	-0.1	0.0
SUM 2111	-3.7	-4.9	-20.3	-26.5	-0.6	-0.6	-0.2	-0.1	0.0	-0.1	0.0
WIN 2111	-3.7	-4.6	-13.9	-22.9	-0.6	-0.6	-0.2	-0.1	0.0	-0.1	0.0

The Calculated Net Effects for each reach are negative values representing a net positive effect as a reduction in depletion of the aquifer, and is treated as a form of recharge.

Attachment # 4 - ESPA Analysis (Page 6 of 7)

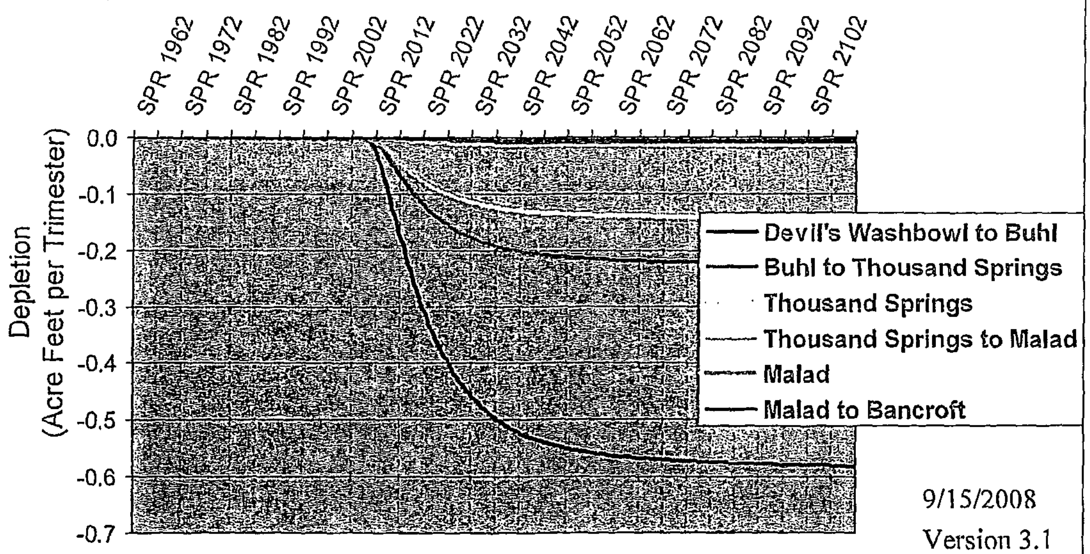
Net Transfer Effect Charts:

Net Transfer Effect Above Milner
(Total Effect With Transfer - Total Effect Without Transfer)



Customer Name: AREVA Transfer No: Irr-

Net Transfer Effect Below Milner
(Total Effect With Transfer - Total Effect Without Transfer)



Customer Name: AREVA Transfer No: Irr-

Attachment # 4 - ESPA Analysis (Page 7 of 7)

ESPA Analysis:

The purpose of this ESPA Spreadsheet is to provide for the analysis of hydrologic effects of the proposed ground water transfers within the Eastern Snake Plain Aquifer on gains and losses of the Snake River. The spreadsheet demonstrates how these hydrologic effects vary over time in eleven reaches of the Snake River.

The ESPA Spreadsheet Analysis model resulted in a negative value in comparing the hydrologic impacts from the existing uses with those that would result from the proposed transfer. A negative value indicates a beneficial effect on the flow of a reach.

Conclusion:

As indicated by the ESPA Spreadsheet model the hydrologic effects do not exceed the effects from the existing use and indicates a net positive gain that would occur after the proposed ground water right transfers. The net positive gain is a reduction in the depletion of the aquifer resulting in either greater spring discharges to or decreased seepage from the river, and is treated as a form of recharge.

Based on the ESPA Spreadsheet no mitigation or additional actions are required to achieve a balance of hydrologic effects.

Instrument # 1298615
IDAHO FALLS, BONNEVILLE, IDAHO
2008-05-05 11:03:00 AM No. of Pages: 7
Recorded for: IDAHO TITLE & TRUST, INC.
RONALD LONGMORE Fee:21.00
Ex-Officio Recorder Deputy SJacobs
Index To: MEMORANDUM
Electronically Recorded by Simplifile

RECORDING REQUESTED BY AND WHEN RECORDED RETURN TO:

Melanie Rubocki, Esq.
Perkins Coie LLP
251 East Front Street, Suite 400
Boise, Idaho 83702

(Space Above For Recorder's Use)

MEMORANDUM OF REAL PROPERTY PURCHASE OPTION AGREEMENT

NOTICE IS HEREBY GIVEN that a Real Property Purchase Option Agreement (the "***Agreement***") has been entered into as of the 30th day of April 2008, by and among Gold Emblem Farms, an Idaho general partnership (the "***Seller***"), and AREVA NC Inc., a Delaware corporation, whose principal place of business is 4800 Hampden Lane, Suite 1100, Bethesda, Maryland, 20814 (the "***Purchaser***"). The Agreement affects approximately Four Thousand Ninety-Five (4,095) acres of undeveloped real property described therein located in Bonneville County, Idaho, and a portion of Idaho State Water Right Number 35-2642 that will result in the transfer of 452,426 gallons per day (0.70 cubic feet per second (CFS) and 506.8 acre-feet per annum (AFA)) of industrial use water to the Property, but not to exceed four (4) CFS and 1,337 AFA of irrigation use water, more particularly described in Exhibit A attached hereto (the "***Property***").

All the terms, conditions, and covenants of the Agreement are incorporated herein by this reference. Without limiting the generality of the foregoing incorporation by reference, pursuant to the terms of the Agreement, Seller is prohibited from transferring or further encumbering the Property, or any portion thereof during the term of the Agreement.

IN WITNESS WHEREOF, the above named parties have executed this Memorandum of Real Property Purchase Option Agreement as of the day and year first above written.

[Signature Page Follows]

**IDAHO TITLE & TRUST
P.O. BOX 50367
IDAHO FALLS, ID 83405**

State of Idaho
DEPARTMENT OF WATER RESOURCES
900 N. Skyline Dr., Suite A • Idaho Falls, Idaho 83402-1718
Phone: (208) 525-7161 • Fax: (208) 525-7177 • Web Site: www.idwr.idaho.gov
EASTERN REGION

C. L. "BUTCH" OTTER
Governor
DAVID R. TUTHILL, JR.
Director

December 10, 2008

AREVA NC INC
4800 HAMPDEN LANE STE 1100
BETHESDA MD 20814

RE: Application for Transfer No 75268
Water Right No(s) 35-2642

Dear Applicant(s):

The Department of Water Resources acknowledges receipt of your water right transfer application. Please refer to the above referenced transfer number in all future correspondence regarding this application.

A legal notice of the application has been prepared and is scheduled for publication in the Post Register on December 18 and 25, 2008. Submittal of protests to this application will be allowed for a period ending ten days after the second publication.

If the application is protested you will be sent a copy of the protest(s). All protests must be resolved before the application can be considered for approval. If the protest(s) cannot be resolved voluntarily, the Department will conduct a conference and/or hearing on the matter.

If the application is not protested, it will be forwarded to our State Office in Boise for final processing. The State Office will notify you of any action taken on the application and will send you a copy of the permit if approved.

Please feel free to contact this office if you have any questions regarding this procedure.

Sincerely,

Sharla Cox

Sharla Cox
Administrative Assistant

ATTACHMENT 10.2-3

EREF REFERENCE

Groundwater Pump Drawdown Report

1.0 AQUIFER TEST CALCULATION BRIEF

TRANSMISSIVITY AND STORATIVITY OF BASALT AQUIFER BENEATH PROPOSED EAGLE ROCK ENRICHMENT PLANT

1.1 Introduction

The objective of the aquifer pumping test conducted at the Lava 3 well was to estimate the storativity (S) and transmissivity (T) of the upper hydrostratigraphic unit within the Snake River basalts beneath the proposed Eagle Rock Enrichment Plant. The aquifer parameters were estimated using a constant rate pumping test and a residual drawdown (recovery) test as per the Groundwater Field Study Plan (MWH, 2008), and standard well test analytical solutions (see Section 1.4). Key inputs to the analysis are elapsed time, drawdown in either the pumping well or an observation well, well construction details, and stratigraphic data for the pumped zone (e.g., piezometric or water level, top and bottom depths of the pumped zone, and depths of confining or leaky layers). Water level measurements could not be made in the pumping well (Lava 3), so monitoring well GW-5 was installed at a radial distance of approximately 15 meters (50 feet) and used to monitor drawdown in the aquifer.

1.2 Test Methods

The aquifer pumping test was conducted using the Lava 3 irrigation well as the pump well and the nearby monitoring well GW-5 as an observation well. The test was conducted in accordance with SOP #X, and consisted of:

- Pre-test monitoring with no pumping for three days to measure local water level trends;
- Constant rate pumping test for 72 hours; and
- Monitoring of residual drawdown (recovery) for 24 hours

The water levels were measured in GW-5 using an InSitu LevelTroll 700 and a BaroTroll, which were factory calibrated. Each of the test periods are explained in the following sub-sections.

1.2.1 Pre-Test Monitoring

The pumping well (Lava 3) was in operation for irrigation prior to the pumping test, and so was shutdown on June 7, 2008. Water levels and barometric pressure were then monitored continuously (every 10 minutes) in GW-5 to evaluate any pre-test trends in water levels and the relationship between barometric pressure and the water level prior to the pumping test.

The pre-test period lasted for three days from June 8 to 14, 2008, as shown on the attached graph (***Pre-Test Water Levels and Barometric Pressures***). At the beginning of the test period weather conditions were cold and windy with some storm fronts moving through the area, and barometric pressures were on the low end. During the course of the test period, the weather remained windy, but gradually warmed up, with barometric pressures steadily rising.

Water levels during this period were relatively stable, varying less than 0.15 feet. The variations that did occur appeared to be at least partially related to barometric pressure changes and wind, with changes in pressure up to 0.15 psi (1.7 feet equivalent). As barometric pressure changed, the water levels also changed over a general increasing or decreasing trend of days. There is also a more random oscillation in the pressure and water levels that changes trend every 4 to 12 hours, and is likely related to wind and shorter period weather changes..

The barometric efficiency (BE) is the ratio of change in water level (Δh) to the corresponding change in pressure (Δp) (Kruseman and de Ritter (2000) or:

$$BE = \gamma(\Delta h/\Delta p),$$

where γ is the specific weight of water.

BE was estimated from the pre-test data by conducting a regression analysis between water levels (head above the transducer in feet) and the barometric pressure converted to feet equivalent. BE is typically in the range of 0.20 to 0.75. From changes in atmospheric pressure observed during the test and the known relationship between Δp and Δh, the water level changes due to atmospheric pressure alone (Δh_p) can be estimated, and is defined as the slope of the regression line.

The results of this regression analysis for the pre-test data are shown in the graph, ***Correlation Between Pre-Test Barometric Pressure and Head*** *(Attachment 1)*. As can be seen on this chart, the correlation coefficient (R^2) is 0.48 (the standard is generally ≥0.8). No other pumping wells are located less than a mile from the pumping well, and so this low value is simply due to barometric inefficiency of the aquifer. Using the available data as shown in the chart, the BE was estimated to be ~22%. The BE was then used to make corrections to the changes in water levels observed during the pumping test to correct for barometric pressure changes so that only changes due to pumping were analyzed, using the following relationship:

$S' = S + \Delta h_p$ for falling barometric pressures
$S' = S - \Delta h_p$ for rising atmospheric pressures

The difference between the uncorrected drawdown (S) and the corrected drawdown (S') is shown in Attachment 1.

1.2.2 72-Hour Constant Rate Test

The constant rate test began on June 11 and was discontinued on June 14, 2008 for a total elapsed time of 72.8 hours. The Lava 3 well is a large diameter (12-inch) irrigation well (Lava 3) originally installed in the 1970s. It was retrofitted with an 8-inch riser pipe and an surface-mounted electrical turbine operating a suction pump. The pump has a capacity of over 4,000 gallons per minute (gpm). The well is open to pumping from the piezometric surface to a depth of approximately 550 feet bgs.

During the constant rate test, the Lava 3 well was pumped at a constant rate of approximately 4,200 gallons per minute (gpm). Due to obstructions in the Lava 3 well, it was not possible to measure water levels during the constant rate test. Water levels and barometric pressure were continuously monitored during the constant rate test in GW-5, which is located 16.7 meters away. GW-5 is a 4-inch diameter PVC monitoring well screened from 706 to 746 feet bgs, and so partially penetrates the aquifer. Water levels were monitored a logarithmic time scale from less than once per second to a maximum of every 90 minutes at the end of the test period.

The changes in water levels (drawdown) can be seen in the graph, ***Drawdown During Constant Rate and Recovery Tests (Attachment 1)***. The water level in GW-5 dropped down in response to pumping rapidly at first, and then more slowly as the cone of depression developed and expanded outwards. Total drawdown was not more than 0.9 feet, but exhibited a classic response (Fetter, 1994). A pseudo-steady state appears to have been reached starting at 1×10^5 seconds (~28 hours). From 28 hours to the end of the test there were increases and decreases that appear to have been wind related, and then at about 2×10^5 seconds (53 hours) there appears to be a general decreasing trend (less drawdown). The decrease in drawdown after 53 hours is likely due to boundary affects (recharge during the test).

1.2.3 24-hour Recovery Test

On the morning of June 14, 2208 (72.8 hours into the constant rate test), the Lava 3 well pump was shut down. Water levels and barometric pressure were measured during this recovery period for 24 hours. Water levels were measured on a logarithmic time scale as during the constant rate test. Residual drawdown versus time is shown in above-mentioned graph, as well as the graph, **Residual Drawdown During the Recovery Test** (Attachment 1).

1.3 Analytical Solutions to Storativity and Transmissivity

The aquifer pumping test results were analyzed using the software package called AQTESOLV (version 4.0, Duffield, 2007). AQTESOLV is a graphical software package that was developed for the design and analysis of aquifer tests in confined, unconfined, leaky and fractured aquifers.

The first step in the analysis process is to develop a conceptual model for the pumped aquifer (e.g., confined or unconfined, equivalent porous medium or individual fracture flow, etc.). The pumped interval in the Laval 3 well (716-850 feet bgs) appears to be part of a confined to semi-confined aquifer. The primary indication that the aquifer is at least partially confined is the apparent response of water levels to barometric pressure changes, as discussed in Section 1.2.1. Consequently, the following two analytical solutions for unsteady radial flow to a confined aquifer were used to solve for S and T, as explained in detail in Fetter (1994) as well as AQTESOLV (Duffield, 2007):

- Theis Method for a confined aquifer using AQTESOLV
- Jacob Straight Line Method for a confined aquifer using AQTESOLV and manually

The results of these analyses are described in the following sections.

1.3.1 Theis Method

The Theis equation for non-equilibrium radial flow for a confined aquifer (Fetter, 1994) is a solution for unsteady flow to a fully penetrating well in a confined aquifer. The solution assumes a line source for the pumped well and therefore neglects well bore storage. Hantush (AQTESOLV, v.4) extended the Theis method to correct for partially penetrating wells. The solution uses the following equations:

$$h_o - h = \frac{Q}{4\pi T} W(u)$$

$$u = \frac{r2S}{4Tt}$$

where

Q	= *pumping rate [L³/T]*
r	= *radial distance [L]*
$h_o - h$	= *drawdown [L]*
S	= *storativity [dimensionless]*
t	= *time [T]*
T	= *transmissivity [L²/T]*

The assumptions used in this solution include the following:

- aquifer has infinite areal extent
- aquifer is homogeneous and of uniform thickness
- pumping well is fully or partially penetrating
- flow to pumping well is horizontal when pumping well is fully penetrating
- aquifer is confined
- flow is unsteady
- water is released instantaneously from storage with decline of hydraulic head
- diameter of pumping well is very small so that well storage can be neglected

The Theis method utilizes a set of type curves related to transmissivity and storativity based on a log-log plot of drawdown versus elapsed time (AQTESOLV, v.4) and the equations above.

The results of the analysis using the Theis method is shown in Attachment 2. Results of the analysis indicated a transmissivity (T) of 731,000 ft^2/dy and a storativity (S) of 0.03. Confined aquifers typically have storativities in the range of 0.005 to 0.00005, while unconfined aquifers typically have a specific yield (S_y) in the range of 0.1 to 0.3. An S of 0.03, is in between typical storage values for confined versus unconfined aquifers, and suggests that the aquifer is acting as an unconfined or semi-confined aquifer.

The recovery test was also analyzed with the Theis method (for recovery). Analysis of the recovery data resulted in a T of 881,000 ft^2/dy, similar to the constant rate results described above. S/S', the ratio of storativity during the constant rate test to storativity during recovery test, was 1.28. A value of S/S' greater than unity (1) indicates the influence of recharge during the test (Duffield, 2007), which was observed in the late time results, discussed in Section 1.2.2 above.

1.3.2 Jacob Straight-Line Method

The Jacob Straight-Line Method of analysis for non-equilibrium radial flow in a confined aquifer (Fetter, 1994) uses the following equations:

$$\mathrm{T} = \frac{2.3Q}{4\pi\Delta(h_o - h)}$$

and

$$\mathrm{S} = \frac{2.25Tt_o}{r2}$$

where

T	= *transmissivity (L^2/T)*
Q	= *pumping rate (L^3/T)*
$\Delta(h_o - h)$	= *drawdown per log cycle of time (L)*
S	= *storativity (dimensionless)*
r	= *radial distance to pumping well (L)*
t_o	= *time where straight line intersects zero drawdown axis on log time vs. drawdown plot (T)*

This method was used in AQTESOLV using a slight variation on the method called the Cooper-Jacob Method (Duffield, 2007). The results of the Cooper-Jacob analysis conducted in AQTESOLV are shown in Attachment 2, and indicated a T of 761,000 ft^2/dy and an S of 0.027, similar to the Theis solutions.

As a confirmation of the results, the Jacob Straight-Line method was also used manually to estimate T and S. The time versus drawdown was plotted on a semi-log plot, from which $\Delta(h_o - h)$ and t_o were estimated. The results of this manual analysis indicated a T of 778,800 ft^2/dy and an S of 0.03, also similar to the Theis solutions, and the Cooper-Jacob method above.

1.3.3 Hydraulic Conductivity

The hydraulic conductivity of the formation tested is calculated by dividing the transmissivity by the aquifer thickness. The aquifer thickness is based on an interpretation of the hydrostratigraphy observed during drilling. It is difficult based on the drillers log for Lava 3 to make an accurate assessment of the exact aquifer thickness, but based on observations in GW-1, it appears that the possible range of thickness could be 150 to over 300 feet. The Lava 3 well is open to pumping from the piezometric surface (~716 feet bgs) to the total depth of the well at 850 feet bgs (134 feet). The aquifer is defined as the interval from from the piezometric surface (~716 feet bgs) to the next major confining layer beneath 850 feet bgs. he individual basalt flows appear to increase in thickness with depth in GW-1, and so 350 feet seems to be a reasonable maximum aquifer thickness on a local scale. Therefore, the hydraulic conductivity is on the order of 2,000 to 2,500 ft/dy (7.0 to 9.0 x 10^{-1} cm/sec). However, if the aquifer thickness is closer to 200 feet thick, the hydraulic conductivity could be 4,500 ft/dy (1.5 cm/sec) or higher. It is important to note though, that this is a measure of the transimissivity of the aquifer as a whole. Individual fractures or void spaces may have transmissivities orders of magnitude higher, while the massive zones will have hydraulic conductivities orders of magnitude lower (as low as 1 x 10^{-8} cm/sec, as measured in the packer tests).

1.3.4 Sensitivity Analysis

The properties of the aquifer overwhelmingly control the response of water levels to the pumping. Other than the properties of the aquifer, the parameters that most affect the results of the aquifer test analysis for a fully penetrating well in confined to semi-confined aquifer, are the flow rate, and the radial distance between wells.

The pump was kept at a constant rate of 4,200 gpm, which was intended to be measured during the pump test, as is standard protocol. A flow meter was installed on one of two outflow pipes from the pumping well. Due to a miscommunication between the owner of the well and irrigation personnel, not all of the flow was going through the one outflow pipe during the entire test, so there were periods when only a portion of the flow was measured. The flow meter indicated 4,200 gpm when all the flow was flowing through the one outflow pipe, as was planned, and that value for Q was used in the analysis. If however, the flow rate were actually on the order of 3,000 gpm, that would reduce the value of T to 538,000 ft^2/dy and S to 0.02.

The radial distance of GW-5 from Lava 3 was measured using a hand-held GPS and so can not have varied during the test.

1.4 Conclusions

Based on the results of the constant rate and recovery tests, the aquifer parameters are as follows:

T = 731,000 to 881,000 ft^2/dy

S = 0.03
K = 2,000 to 2,500 ft/dy

The aquifer has a barometric efficiency of the 22% indicating that it is at least partially confined. Late state data during the constant rate test indicated the presence of a boundary condition in the form of additional recharge to the aquifer.

1.5 References

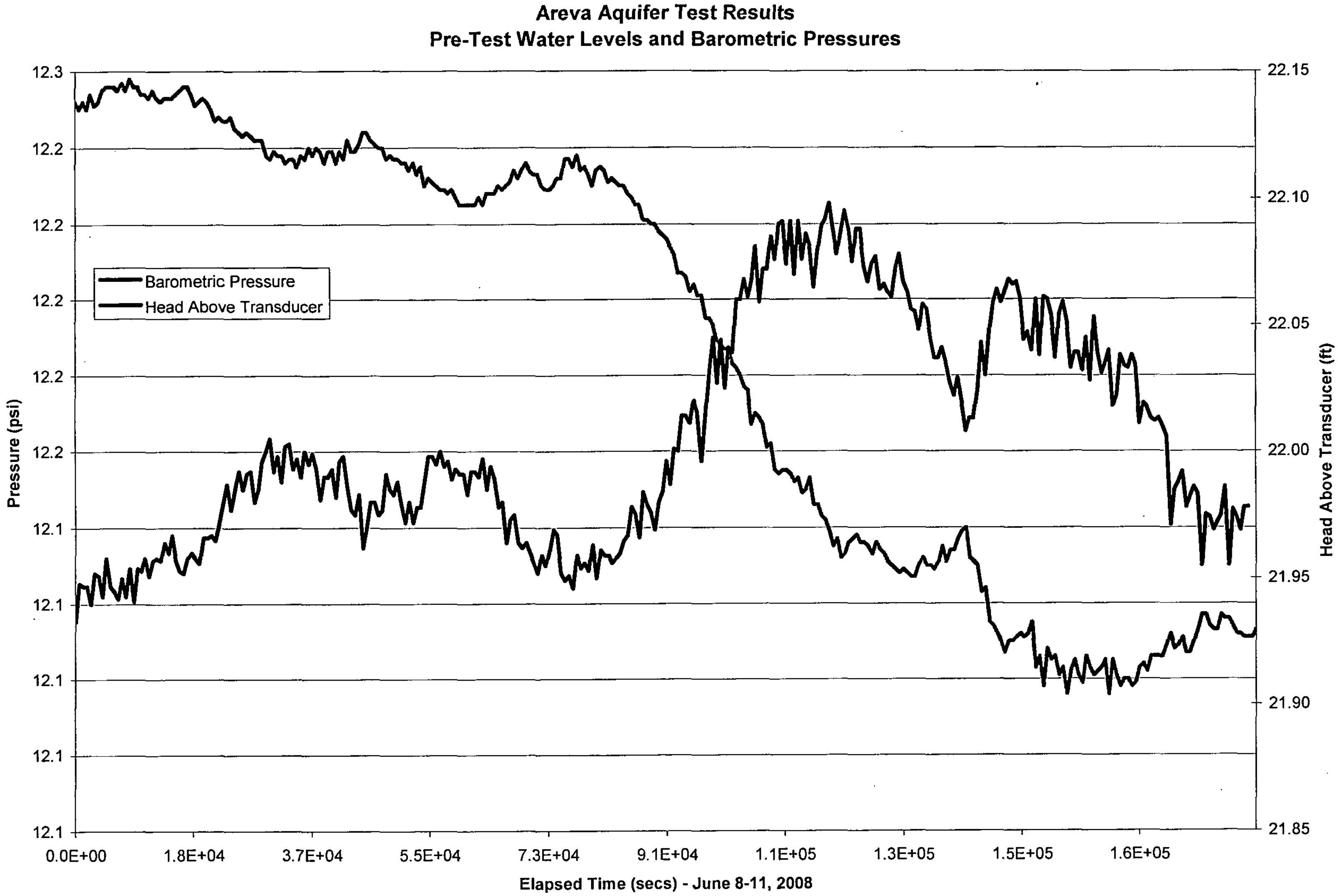
Fetter, 1994. pp. 145-146, and 214-243

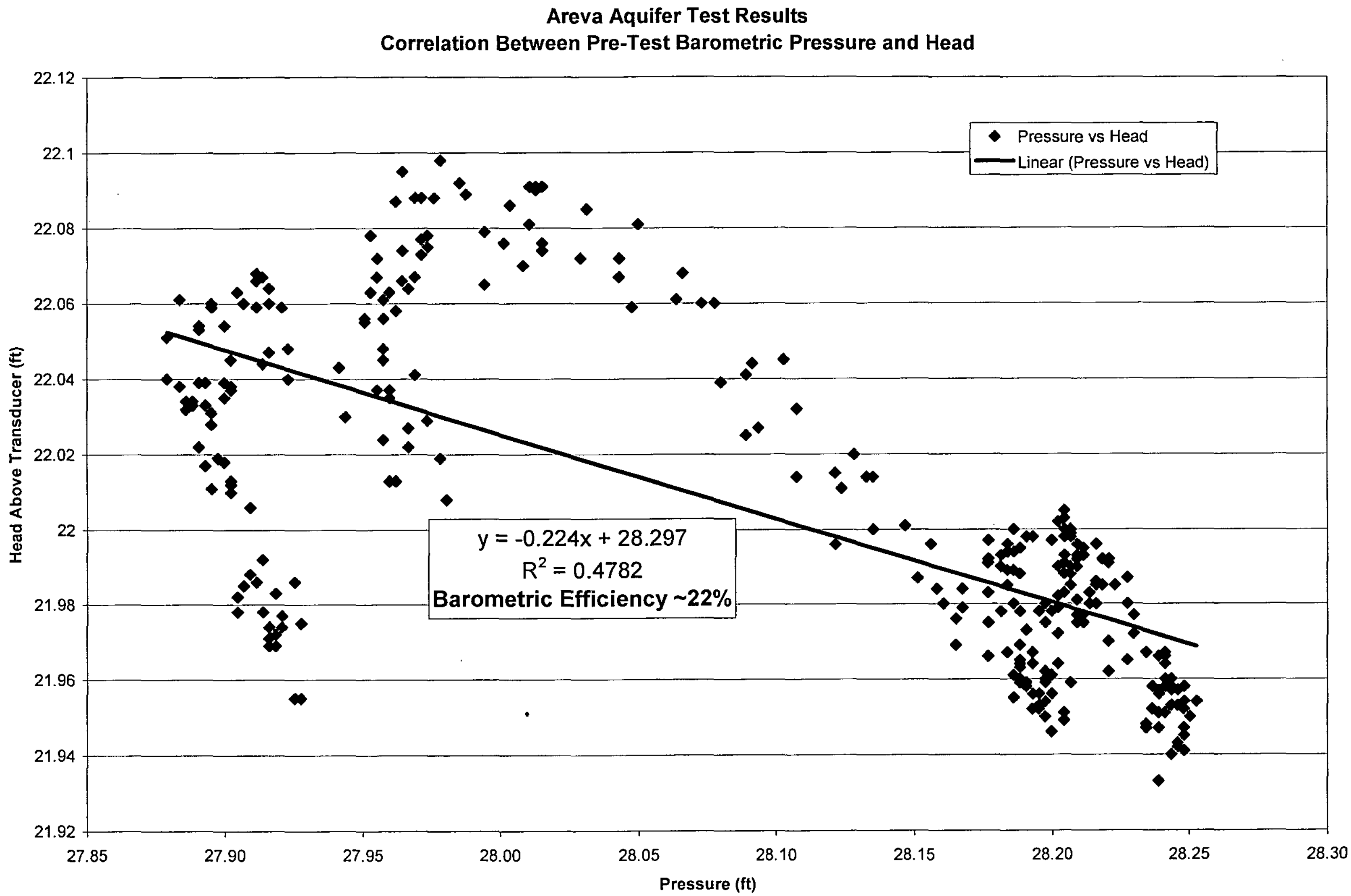
Freeze and Cherry, 1979. pp. 37, 145

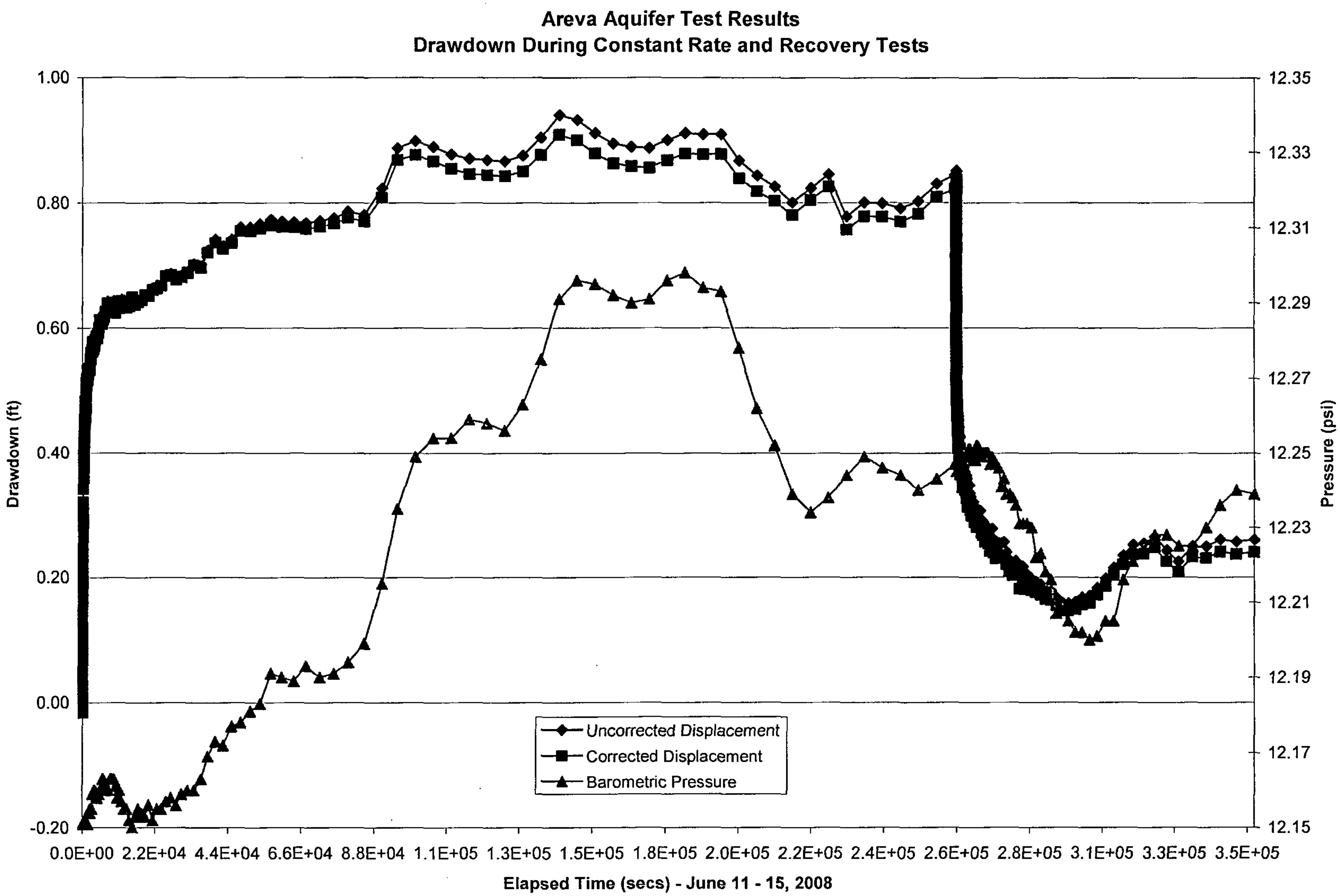
Duffield, G.M., 2007. *AQTESOLV for Windows Version 4.5 User's Guide*, HydroSOLVE, Inc., Reston, VA (accessed via help menu).

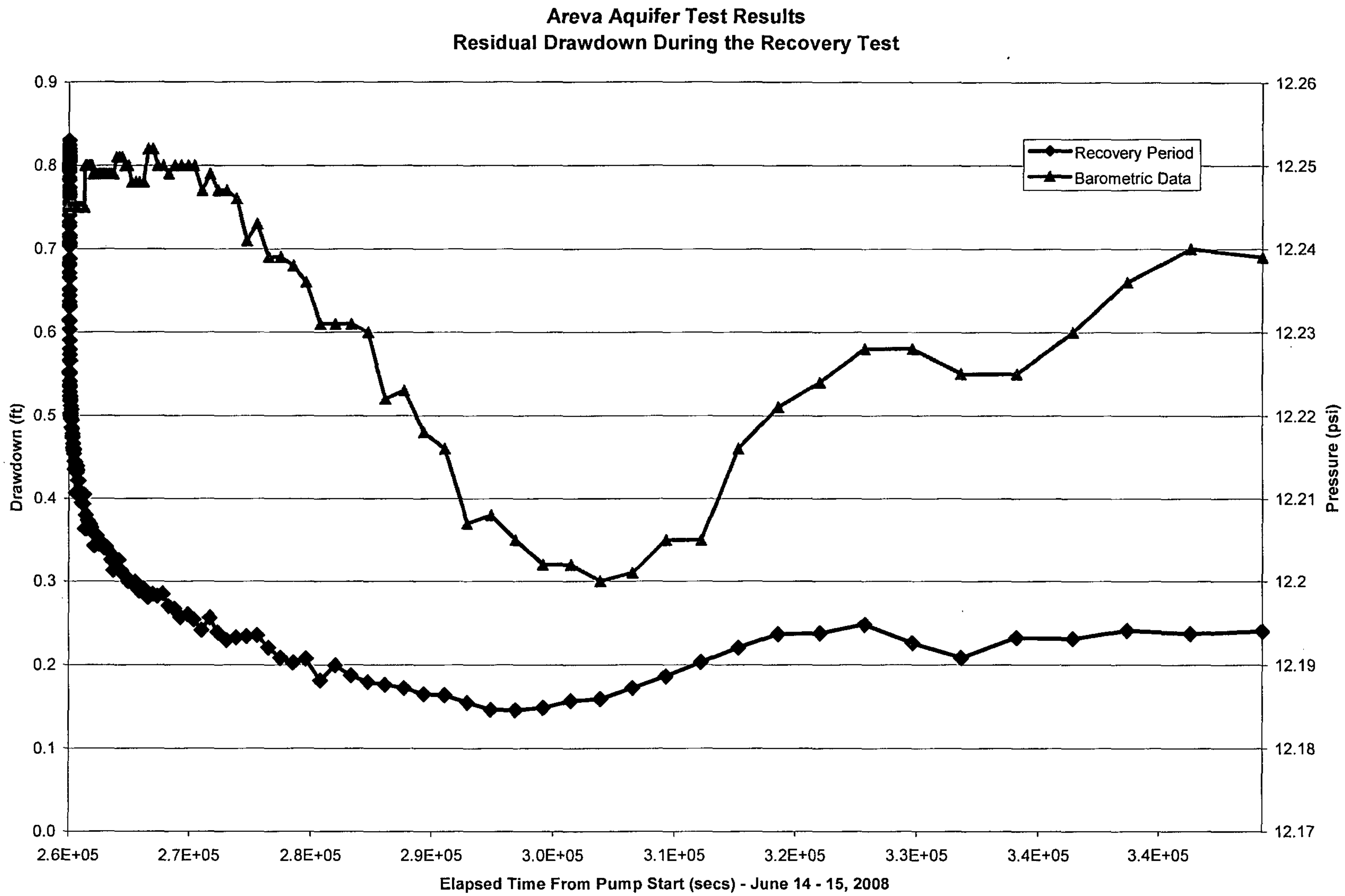
Kruseman, G.P., and de Ridder, N.A., 1990. *Analysis and Evaluation of Pumping Test Data*, Second Edition, International Institute for Land Reclamation and Improvement, The Netherlands, pp. 44-47.

ATTACHMENT 1


Areva Aquifer Test Results
Pre-Test Water Levels and Barometric Pressures
Barometric Pressure
Head Above Transducer
Pressure (psi)
12.3
12.2
12.2
12.2
12.2
12.2
12.1
12.1
12.1
12.1
12.1
Head Above Transducer (ft)
22.15
22.10
22.05
22.00
21.95
21.90
21.85
0.0E+00
1.8E+04
3.7E+04
5.5E+04
7.3E+04
9.1E+04
1.1E+05
1.3E+05
1.5E+05
1.6E+05
Elapsed Time (secs) - June 8-11, 2008


Areva Aquifer Test Results
Correlation Between Pre-Test Barometric Pressure and Head
Pressure vs Head
Linear (Pressure vs Head)
y = -0.224x + 28.297
R2 = 0.4782
Barometric Efficiency ~22%
Head Above Transducer (ft)
Pressure (ft)
22.12
22.1
22.08
22.06
22.04
22.02
22
21.98
21.96
21.94
21.92
27.85
27.90
27.95
28.00
28.05
28.10
28.15
28.20
28.25
28.30

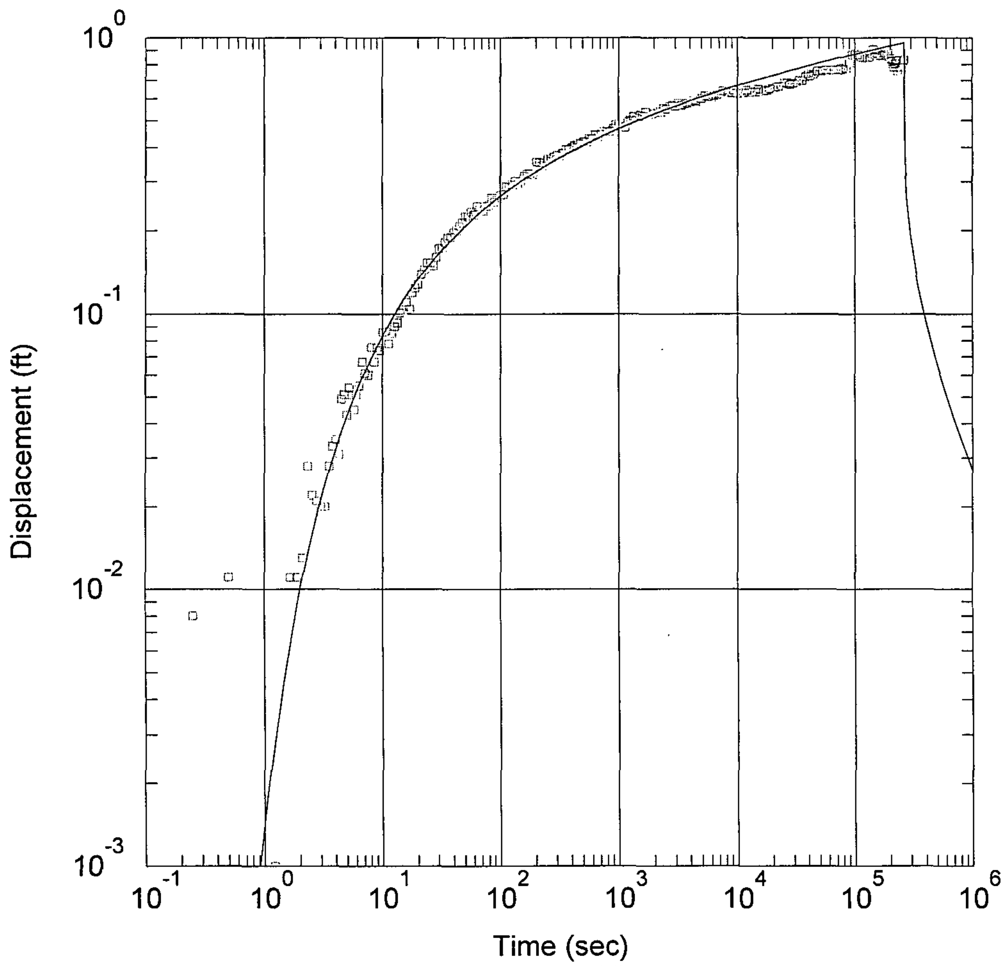

Areva Aquifer Test Results
Drawdown During Constant Rate and Recovery Tests
Drawdown (ft)
1.00
0.80
0.60
0.40
0.20
0.00
-0.20
Pressure (psi)
12.35
12.33
12.31
12.29
12.27
12.25
12.23
12.21
12.19
12.17
12.15
0.0E+00 2.2E+04 4.4E+04 6.6E+04 8.8E+04 1.1E+05 1.3E+05 1.5E+05 1.8E+05 2.0E+05 2.2E+05 2.4E+05 2.6E+05 2.8E+05 3.1E+05 3.3E+05 3.5E+05
Elapsed Time (secs) - June 11 - 15, 2008
Uncorrected Displacement
Corrected Displacement
Barometric Pressure


Areva Aquifer Test Results
Residual Drawdown During the Recovery Test
Recovery Period
Barometric Data
Drawdown (ft)
Pressure (psi)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
12.26
12.25
12.24
12.23
12.22
12.21
12.2
12.19
12.18
12.17
2.6E+05
2.7E+05
2.8E+05
2.9E+05
3.0E+05
3.1E+05
3.2E+05
3.3E+05
3.4E+05
3.4E+05
Elapsed Time From Pump Start (secs) - June 14 - 15, 2008

ATTACHMENT 2

Areva Environmental Report

Prepared By: MWH	Prepared For: Areva
Project: Theis Confined	Location: Idaho Falls, ID



Data Set: J:\...\Lava 3 - Theis Confined.aqt
Date: 07/03/08 Time: 13:20:27

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 7.306E+5 ft^2/day S = 0.03172
Kz/Kr = 1. b = 350. ft

WELL DATA

Pumping Wells

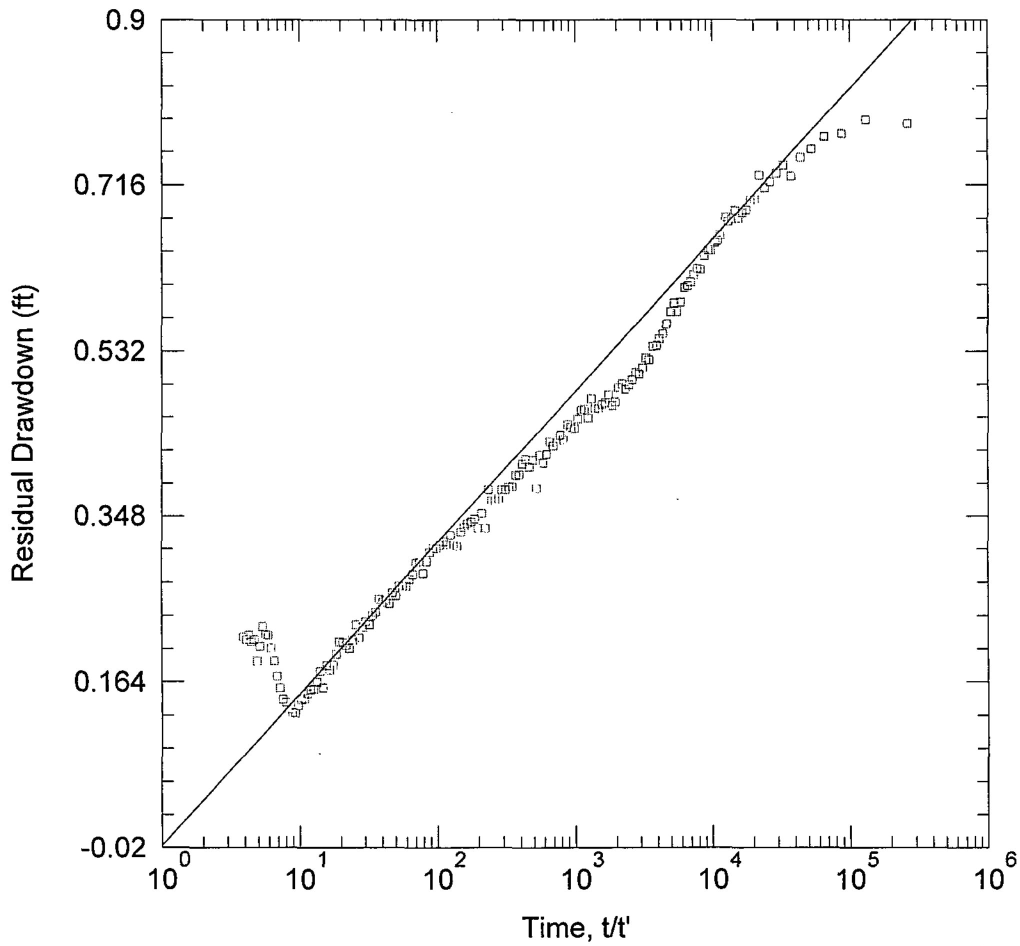
Well Name	X (ft)	Y (ft)
Lava 3	19851	24078

Observation Wells

Well Name	X (ft)	Y (ft)
▫ GW-5	19821	24124

Areva Environmental Study

Prepared By: MWH	Prepared For: Areva
Project: Theis Recovery	Location: Idaho Falls, ID



Data Set: J:\...\Lava 3 - Theis Recovery.aqt
Date: 07/03/08 Time: 13:32:08

SOLUTION

Aquifer Model: Confined
Solution Method: Theis (Recovery)

T = 8.81E+5 ft^2/day S/S' = 1.275

AQUIFER DATA

Saturated Thickness: 145. Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

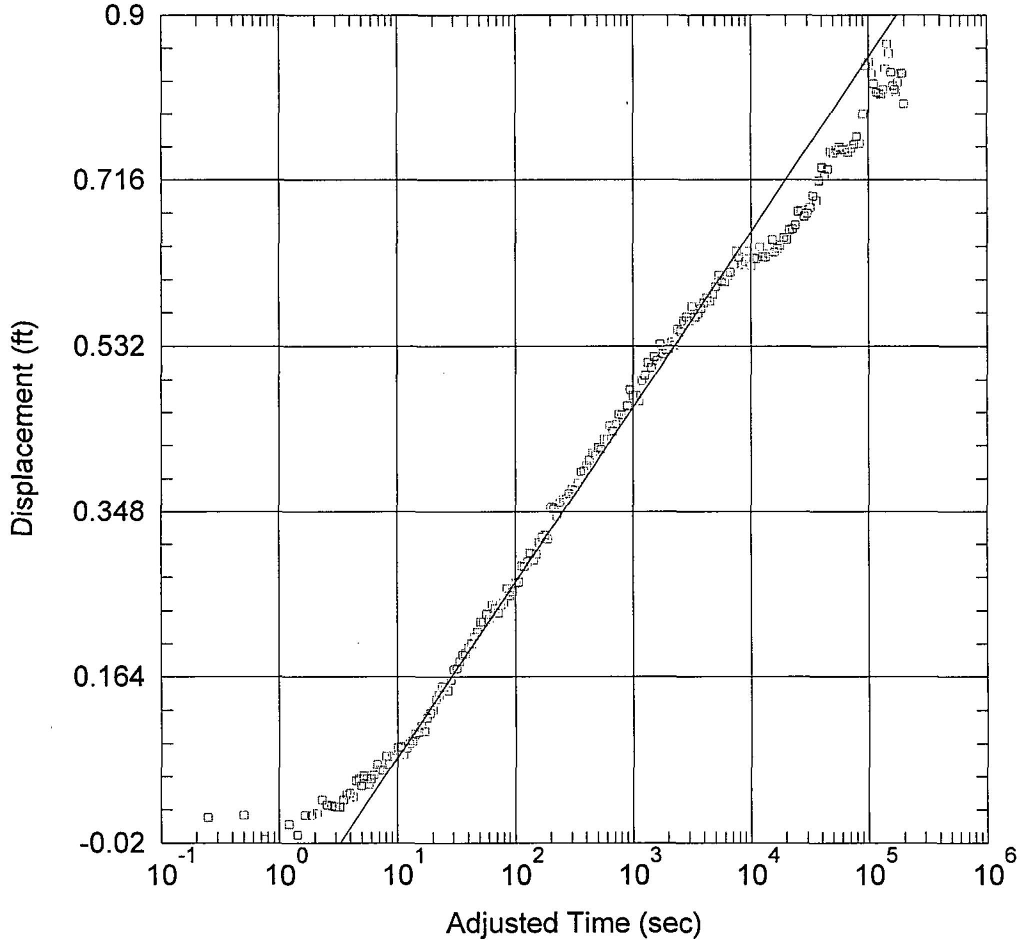
Well Name	X (ft)	Y (ft)
Lava 3	19851	24078

Observation Wells

Well Name	X (ft)	Y (ft)
▫ GW-5	19821	24124

Areva Environmental Study

Prepared By:	Prepared For:
MWH	Areva
Project: Cooper Jacob Confined	Location: Idaho Falls, ID



SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

T = 7.613E+5 ft^2/day   S = 0.02714

AQUIFER DATA

Saturated Thickness: 145. ft   Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Lava 3	19851	24078

Observation Wells

Well Name	X (ft)	Y (ft)
□ GW-5	19821	24124

Data Set: J:\1005328 Areva\Data Repository\Aquifer Test Results\Aqtesolv Files\Lava 3 - Theis Confined.aqt
Title: Areva Environmental Report
Date: 07/03/08
Time: 13:21:12

PROJECT INFORMATION

Company: MWH
Client: Areva
Project: Theis Confined
Location: Idaho Falls, ID
Test Date: June 2008
Test Well: Lava 3

AQUIFER DATA

Saturated Thickness: 350. ft
Anisotropy Ratio (Kz/Kr): 1.

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: Lava 3

X Location: 19851. ft
Y Location: 24078. ft

Casing Radius: 0.667 ft
Well Radius: 1. ft

Fully Penetrating Well

No. of pumping periods: 2

Pumping Period Data

Time (sec)	Rate (gal/min)	Time (sec)	Rate (gal/min)
0.	4200.	2.627E+5	0.

OBSERVATION WELL DATA

No. of observation wells: 1

Observation Well No. 1: GW-5

X Location: 19821. ft
Y Location: 24124. ft

Radial distance from Lava 3: 54.91812087 ft

Partially Penetrating Well
Depth to Top of Screen: 15. ft
Depth to Bottom of Screen: 55. ft

No. of Observations: 224

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.25	0.008	1008.	0.477
0.5	0.011	1068.	0.477
0.75	-0.016	1128.	0.471
1.207	0.001	1194.	0.494
1.428	-0.011	1266.	0.5
1.649	0.011	1344.	0.514
1.873	0.011	1422.	0.508
2.094	0.013	1506.	0.52
2.314	0.028	1596.	0.516

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
2.535	0.022	1692.	0.5353
2.758	0.021	1788.	0.5243
3.001	0.02	1896.	0.5283
3.25	0.02	2010.	0.5293
3.5	0.028	2130.	0.5373
3.75	0.033	2256.	0.5333
4.	0.035	2388.	0.5511
4.25	0.031	2532.	0.5491
4.5	0.049	2682.	0.5611
4.75	0.051	2838.	0.5651
5.	0.043	3006.	0.5622
5.25	0.054	3186.	0.5782
5.5	0.051	3372.	0.5662
5.75	0.045	3576.	0.57
6.	0.051	3786.	0.576
6.36	0.055	4008.	0.582
6.72	0.067	4248.	0.5874
7.14	0.061	4500.	0.5834
7.56	0.06	4764.	0.5912
7.98	0.076	5046.	0.6002
8.46	0.067	5346.	0.613
9.	0.076	5664.	0.607
9.48	0.074	6000.	0.6063
10.08	0.086	6360.	0.6133
10.68	0.087	6720.	0.6168
11.28	0.078	7140.	0.6258
11.94	0.085	7560.	0.6398
12.66	0.09	7980.	0.633
13.44	0.093	8460.	0.6263
14.22	0.101	9000.	0.6293
15.06	0.103	9480.	0.6403
15.96	0.11	1.008E+4	0.6238
16.92	0.104	1.068E+4	0.6314
17.88	0.119	1.128E+4	0.631
18.96	0.124	1.194E+4	0.6437
20.1	0.128	1.266E+4	0.6321
21.3	0.139	1.344E+4	0.6321
22.56	0.144	1.422E+4	0.6348
23.88	0.153	1.506E+4	0.6492
25.32	0.153	1.596E+4	0.6366
26.82	0.149	1.692E+4	0.6411
28.38	0.16	1.788E+4	0.6443
30.06	0.172	1.896E+4	0.6526
31.86	0.173	2.01E+4	0.6509
33.72	0.181	2.13E+4	0.6608
35.76	0.188	2.256E+4	0.6631
37.86	0.19	2.388E+4	0.6671
40.2	0.197	2.532E+4	0.6827
42.48	0.201	2.682E+4	0.6844
45.	0.208	2.838E+4	0.6769
47.64	0.214	3.006E+4	0.6812
50.46	0.225	3.186E+4	0.688
53.46	0.225	3.372E+4	0.7
56.64	0.234	3.576E+4	0.6963
60.	0.228	3.786E+4	0.72
63.6	0.244	4.008E+4	0.7361
67.2	0.24	4.248E+4	0.7263
71.58	0.235	4.5E+4	0.7352
75.6	0.244	4.764E+4	0.755
79.8	0.246	5.046E+4	0.7543
84.6	0.262	5.346E+4	0.7588
90.	0.254	5.664E+4	0.764
94.8	0.258	6.0E+4	0.7613
100.8	0.268	6.36E+4	0.7605
106.8	0.269	6.72E+4	0.7586
112.8	0.287	7.14E+4	0.7623

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
119.4	0.286	7.56E+4	0.767
126.6	0.291	7.98E+4	0.7764
134.4	0.301	8.46E+4	0.7702
142.2	0.293	9.0E+4	0.8087
150.6	0.3	9.48E+4	0.8682
159.6	0.313	1.002E+5	0.876
169.2	0.319	1.056E+5	0.8659
178.8	0.321	1.11E+5	0.8539
189.6	0.317	1.164E+5	0.8458
201.1	0.353	1.218E+5	0.844
213.	0.351	1.272E+5	0.8425
225.6	0.342	1.326E+5	0.8499
238.8	0.358	1.38E+5	0.8762
253.2	0.361	1.434E+5	0.9086
268.2	0.362	1.488E+5	0.8995
283.8	0.368	1.542E+5	0.8787
300.6	0.373	1.596E+5	0.8624
318.6	0.372	1.65E+5	0.8579
337.2	0.38	1.704E+5	0.8556
357.6	0.392	1.758E+5	0.8675
378.6	0.393	1.812E+5	0.8781
400.8	0.399	1.866E+5	0.877
424.8	0.405	1.92E+5	0.8772
450.	0.413	1.974E+5	0.8386
476.4	0.411	2.028E+5	0.8181
504.6	0.419	2.082E+5	0.8024
534.6	0.417	2.136E+5	0.7803
566.4	0.429	2.19E+5	0.8044
600.	0.428	2.244E+5	0.8255
636.	0.443	2.298E+5	0.7572
672.	0.437	2.352E+5	0.778
714.	0.445	2.406E+5	0.7777
756.	0.456	2.46E+5	0.7702
798.	0.455	2.514E+5	0.7821
846.	0.456	2.568E+5	0.8094
900.	0.466	2.622E+5	0.8225
948.	0.484	2.627E+5	0.8299

SOLUTION

Pumping Test
Aquifer Model: Confined
Solution Method: Theis

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	7.306E+5	ft^2/day
S	0.03172	
Kz/Kr	1.	
b	350.	ft

K = T/b = 2087.3 ft/day (0.7364 cm/sec)
Ss = S/b = 9.062E-5 1/ft

NOTES

The water levels during the pre-test period did respond to barometric pressure changes; displacement values were

Data Set: J:\1005328 Areva\Data Repository\Aquifer Test Results\Aqtesolv Files\Lava 3 - Theis Confined.aqt
Title: Areva Environmental Report
Date: 07/03/08
Time: 13:21:12

PROJECT INFORMATION

Company: MWH
Client: Areva
Project: Theis Confined
Location: Idaho Falls, ID
Test Date: June 2008
Test Well: Lava 3

AQUIFER DATA

Saturated Thickness: 350. ft
Anisotropy Ratio (Kz/Kr): 1.

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: Lava 3

X Location: 19851. ft
Y Location: 24078. ft

Casing Radius: 0.667 ft
Well Radius: 1. ft

Fully Penetrating Well

No. of pumping periods: 2

Pumping Period Data

Time (sec)	Rate (gal/min)	Time (sec)	Rate (gal/min)
0.	4200.	2.627E+5	0.

OBSERVATION WELL DATA

No. of observation wells: 1

Observation Well No. 1: GW-5

X Location: 19821. ft
Y Location: 24124. ft

Radial distance from Lava 3: 54.91812087 ft

Partially Penetrating Well
Depth to Top of Screen: 15. ft
Depth to Bottom of Screen: 55. ft

No. of Observations: 224

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.25	0.008	1008.	0.477
0.5	0.011	1068.	0.477
0.75	-0.016	1128.	0.471
1.207	0.001	1194.	0.494
1.428	-0.011	1266.	0.5
1.649	0.011	1344.	0.514
1.873	0.011	1422.	0.508
2.094	0.013	1506.	0.52
2.314	0.028	1596.	0.516

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
2.535	0.022	1692.	0.5353
2.758	0.021	1788.	0.5243
3.001	0.02	1896.	0.5283
3.25	0.02	2010.	0.5293
3.5	0.028	2130.	0.5373
3.75	0.033	2256.	0.5333
4.	0.035	2388.	0.5511
4.25	0.031	2532.	0.5491
4.5	0.049	2682.	0.5611
4.75	0.051	2838.	0.5651
5.	0.043	3006.	0.5622
5.25	0.054	3186.	0.5782
5.5	0.051	3372.	0.5662
5.75	0.045	3576.	0.57
6.	0.051	3786.	0.576
6.36	0.055	4008.	0.582
6.72	0.067	4248.	0.5874
7.14	0.061	4500.	0.5834
7.56	0.06	4764.	0.5912
7.98	0.076	5046.	0.6002
8.46	0.067	5346.	0.613
9.	0.076	5664.	0.607
9.48	0.074	6000.	0.6063
10.08	0.086	6360.	0.6133
10.68	0.087	6720.	0.6168
11.28	0.078	7140.	0.6258
11.94	0.085	7560.	0.6398
12.66	0.09	7980.	0.633
13.44	0.093	8460.	0.6263
14.22	0.101	9000.	0.6293
15.06	0.103	9480.	0.6403
15.96	0.11	1.008E+4	0.6238
16.92	0.104	1.068E+4	0.6314
17.88	0.119	1.128E+4	0.631
18.96	0.124	1.194E+4	0.6437
20.1	0.128	1.266E+4	0.6321
21.3	0.139	1.344E+4	0.6321
22.56	0.144	1.422E+4	0.6348
23.88	0.153	1.506E+4	0.6492
25.32	0.153	1.596E+4	0.6366
26.82	0.149	1.692E+4	0.6411
28.38	0.16	1.788E+4	0.6443
30.06	0.172	1.896E+4	0.6526
31.86	0.173	2.01E+4	0.6509
33.72	0.181	2.13E+4	0.6608
35.76	0.188	2.256E+4	0.6631
37.86	0.19	2.388E+4	0.6671
40.2	0.197	2.532E+4	0.6827
42.48	0.201	2.682E+4	0.6844
45.	0.208	2.838E+4	0.6769
47.64	0.214	3.006E+4	0.6812
50.46	0.225	3.186E+4	0.688
53.46	0.225	3.372E+4	0.7
56.64	0.234	3.576E+4	0.6963
60.	0.228	3.786E+4	0.72
63.6	0.244	4.008E+4	0.7361
67.2	0.24	4.248E+4	0.7263
71.58	0.235	4.5E+4	0.7352
75.6	0.244	4.764E+4	0.755
79.8	0.246	5.046E+4	0.7543
84.6	0.262	5.346E+4	0.7588
90.	0.254	5.664E+4	0.764
94.8	0.258	6.0E+4	0.7613
100.8	0.268	6.36E+4	0.7605
106.8	0.269	6.72E+4	0.7586
112.8	0.287	7.14E+4	0.7623

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
119.4	0.286	7.56E+4	0.767
126.6	0.291	7.98E+4	0.7764
134.4	0.301	8.46E+4	0.7702
142.2	0.293	9.0E+4	0.8087
150.6	0.3	9.48E+4	0.8682
159.6	0.313	1.002E+5	0.876
169.2	0.319	1.056E+5	0.8659
178.8	0.321	1.11E+5	0.8539
189.6	0.317	1.164E+5	0.8458
201.1	0.353	1.218E+5	0.844
213.	0.351	1.272E+5	0.8425
225.6	0.342	1.326E+5	0.8499
238.8	0.358	1.38E+5	0.8762
253.2	0.361	1.434E+5	0.9086
268.2	0.362	1.488E+5	0.8995
283.8	0.368	1.542E+5	0.8787
300.6	0.373	1.596E+5	0.8624
318.6	0.372	1.65E+5	0.8579
337.2	0.38	1.704E+5	0.8556
357.6	0.392	1.758E+5	0.8675
378.6	0.393	1.812E+5	0.8781
400.8	0.399	1.866E+5	0.877
424.8	0.405	1.92E+5	0.8772
450.	0.413	1.974E+5	0.8386
476.4	0.411	2.028E+5	0.8181
504.6	0.419	2.082E+5	0.8024
534.6	0.417	2.136E+5	0.7803
566.4	0.429	2.19E+5	0.8044
600.	0.428	2.244E+5	0.8255
636.	0.443	2.298E+5	0.7572
672.	0.437	2.352E+5	0.778
714.	0.445	2.406E+5	0.7777
756.	0.456	2.46E+5	0.7702
798.	0.455	2.514E+5	0.7821
846.	0.456	2.568E+5	0.8094
900.	0.466	2.622E+5	0.8225
948.	0.484	2.627E+5	0.8299

SOLUTION

Pumping Test
Aquifer Model: Confined
Solution Method: Theis

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	7.306E+5	ft^2/day
S	0.03172	
Kz/Kr	1.	
b	350.	ft

K = T/b = 2087.3 ft/day (0.7364 cm/sec)
Ss = S/b = 9.062E-5 1/ft

NOTES

The water levels during the pre-test period did respond to barometric pressure changes; displacement values were

Data Set: J:\1005328 Areva\Data Repository\Aquifer Test Results\Aqtesolv Files\Lava 3 - Jacob Confined.aqt
Title: Areva Environmental Study
Date: 07/03/08
Time: 15:03:09

PROJECT INFORMATION

Company: MWH
Client: Areva
Project: Cooper Jacob Confined
Location: Idaho Falls, ID
Test Date: June 2008
Test Well: Lava 1

AQUIFER DATA

Saturated Thickness: 145. ft
Anisotropy Ratio (Kz/Kr): 1.

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: Lava 3

X Location: 19851. ft
Y Location: 24078. ft

Casing Radius: 0.667 ft
Well Radius: 1. ft

Fully Penetrating Well

No. of pumping periods: 1

Pumping Period Data

Time (sec)	Rate (gal/min)
0.	4200.

OBSERVATION WELL DATA

No. of observation wells: 1

Observation Well No. 1: GW-5

X Location: 19821. ft
Y Location: 24124. ft

Radial distance from Lava 3: 54.91812087 ft

Partially Penetrating Well
Depth to Top of Screen: 15. ft
Depth to Bottom of Screen: 55. ft

No. of Observations: 211

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.25	0.008	714.	0.445
0.5	0.011	756.	0.456
0.75	-0.016	798.	0.455
1.207	0.001	846.	0.456
1.428	-0.011	900.	0.466
1.649	0.011	948.	0.484
1.873	0.011	1008.	0.477
2.094	0.013	1068.	0.477
2.314	0.028	1128.	0.471

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
2.535	0.022	1194.	0.494
2.758	0.021	1266.	0.5
3.001	0.02	1344.	0.514
3.25	0.02	1422.	0.508
3.5	0.028	1506.	0.52
3.75	0.033	1596.	0.516
4.	0.035	1692.	0.5344
4.25	0.031	1788.	0.5234
4.5	0.049	1896.	0.5274
4.75	0.051	2010.	0.5284
5.	0.043	2130.	0.5364
5.25	0.054	2256.	0.5324
5.5	0.051	2388.	0.5499
5.75	0.045	2532.	0.5479
6.	0.051	2682.	0.5599
6.36	0.055	2838.	0.5639
6.72	0.067	3006.	0.5598
7.14	0.061	3186.	0.5758
7.56	0.06	3372.	0.5638
7.98	0.076	3576.	0.5673
8.46	0.067	3786.	0.5733
9.	0.076	4008.	0.5793
9.48	0.074	4248.	0.5854
10.08	0.086	4500.	0.5814
10.68	0.087	4764.	0.5888
11.28	0.078	5046.	0.5978
11.94	0.085	5346.	0.6103
12.66	0.09	5664.	0.6043
13.44	0.093	6000.	0.6028
14.22	0.101	6360.	0.6098
15.06	0.103	6720.	0.6138
15.96	0.11	7140.	0.6228
16.92	0.104	7560.	0.6368
17.88	0.119	7980.	0.6303
18.96	0.124	8460.	0.6228
20.1	0.128	9000.	0.6258
21.3	0.139	9480.	0.6368
22.56	0.144	1.008E+4	0.6208
23.88	0.153	1.068E+4	0.6294
25.32	0.153	1.128E+4	0.6283
26.82	0.149	1.194E+4	0.6419
28.38	0.16	1.266E+4	0.6309
30.06	0.172	1.344E+4	0.6309
31.86	0.173	1.422E+4	0.6345
33.72	0.181	1.506E+4	0.6495
35.76	0.188	1.596E+4	0.636
37.86	0.19	1.692E+4	0.6399
40.2	0.197	1.788E+4	0.6434
42.48	0.201	1.896E+4	0.652
45.	0.208	2.01E+4	0.6494
47.64	0.214	2.13E+4	0.6605
50.46	0.225	2.256E+4	0.6619
53.46	0.225	2.388E+4	0.6659
56.64	0.234	2.532E+4	0.6809
60.	0.228	2.682E+4	0.6824
63.6	0.244	2.838E+4	0.6754
67.2	0.24	3.006E+4	0.6788
71.58	0.235	3.186E+4	0.6853
75.6	0.244	3.372E+4	0.6973
79.8	0.246	3.576E+4	0.6928
84.6	0.262	3.786E+4	0.7146
90.	0.254	4.008E+4	0.7296
94.8	0.258	4.248E+4	0.7201
100.8	0.268	4.5E+4	0.7275
106.8	0.269	4.764E+4	0.747
112.8	0.287	5.046E+4	0.7454

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
119.4	0.286	5.346E+4	0.7494
126.6	0.291	5.664E+4	0.7522
134.4	0.301	6.0E+4	0.7497
142.2	0.293	6.36E+4	0.7492
150.6	0.3	6.72E+4	0.7462
159.6	0.313	7.14E+4	0.7507
169.2	0.319	7.56E+4	0.7552
178.8	0.321	7.98E+4	0.7636
189.6	0.317	8.46E+4	0.756
201.1	0.353	9.0E+4	0.7897
213.	0.351	9.48E+4	0.8433
225.6	0.342	1.002E+5	0.847
238.8	0.358	1.056E+5	0.8354
253.2	0.361	1.11E+5	0.8234
268.2	0.362	1.164E+5	0.8138
283.8	0.368	1.218E+5	0.8124
300.6	0.373	1.272E+5	0.8114
318.6	0.372	1.326E+5	0.8168
337.2	0.38	1.38E+5	0.8395
357.6	0.392	1.434E+5	0.8672
378.6	0.393	1.488E+5	0.8566
400.8	0.399	1.542E+5	0.8361
424.8	0.405	1.596E+5	0.8207
450.	0.413	1.65E+5	0.8167
476.4	0.411	1.704E+5	0.8142
504.6	0.419	1.758E+5	0.8246
534.6	0.417	1.812E+5	0.8346
566.4	0.429	1.866E+5	0.8346
600.	0.428	1.92E+5	0.8352
636.	0.443	1.974E+5	0.801
672.	0.437		

SOLUTION

Pumping Test
Aquifer Model: Confined
Solution Method: Cooper-Jacob

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	7.613E+5	ft^2/day
S	0.02714	

K = T/b = 5250.3 ft/day (1.852 cm/sec)
Ss = S/b = 0.0001872 1/ft

Report Date: 6/10/2008 18:17
Report User Name: rtleeson
Report Computer Name: SBS1TLEESON

Log File Properties
File Name gw-5-aq-pre 2008-06-10 12-54-11.wsl
Create Date 6/10/2008 12:54

Device Properties
Device Level TROLL® 700
Site gw-5 install
Device Name
Serial Number 123848
Firmware Version 2.07

Log Configuration

Log Name	gw-5-aq-pre
Created By	Unknown
Computer Name	Field PC
Application	WinSituMobile.exe
Application Version	5.5.0.5
Create Date	6/8/2008 10:09
Notes Size(bytes)	4096
Type	Linear
Overwrite when full	Disabled
Scheduled Start Time	6/8/2008 10:10
Scheduled Stop	No Stop Time
Interval	Days: 0 Hours: 00 Mins: 10 Secs: 00

Level Reference Settings At Log Creation
Level Measurement Depth
Specific Gravity 0.999

Log Notes:

Date and Time	Note
6/8/2008 17:26	User Note: "Downloading log - Used Batt: 3% Memory: 3% User: Ryan Jakubowski"
6/9/2008 13:17	User Note: "Downloading log - Used Batt: 3% Memory: 3% User: Ryan Jakubowski"
6/10/2008 12:57	Manual Stop Command

Log Data:
Record Count 305

Date and Time	Elapsed Time Elapsed Time (secs)	Sensor: Pres 231ft SN#: 123848 Pressure (PSI)	Sensor: Pres 231ft SN#: 123848 Temperature (C)	Sensor: Pres 231ft SN#: 123848 Transducer Head (ft)
6/8/2008 10:10	0	9.506	11.337	21.949
6/8/2008 10:20	600.001	9.503	11.328	21.942
6/8/2008 10:30	1200.001	9.499	11.325	21.933
6/8/2008 10:40	1800.001	9.506	11.328	21.948
6/8/2008 10:50	2400.001	9.505	11.323	21.947
6/8/2008 11:00	3000.001	9.505	11.33	21.947
6/8/2008 11:10	3600.001	9.502	11.325	21.94
6/8/2008 11:20	4200.001	9.507	11.324	21.952
6/8/2008 11:30	4800.001	9.507	11.323	21.951
6/8/2008 11:40	5400.001	9.503	11.327	21.943
6/8/2008 11:50	6000.001	9.51	11.323	21.958
6/8/2008 12:00	6600.001	9.505	11.325	21.947

6/8/2008 12:10	7200.001	9.504	11.325	21.945
6/8/2008 12:20	7800.001	9.503	11.323	21.942
6/8/2008 12:30	8400.001	9.506	11.321	21.95
6/8/2008 12:40	9000.001	9.504	11.32	21.943
6/8/2008 12:50	9600.001	9.508	11.319	21.954
6/8/2008 13:00	10200.001	9.502	11.324	21.941
6/8/2008 13:10	10800.001	9.508	11.323	21.954
6/8/2008 13:20	11400.001	9.508	11.325	21.953
6/8/2008 13:30	12000.001	9.51	11.326	21.958
6/8/2008 13:40	12600.001	9.507	11.322	21.951
6/8/2008 13:50	13200.001	9.509	11.319	21.957
6/8/2008 14:00	13800.001	9.51	11.322	21.958
6/8/2008 14:10	14400.001	9.51	11.321	21.957
6/8/2008 14:20	15000.001	9.512	11.322	21.964
6/8/2008 14:30	15600.001	9.511	11.32	21.96
6/8/2008 14:40	16200.001	9.514	11.321	21.967
6/8/2008 14:50	16800.001	9.509	11.321	21.957
6/8/2008 15:00	17400.001	9.508	11.318	21.953
6/8/2008 15:10	18000.001	9.507	11.318	21.952
6/8/2008 15:20	18600.001	9.51	11.318	21.958
6/8/2008 15:30	19200.001	9.511	11.318	21.96
6/8/2008 15:40	19800.001	9.51	11.316	21.958
6/8/2008 15:50	20400.001	9.509	11.313	21.956
6/8/2008 16:00	21000.001	9.513	11.313	21.966
6/8/2008 16:10	21600.001	9.513	11.315	21.966
6/8/2008 16:20	22200.001	9.514	11.315	21.967
6/8/2008 16:30	22800.001	9.513	11.314	21.965
6/8/2008 16:40	23400.001	9.516	11.318	21.972
6/8/2008 16:50	24000.001	9.519	11.315	21.98
6/8/2008 17:00	24600.001	9.522	11.313	21.987
6/8/2008 17:10	25200.001	9.518	11.315	21.977
6/8/2008 17:20	25800.001	9.521	11.314	21.985
6/8/2008 17:30	26400.001	9.525	11.316	21.992
6/8/2008 17:40	27000.001	9.522	11.314	21.985
6/8/2008 17:50	27600.001	9.524	11.31	21.991
6/8/2008 18:00	28200.001	9.525	11.311	21.992
6/8/2008 18:10	28800.001	9.519	11.304	21.98
6/8/2008 18:20	29400.001	9.522	11.306	21.985
6/8/2008 18:30	30000.001	9.527	11.303	21.996
6/8/2008 18:40	30600.001	9.528	11.304	22
6/8/2008 18:50	31200.001	9.53	11.301	22.005
6/8/2008 19:00	31800.001	9.525	11.301	21.992
6/8/2008 19:10	32400.001	9.527	11.299	21.998
6/8/2008 19:20	33000.001	9.523	11.298	21.988
6/8/2008 19:30	33600.001	9.529	11.295	22.002
6/8/2008 19:40	34200.001	9.53	11.297	22.003
6/8/2008 19:50	34800.001	9.525	11.294	21.993
6/8/2008 20:00	35400.001	9.527	11.293	21.997
6/8/2008 20:10	36000.001	9.524	11.295	21.99
6/8/2008 20:20	36600.001	9.528	11.292	22
6/8/2008 20:30	37200.001	9.526	11.294	21.995
6/8/2008 20:40	37800.001	9.528	11.296	21.999
6/8/2008 20:50	38400.001	9.525	11.295	21.993
6/8/2008 21:00	39000.001	9.52	11.296	21.981
6/8/2008 21:10	39600.001	9.524	11.296	21.99
6/8/2008 21:20	40200.001	9.524	11.296	21.99
6/8/2008 21:30	40800.001	9.525	11.298	21.993
6/8/2008 21:40	41400.001	9.52	11.294	21.982
6/8/2008 21:50	42000.001	9.527	11.297	21.996
6/8/2008 22:00	42600.001	9.527	11.292	21.998
6/8/2008 22:10	43200.001	9.522	11.292	21.986
6/8/2008 22:20	43800.001	9.518	11.295	21.977
6/8/2008 22:30	44400.001	9.517	11.296	21.975

6/8/2008 22:40	45000.001	9.521	11.293	21.983
6/8/2008 22:50	45600.001	9.512	11.294	21.962
6/8/2008 23:00	46200.001	9.515	11.295	21.97
6/8/2008 23:10	46800.001	9.52	11.292	21.98
6/8/2008 23:20	47400.001	9.519	11.291	21.98
6/8/2008 23:30	48000.001	9.517	11.294	21.975
6/8/2008 23:40	48600.001	9.518	11.292	21.977
6/8/2008 23:50	49200.001	9.524	11.29	21.991
6/9/2008 0:00	49800.001	9.522	11.291	21.985
6/9/2008 0:10	50400.001	9.521	11.291	21.983
6/9/2008 0:20	51000.001	9.523	11.291	21.988
6/9/2008 0:30	51600.001	9.519	11.288	21.979
6/9/2008 0:40	52200.001	9.516	11.29	21.972
6/9/2008 0:50	52800.001	9.519	11.288	21.98
6/9/2008 1:00	53400.001	9.516	11.286	21.972
6/9/2008 1:10	54000.001	9.519	11.287	21.978
6/9/2008 1:20	54600.001	9.519	11.289	21.978
6/9/2008 1:30	55200.001	9.523	11.29	21.988
6/9/2008 1:40	55800.001	9.527	11.286	21.998
6/9/2008 1:50	56400.001	9.527	11.29	21.998
6/9/2008 2:00	57000.001	9.526	11.287	21.995
6/9/2008 2:10	57600.001	9.528	11.287	22
6/9/2008 2:20	58200.001	9.525	11.289	21.994
6/9/2008 2:30	58800.001	9.526	11.29	21.996
6/9/2008 2:40	59400.001	9.523	11.29	21.989
6/9/2008 2:50	60000.001	9.525	11.286	21.993
6/9/2008 3:00	60600.001	9.524	11.287	21.991
6/9/2008 3:10	61200.001	9.524	11.288	21.991
6/9/2008 3:20	61800.001	9.521	11.286	21.983
6/9/2008 3:30	62400.001	9.525	11.287	21.992
6/9/2008 3:40	63000.001	9.524	11.288	21.992
6/9/2008 3:50	63600.001	9.524	11.287	21.99
6/9/2008 4:00	64200.001	9.527	11.287	21.997
6/9/2008 4:10	64800.001	9.522	11.289	21.985
6/9/2008 4:20	65400.001	9.525	11.285	21.994
6/9/2008 4:30	66000.001	9.523	11.291	21.989
6/9/2008 4:40	66600.001	9.518	11.285	21.978
6/9/2008 4:50	67200.001	9.52	11.288	21.98
6/9/2008 5:00	67800.001	9.512	11.286	21.964
6/9/2008 5:10	68400.001	9.516	11.285	21.973
6/9/2008 5:20	69000.001	9.517	11.284	21.975
6/9/2008 5:30	69600.001	9.512	11.285	21.964
6/9/2008 5:40	70200.001	9.512	11.282	21.962
6/9/2008 5:50	70800.001	9.513	11.288	21.964
6/9/2008 6:00	71400.001	9.511	11.285	21.96
6/9/2008 6:10	72000.001	9.509	11.28	21.956
6/9/2008 6:20	72600.001	9.507	11.287	21.952
6/9/2008 6:30	73200.001	9.51	11.285	21.959
6/9/2008 6:40	73800.001	9.509	11.284	21.955
6/9/2008 6:50	74400.001	9.511	11.282	21.961
6/9/2008 7:00	75000.001	9.515	11.282	21.969
6/9/2008 7:10	75600.001	9.514	11.28	21.967
6/9/2008 7:20	76200.001	9.507	11.279	21.952
6/9/2008 7:30	76800.001	9.506	11.281	21.949
6/9/2008 7:40	77400.001	9.507	11.281	21.951
6/9/2008 7:50	78000.001	9.505	11.282	21.946
6/9/2008 8:00	78600.001	9.51	11.281	21.959
6/9/2008 8:10	79200.001	9.508	11.281	21.954
6/9/2008 8:20	79800.001	9.509	11.282	21.956
6/9/2008 8:30	80400.001	9.508	11.283	21.953
6/9/2008 8:40	81000.001	9.512	11.284	21.963
6/9/2008 8:50	81600.001	9.507	11.277	21.95
6/9/2008 9:00	82200.001	9.511	11.281	21.961

6/9/2008 9:10	82800.001	9.51	11.282	21.959
6/9/2008 9:20	83400.001	9.51	11.281	21.959
6/9/2008 9:30	84000.001	9.509	11.281	21.956
6/9/2008 9:40	84600.001	9.51	11.281	21.958
6/9/2008 9:50	85200.001	9.511	11.281	21.96
6/9/2008 10:00	85800.001	9.513	11.277	21.965
6/9/2008 10:10	86400.001	9.514	11.279	21.967
6/9/2008 10:20	87000.001	9.518	11.281	21.978
6/9/2008 10:30	87600.001	9.517	11.28	21.975
6/9/2008 10:40	88200.001	9.513	11.279	21.966
6/9/2008 10:50	88800.001	9.521	11.28	21.984
6/9/2008 11:00	89400.001	9.519	11.281	21.979
6/9/2008 11:10	90000.001	9.518	11.277	21.976
6/9/2008 11:20	90600.001	9.514	11.276	21.969
6/9/2008 11:30	91200.001	9.519	11.278	21.98
6/9/2008 11:40	91800.001	9.521	11.28	21.984
6/9/2008 11:50	92400.001	9.526	11.28	21.996
6/9/2008 12:00	93000.001	9.522	11.277	21.987
6/9/2008 12:10	93600.001	9.528	11.277	22.001
6/9/2008 12:20	94200.001	9.528	11.282	22
6/9/2008 12:30	94800.001	9.534	11.277	22.014
6/9/2008 12:40	95400.001	9.534	11.278	22.014
6/9/2008 12:50	96000.001	9.533	11.275	22.011
6/9/2008 13:00	96600.001	9.537	11.277	22.02
6/9/2008 13:10	97200.001	9.534	11.277	22.015
6/9/2008 13:20	97800.001	9.526	11.283	21.996
6/9/2008 13:30	98400.001	9.534	11.282	22.014
6/9/2008 13:40	99000.001	9.542	11.275	22.032
6/9/2008 13:50	99600.001	9.548	11.278	22.045
6/9/2008 14:00	100200.001	9.54	11.276	22.027
6/9/2008 14:10	100800.001	9.547	11.279	22.044
6/9/2008 14:20	101400.001	9.539	11.275	22.025
6/9/2008 14:30	102000.001	9.546	11.276	22.041
6/9/2008 14:40	102600.001	9.545	11.278	22.039
6/9/2008 14:50	103200.001	9.554	11.279	22.06
6/9/2008 15:00	103800.001	9.554	11.277	22.06
6/9/2008 15:10	104400.001	9.557	11.279	22.068
6/9/2008 15:20	105000.001	9.554	11.281	22.061
6/9/2008 15:30	105600.001	9.557	11.277	22.067
6/9/2008 15:40	106200.001	9.563	11.279	22.081
6/9/2008 15:50	106800.001	9.553	11.274	22.059
6/9/2008 16:00	107400.001	9.559	11.277	22.072
6/9/2008 16:10	108000.001	9.559	11.278	22.072
6/9/2008 16:20	108600.001	9.565	11.279	22.085
6/9/2008 16:30	109200.001	9.561	11.28	22.076
6/9/2008 16:40	109800.001	9.567	11.278	22.09
6/9/2008 16:50	110400.001	9.567	11.279	22.091
6/9/2008 17:00	111000.001	9.56	11.276	22.074
6/9/2008 17:10	111600.001	9.567	11.278	22.091
6/9/2008 17:20	112200.001	9.558	11.278	22.07
6/9/2008 17:30	112800.001	9.568	11.278	22.091
6/9/2008 17:40	113400.001	9.561	11.277	22.076
6/9/2008 17:50	114000.001	9.565	11.279	22.086
6/9/2008 18:00	114600.001	9.563	11.28	22.081
6/9/2008 18:10	115200.001	9.556	11.278	22.065
6/9/2008 18:20	115800.001	9.562	11.278	22.079
6/9/2008 18:30	116400.001	9.567	11.281	22.089
6/9/2008 18:40	117000.001	9.568	11.274	22.092
6/9/2008 18:50	117600.001	9.57	11.274	22.098
6/9/2008 19:00	118200.001	9.566	11.278	22.088
6/9/2008 19:10	118800.001	9.562	11.277	22.078
6/9/2008 19:20	119400.001	9.566	11.277	22.087
6/9/2008 19:30	120000.001	9.569	11.28	22.095

6/9/2008 19:40	120600.001	9.566	11.276	22.088
6/9/2008 19:50	121200.001	9.56	11.278	22.075
6/9/2008 20:00	121800.001	9.566	11.274	22.088
6/9/2008 20:10	122400.001	9.566	11.272	22.088
6/9/2008 20:20	123000.001	9.56	11.273	22.073
6/9/2008 20:30	123600.001	9.557	11.276	22.067
6/9/2008 20:40	124200.001	9.56	11.275	22.074
6/9/2008 20:50	124800.001	9.561	11.274	22.077
6/9/2008 21:00	125400.001	9.556	11.275	22.064
6/9/2008 21:10	126000.001	9.557	11.274	22.066
6/9/2008 21:20	126600.001	9.555	11.272	22.063
6/9/2008 21:30	127200.001	9.554	11.272	22.061
6/9/2008 21:40	127800.001	9.559	11.274	22.072
6/9/2008 21:50	128400.001	9.562	11.275	22.078
6/9/2008 22:00	129000.001	9.557	11.276	22.067
6/9/2008 22:10	129600.001	9.556	11.275	22.063
6/9/2008 22:20	130200.001	9.553	11.274	22.056
6/9/2008 22:30	130800.001	9.552	11.276	22.055
6/9/2008 22:40	131400.001	9.549	11.278	22.048
6/9/2008 22:50	132000.001	9.553	11.277	22.058
6/9/2008 23:00	132600.001	9.552	11.274	22.056
6/9/2008 23:10	133200.001	9.547	11.277	22.045
6/9/2008 23:20	133800.001	9.544	11.276	22.037
6/9/2008 23:30	134400.001	9.544	11.275	22.037
6/9/2008 23:40	135000.001	9.546	11.275	22.041
6/9/2008 23:50	135600.001	9.543	11.278	22.035
6/10/2008 0:00	136200.001	9.54	11.276	22.027
6/10/2008 0:10	136800.001	9.538	11.274	22.022
6/10/2008 0:20	137400.001	9.541	11.276	22.029
6/10/2008 0:30	138000.001	9.536	11.279	22.019
6/10/2008 0:40	138600.001	9.532	11.275	22.008
6/10/2008 0:50	139200.001	9.534	11.274	22.013
6/10/2008 1:00	139800.001	9.534	11.275	22.013
6/10/2008 1:10	140400.001	9.539	11.278	22.024
6/10/2008 1:20	141000.001	9.547	11.274	22.043
6/10/2008 1:30	141600.001	9.541	11.274	22.03
6/10/2008 1:40	142200.001	9.549	11.277	22.048
6/10/2008 1:50	142800.001	9.554	11.277	22.059
6/10/2008 2:00	143400.001	9.556	11.273	22.064
6/10/2008 2:10	144000.001	9.554	11.273	22.059
6/10/2008 2:20	144600.001	9.555	11.274	22.063
6/10/2008 2:30	145200.001	9.557	11.274	22.068
6/10/2008 2:40	145800.001	9.557	11.276	22.066
6/10/2008 2:50	146400.001	9.557	11.274	22.067
6/10/2008 3:00	147000.001	9.554	11.277	22.06
6/10/2008 3:10	147600.001	9.547	11.273	22.044
6/10/2008 3:20	148200.001	9.548	11.275	22.047
6/10/2008 3:30	148800.001	9.545	11.275	22.04
6/10/2008 3:40	149400.001	9.554	11.274	22.06
6/10/2008 3:50	150000.001	9.545	11.276	22.038
6/10/2008 4:00	150600.001	9.555	11.277	22.061
6/10/2008 4:10	151200.001	9.554	11.276	22.06
6/10/2008 4:20	151800.001	9.552	11.275	22.054
6/10/2008 4:30	152400.001	9.544	11.276	22.037
6/10/2008 4:40	153000.001	9.551	11.276	22.054
6/10/2008 4:50	153600.001	9.554	11.273	22.059
6/10/2008 5:00	154200.001	9.55	11.274	22.051
6/10/2008 5:10	154800.001	9.542	11.273	22.033
6/10/2008 5:20	155400.001	9.545	11.279	22.039
6/10/2008 5:30	156000.001	9.545	11.275	22.039
6/10/2008 5:40	156600.001	9.542	11.274	22.032
6/10/2008 5:50	157200.001	9.548	11.275	22.045
6/10/2008 6:00	157800.001	9.54	11.273	22.028

6/10/2008 6:10	158400.001	9.551	11.271	22.053
6/10/2008 6:20	159000.001	9.545	11.274	22.039
6/10/2008 6:30	159600.001	9.542	11.271	22.031
6/10/2008 6:40	160200.001	9.543	11.275	22.035
6/10/2008 6:50	160800.001	9.545	11.273	22.04
6/10/2008 7:00	161400.001	9.536	11.275	22.018
6/10/2008 7:10	162000.001	9.538	11.275	22.022
6/10/2008 7:20	162600.001	9.545	11.274	22.038
6/10/2008 7:30	163200.001	9.543	11.274	22.034
6/10/2008 7:40	163800.001	9.543	11.273	22.033
6/10/2008 7:50	164400.001	9.545	11.275	22.038
6/10/2008 8:00	165000.001	9.543	11.27	22.034
6/10/2008 8:10	165600.001	9.533	11.272	22.011
6/10/2008 8:20	166200.001	9.536	11.274	22.019
6/10/2008 8:30	166800.001	9.535	11.274	22.017
6/10/2008 8:40	167400.001	9.534	11.275	22.013
6/10/2008 8:50	168000.001	9.533	11.274	22.012
6/10/2008 9:00	168600.001	9.534	11.275	22.013
6/10/2008 9:10	169200.001	9.532	11.275	22.01
6/10/2008 9:20	169800.001	9.531	11.274	22.006
6/10/2008 9:30	170400.001	9.516	11.274	21.971
6/10/2008 9:40	171000.001	9.522	11.274	21.985
6/10/2008 9:50	171600.001	9.523	11.275	21.988
6/10/2008 10:00	172200.001	9.524	11.272	21.992
6/10/2008 10:10	172800.001	9.518	11.272	21.978
6/10/2008 10:20	173400.001	9.52	11.274	21.982
6/10/2008 10:30	174000.001	9.522	11.274	21.986
6/10/2008 10:40	174600.001	9.521	11.274	21.983
6/10/2008 10:50	175200.001	9.509	11.274	21.955
6/10/2008 11:00	175800.001	9.517	11.274	21.975
6/10/2008 11:10	176400.001	9.517	11.269	21.974
6/10/2008 11:20	177000.001	9.515	11.274	21.969
6/10/2008 11:30	177600.001	9.516	11.276	21.972
6/10/2008 11:40	178200.001	9.517	11.277	21.975
6/10/2008 11:50	178800.001	9.522	11.272	21.986
6/10/2008 12:00	179400.001	9.509	11.272	21.955
6/10/2008 12:10	180000.001	9.518	11.278	21.977
6/10/2008 12:20	180600.001	9.517	11.275	21.974
6/10/2008 12:30	181200.001	9.515	11.275	21.969
6/10/2008 12:40	181800.001	9.519	11.273	21.978
6/10/2008 12:50	182400.001	9.519	11.277	21.978

Date and Time	Elapsed Time (secs)		Pressure (PSI)	Pressure (ft)	Transducer Head (ft)
6/8/08 10:30	0	0	12.242	28.2389	21.933
6/8/08 10:40	600	600	12.240	28.2342	21.948
6/8/08 10:50	1200	1200	12.242	28.2389	21.947
6/8/08 11:00	1800	1800	12.240	28.2342	21.947
6/8/08 11:10	2400	2400	12.244	28.2435	21.94
6/8/08 11:20	3000	3000	12.241	28.2366	21.952
6/8/08 11:30	3600.001	3600.001	12.242	28.2389	21.951
6/8/08 11:40	4200	4200	12.245	28.2458	21.943
6/8/08 11:50	4800	4800	12.246	28.2481	21.958
6/8/08 12:00	5400	5400	12.246	28.2481	21.947
6/8/08 12:10	6000	6000	12.246	28.2481	21.945
6/8/08 12:20	6600	6600	12.245	28.2458	21.942
6/8/08 12:30	7200	7200	12.247	28.2504	21.95
6/8/08 12:40	7800	7800	12.245	28.2458	21.943
6/8/08 12:50	8400	8400	12.248	28.2527	21.954
6/8/08 13:00	9000	9000	12.246	28.2481	21.941
6/8/08 13:10	9600	9600	12.246	28.2481	21.954
6/8/08 13:20	10200	10200	12.244	28.2435	21.953
6/8/08 13:30	10800	10800	12.244	28.2435	21.958
6/8/08 13:40	11400	11400	12.243	28.2412	21.951
6/8/08 13:50	12000	12000	12.245	28.2458	21.957
6/8/08 14:00	12600	12600	12.243	28.2412	21.958
6/8/08 14:10	13200	13200	12.242	28.2389	21.957
6/8/08 14:20	13800	13800	12.243	28.2412	21.964
6/8/08 14:30	14400.001	14400.001	12.243	28.2412	21.96
6/8/08 14:40	15000	15000	12.243	28.2412	21.967
6/8/08 14:50	15600	15600	12.244	28.2435	21.957
6/8/08 15:00	16200	16200	12.245	28.2458	21.953
6/8/08 15:10	16800	16800	12.246	28.2481	21.952
6/8/08 15:20	17400	17400	12.246	28.2481	21.958
6/8/08 15:30	18000.001	18000.001	12.244	28.2435	21.96
6/8/08 15:40	18600	18600	12.241	28.2366	21.958
6/8/08 15:50	19200	19200	12.242	28.2389	21.956
6/8/08 16:00	19800	19800	12.243	28.2412	21.966
6/8/08 16:10	20400	20400	12.242	28.2389	21.966
6/8/08 16:20	21000	21000	12.240	28.2342	21.967
6/8/08 16:30	21600	21600	12.237	28.2273	21.965
6/8/08 16:40	22200	22200	12.238	28.2296	21.972
6/8/08 16:50	22800	22800	12.237	28.2273	21.98
6/8/08 17:00	23400	23400	12.237	28.2273	21.987
6/8/08 17:10	24000	24000	12.238	28.2296	21.977
6/8/08 17:20	24600	24600	12.235	28.2227	21.985

6/8/08 17:30	25200	25200	12.234	28.2204	21.992
6/8/08 17:40	25800	25800	12.233	28.2181	21.985
6/8/08 17:50	26400	26400	12.234	28.2204	21.991
6/8/08 18:00	27000	27000	12.233	28.2181	21.992
6/8/08 18:10	27600	27600	12.232	28.2158	21.98
6/8/08 18:20	28200	28200	12.232	28.2158	21.985
6/8/08 18:30	28800	28800	12.232	28.2158	21.996
6/8/08 18:40	29400	29400	12.228	28.2066	22
6/8/08 18:50	30000	30000	12.227	28.2043	22.005
6/8/08 19:00	30600	30600	12.229	28.2089	21.992
6/8/08 19:10	31200	31200	12.228	28.2066	21.998
6/8/08 19:20	31800	31800	12.228	28.2066	21.988
6/8/08 19:30	32400	32400	12.226	28.2020	22.002
6/8/08 19:40	33000	33000	12.227	28.2043	22.003
6/8/08 19:50	33600	33600	12.227	28.2043	21.993
6/8/08 20:00	34200	34200	12.225	28.1996	21.997
6/8/08 20:10	34800	34800	12.228	28.2066	21.99
6/8/08 20:20	35400	35400	12.227	28.2043	22
6/8/08 20:30	36000	36000	12.230	28.2112	21.995
6/8/08 20:40	36600	36600	12.228	28.2066	21.999
6/8/08 20:50	37200	37200	12.230	28.2112	21.993
6/8/08 21:00	37800	37800	12.229	28.2089	21.981
6/8/08 21:10	38400	38400	12.226	28.2020	21.99
6/8/08 21:20	39000	39000	12.229	28.2089	21.99
6/8/08 21:30	39600	39600	12.229	28.2089	21.993
6/8/08 21:40	40200	40200	12.226	28.2020	21.982
6/8/08 21:50	40800	40800	12.229	28.2089	21.996
6/8/08 22:00	41400	41400	12.227	28.2043	21.998
6/8/08 22:10	42000	42000	12.232	28.2158	21.986
6/8/08 22:20	42600	42600	12.229	28.2089	21.977
6/8/08 22:30	43200.001	43200.001	12.229	28.2089	21.975
6/8/08 22:40	43800	43800	12.231	28.2135	21.983
6/8/08 22:50	44400	44400	12.234	28.2204	21.962
6/8/08 23:00	45000	45000	12.234	28.2204	21.97
6/8/08 23:10	45600	45600	12.232	28.2158	21.98
6/8/08 23:20	46200	46200	12.231	28.2135	21.98
6/8/08 23:30	46800	46800	12.230	28.2112	21.975
6/8/08 23:40	47400	47400	12.230	28.2112	21.977
6/8/08 23:50	48000	48000	12.227	28.2043	21.991
6/9/08 0:00	48600	48600	12.228	28.2066	21.985
6/9/08 0:10	49200	49200	12.227	28.2043	21.983
6/9/08 0:20	49800	49800	12.227	28.2043	21.988
6/9/08 0:30	50400	50400	12.226	28.2020	21.979
6/9/08 0:40	51000	51000	12.226	28.2020	21.972
6/9/08 0:50	51600	51600	12.224	28.1973	21.98

6/9/08 1:00	52200	52200	12.226	28.2020	21.972
6/9/08 1:10	52800	52800	12.223	28.1950	21.978
6/9/08 1:20	53400	53400	12.225	28.1996	21.978
6/9/08 1:30	54000.001	54000.001	12.220	28.1881	21.988
6/9/08 1:40	54600	54600	12.222	28.1927	21.998
6/9/08 1:50	55200	55200	12.221	28.1904	21.998
6/9/08 2:00	55800	55800	12.220	28.1881	21.995
6/9/08 2:10	56400	56400	12.219	28.1858	22
6/9/08 2:20	57000	57000	12.219	28.1858	21.994
6/9/08 2:30	57600	57600	12.218	28.1835	21.996
6/9/08 2:40	58200	58200	12.219	28.1858	21.989
6/9/08 2:50	58800	58800	12.217	28.1812	21.993
6/9/08 3:00	59400	59400	12.215	28.1766	21.991
6/9/08 3:10	60000	60000	12.215	28.1766	21.991
6/9/08 3:20	60600	60600	12.215	28.1766	21.983
6/9/08 3:30	61200	61200	12.215	28.1766	21.992
6/9/08 3:40	61800	61800	12.215	28.1766	21.992
6/9/08 3:50	62400	62400	12.217	28.1812	21.99
6/9/08 4:00	63000	63000	12.215	28.1766	21.997
6/9/08 4:10	63600	63600	12.218	28.1835	21.985
6/9/08 4:20	64200	64200	12.218	28.1835	21.994
6/9/08 4:30	64800	64800	12.218	28.1835	21.989
6/9/08 4:40	65400	65400	12.220	28.1881	21.978
6/9/08 4:50	66000	66000	12.219	28.1858	21.98
6/9/08 5:00	66600	66600	12.220	28.1881	21.964
6/9/08 5:10	67200	67200	12.221	28.1904	21.973
6/9/08 5:20	67800	67800	12.224	28.1973	21.975
6/9/08 5:30	68400	68400	12.222	28.1927	21.964
6/9/08 5:40	69000	69000	12.224	28.1973	21.962
6/9/08 5:50	69600	69600	12.226	28.2020	21.964
6/9/08 6:00	70200	70200	12.224	28.1973	21.96
6/9/08 6:10	70800	70800	12.223	28.1950	21.956
6/9/08 6:20	71400	71400	12.223	28.1950	21.952
6/9/08 6:30	72000	72000	12.220	28.1881	21.959
6/9/08 6:40	72600	72600	12.219	28.1858	21.955
6/9/08 6:50	73200	73200	12.219	28.1858	21.961
6/9/08 7:00	73800	73800	12.220	28.1881	21.969
6/9/08 7:10	74400	74400	12.222	28.1927	21.967
6/9/08 7:20	75000	75000	12.222	28.1927	21.952
6/9/08 7:30	75600	75600	12.227	28.2043	21.949
6/9/08 7:40	76200	76200	12.227	28.2043	21.951
6/9/08 7:50	76800	76800	12.225	28.1996	21.946
6/9/08 8:00	77400	77400	12.228	28.2066	21.959
6/9/08 8:10	78000	78000	12.224	28.1973	21.954
6/9/08 8:20	78600	78600	12.225	28.1996	21.956

6/9/08 8:30	79200	79200	12.223	28.1950	21.953
6/9/08 8:40	79800	79800	12.220	28.1881	21.963
6/9/08 8:50	80400	80400	12.224	28.1973	21.95
6/9/08 9:00	81000	81000	12.225	28.1996	21.961
6/9/08 9:10	81600	81600	12.224	28.1973	21.959
6/9/08 9:20	82200	82200	12.221	28.1904	21.959
6/9/08 9:30	82800	82800	12.222	28.1927	21.956
6/9/08 9:40	83400	83400	12.221	28.1904	21.958
6/9/08 9:50	84000	84000	12.220	28.1881	21.96
6/9/08 10:00	84600	84600	12.220	28.1881	21.965
6/9/08 10:10	85200	85200	12.218	28.1835	21.967
6/9/08 10:20	85800	85800	12.217	28.1812	21.978
6/9/08 10:30	86400	86400	12.215	28.1766	21.975
6/9/08 10:40	87000	87000	12.215	28.1766	21.966
6/9/08 10:50	87600	87600	12.211	28.1674	21.984
6/9/08 11:00	88200	88200	12.211	28.1674	21.979
6/9/08 11:10	88800	88800	12.210	28.1650	21.976
6/9/08 11:20	89400	89400	12.210	28.1650	21.969
6/9/08 11:30	90000	90000	12.208	28.1604	21.98
6/9/08 11:40	90600	90600	12.207	28.1581	21.984
6/9/08 11:50	91200	91200	12.206	28.1558	21.996
6/9/08 12:00	91800	91800	12.204	28.1512	21.987
6/9/08 12:10	92400	92400	12.202	28.1466	22.001
6/9/08 12:20	93000	93000	12.197	28.1351	22
6/9/08 12:30	93600.001	93600.001	12.197	28.1351	22.014
6/9/08 12:40	94200	94200	12.196	28.1328	22.014
6/9/08 12:50	94800	94800	12.192	28.1235	22.011
6/9/08 13:00	95400	95400	12.194	28.1281	22.02
6/9/08 13:10	96000	96000	12.191	28.1212	22.015
6/9/08 13:20	96600	96600	12.191	28.1212	21.996
6/9/08 13:30	97200	97200	12.185	28.1074	22.014
6/9/08 13:40	97800	97800	12.185	28.1074	22.032
6/9/08 13:50	98400	98400	12.183	28.1028	22.045
6/9/08 14:00	99000	99000	12.179	28.0935	22.027
6/9/08 14:10	99600	99600	12.178	28.0912	22.044
6/9/08 14:20	100200	100200	12.177	28.0889	22.025
6/9/08 14:30	100800	100800	12.177	28.0889	22.041
6/9/08 14:40	101400	101400	12.173	28.0797	22.039
6/9/08 14:50	102000	102000	12.172	28.0774	22.06
6/9/08 15:00	102600	102600	12.170	28.0728	22.06
6/9/08 15:10	103200	103200	12.167	28.0659	22.068
6/9/08 15:20	103800	103800	12.166	28.0636	22.061
6/9/08 15:30	104400.001	104400.001	12.157	28.0428	22.067
6/9/08 15:40	105000	105000	12.160	28.0497	22.081
6/9/08 15:50	105600	105600	12.159	28.0474	22.059

6/9/08 16:00	106200	106200	12.157	28.0428	22.072
6/9/08 16:10	106800	106800	12.151	28.0289	22.072
6/9/08 16:20	107400	107400	12.152	28.0313	22.085
6/9/08 16:30	108000	108000	12.145	28.0151	22.076
6/9/08 16:40	108600	108600	12.144	28.0128	22.09
6/9/08 16:50	109200	109200	12.145	28.0151	22.091
6/9/08 17:00	109800	109800	12.145	28.0151	22.074
6/9/08 17:10	110400	110400	12.144	28.0128	22.091
6/9/08 17:20	111000	111000	12.142	28.0082	22.07
6/9/08 17:30	111600	111600	12.143	28.0105	22.091
6/9/08 17:40	112200	112200	12.139	28.0013	22.076
6/9/08 17:50	112800	112800	12.140	28.0036	22.086
6/9/08 18:00	113400	113400	12.143	28.0105	22.081
6/9/08 18:10	114000	114000	12.136	27.9943	22.065
6/9/08 18:20	114600	114600	12.136	27.9943	22.079
6/9/08 18:30	115200	115200	12.133	27.9874	22.089
6/9/08 18:40	115800	115800	12.132	27.9851	22.092
6/9/08 18:50	116400	116400	12.129	27.9782	22.098
6/9/08 19:00	117000	117000	12.125	27.9690	22.088
6/9/08 19:10	117600	117600	12.127	27.9736	22.078
6/9/08 19:20	118200	118200	12.122	27.9621	22.087
6/9/08 19:30	118800	118800	12.123	27.9644	22.095
6/9/08 19:40	119400	119400	12.126	27.9713	22.088
6/9/08 19:50	120000	120000	12.127	27.9736	22.075
6/9/08 20:00	120600	120600	12.128	27.9759	22.088
6/9/08 20:10	121200	121200	12.126	27.9713	22.088
6/9/08 20:20	121800	121800	12.126	27.9713	22.073
6/9/08 20:30	122400	122400	12.125	27.9690	22.067
6/9/08 20:40	123000	123000	12.123	27.9644	22.074
6/9/08 20:50	123600	123600	12.126	27.9713	22.077
6/9/08 21:00	124200	124200	12.124	27.9667	22.064
6/9/08 21:10	124800	124800	12.123	27.9644	22.066
6/9/08 21:20	125400	125400	12.121	27.9597	22.063
6/9/08 21:30	126000	126000	12.120	27.9574	22.061
6/9/08 21:40	126600	126600	12.119	27.9551	22.072
6/9/08 21:50	127200	127200	12.118	27.9528	22.078
6/9/08 22:00	127800	127800	12.119	27.9551	22.067
6/9/08 22:10	128400	128400	12.118	27.9528	22.063
6/9/08 22:20	129000	129000	12.117	27.9505	22.056
6/9/08 22:30	129600	129600	12.117	27.9505	22.055
6/9/08 22:40	130200	130200	12.120	27.9574	22.048
6/9/08 22:50	130800	130800	12.122	27.9621	22.058
6/9/08 23:00	131400	131400	12.120	27.9574	22.056
6/9/08 23:10	132000	132000	12.120	27.9574	22.045
6/9/08 23:20	132600	132600	12.119	27.9551	22.037

6/9/08 23:30	133200	133200	12.121	27.9597	22.037
6/9/08 23:40	133800	133800	12.125	27.9690	22.041
6/9/08 23:50	134400	134400	12.121	27.9597	22.035
6/10/08 0:00	135000	135000	12.124	27.9667	22.027
6/10/08 0:10	135600	135600	12.124	27.9667	22.022
6/10/08 0:20	136200	136200	12.127	27.9736	22.029
6/10/08 0:30	136800	136800	12.129	27.9782	22.019
6/10/08 0:40	137400	137400	12.130	27.9805	22.008
6/10/08 0:50	138000	138000	12.122	27.9621	22.013
6/10/08 1:00	138600	138600	12.121	27.9597	22.013
6/10/08 1:10	139200	139200	12.120	27.9574	22.024
6/10/08 1:20	139800	139800	12.113	27.9413	22.043
6/10/08 1:30	140400	140400	12.114	27.9436	22.03
6/10/08 1:40	141000	141000	12.105	27.9228	22.048
6/10/08 1:50	141600	141600	12.104	27.9205	22.059
6/10/08 2:00	142200	142200	12.102	27.9159	22.064
6/10/08 2:10	142800	142800	12.100	27.9113	22.059
6/10/08 2:20	143400	143400	12.097	27.9044	22.063
6/10/08 2:30	144000.001	144000.001	12.100	27.9113	22.068
6/10/08 2:40	144600	144600	12.100	27.9113	22.066
6/10/08 2:50	145200	145200	12.101	27.9136	22.067
6/10/08 3:00	145800	145800	12.102	27.9159	22.06
6/10/08 3:10	146400	146400	12.101	27.9136	22.044
6/10/08 3:20	147000	147000	12.102	27.9159	22.047
6/10/08 3:30	147600	147600	12.105	27.9228	22.04
6/10/08 3:40	148200	148200	12.093	27.8952	22.06
6/10/08 3:50	148800	148800	12.096	27.9021	22.038
6/10/08 4:00	149400	149400	12.088	27.8836	22.061
6/10/08 4:10	150000	150000	12.098	27.9067	22.06
6/10/08 4:20	150600	150600	12.095	27.8998	22.054
6/10/08 4:30	151200.001	151200.001	12.096	27.9021	22.037
6/10/08 4:40	151800	151800	12.091	27.8905	22.054
6/10/08 4:50	152400	152400	12.093	27.8952	22.059
6/10/08 5:00	153000	153000	12.086	27.8790	22.051
6/10/08 5:10	153600	153600	12.092	27.8929	22.033
6/10/08 5:20	154200	154200	12.095	27.8998	22.039
6/10/08 5:30	154800.001	154800.001	12.091	27.8905	22.039
6/10/08 5:40	155400	155400	12.089	27.8859	22.032
6/10/08 5:50	156000	156000	12.096	27.9021	22.045
6/10/08 6:00	156600	156600	12.093	27.8952	22.028
6/10/08 6:10	157200	157200	12.091	27.8905	22.053
6/10/08 6:20	157800	157800	12.092	27.8929	22.039
6/10/08 6:30	158400	158400	12.093	27.8952	22.031
6/10/08 6:40	159000	159000	12.095	27.8998	22.035
6/10/08 6:50	159600	159600	12.086	27.8790	22.04

6/10/08 7:00	160200	160200	12.095	27.8998	22.018
6/10/08 7:10	160800	160800	12.091	27.8905	22.022
6/10/08 7:20	161400	161400	12.088	27.8836	22.038
6/10/08 7:30	162000	162000	12.090	27.8882	22.034
6/10/08 7:40	162600	162600	12.090	27.8882	22.033
6/10/08 7:50	163200	163200	12.088	27.8836	22.038
6/10/08 8:00	163800	163800	12.089	27.8859	22.034
6/10/08 8:10	164400	164400	12.093	27.8952	22.011
6/10/08 8:20	165000	165000	12.094	27.8975	22.019
6/10/08 8:30	165600	165600	12.092	27.8929	22.017
6/10/08 8:40	166200	166200	12.096	27.9021	22.013
6/10/08 8:50	166800	166800	12.096	27.9021	22.012
6/10/08 9:00	167400	167400	12.096	27.9021	22.013
6/10/08 9:10	168000	168000	12.096	27.9021	22.01
6/10/08 9:20	168600	168600	12.099	27.9090	22.006
6/10/08 9:30	169200	169200	12.102	27.9159	21.971
6/10/08 9:40	169800	169800	12.098	27.9067	21.985
6/10/08 9:50	170400	170400	12.099	27.9090	21.988
6/10/08 10:00	171000	171000	12.101	27.9136	21.992
6/10/08 10:10	171600	171600	12.097	27.9044	21.978
6/10/08 10:20	172200	172200	12.097	27.9044	21.982
6/10/08 10:30	172800	172800	12.100	27.9113	21.986
6/10/08 10:40	173400	173400	12.103	27.9182	21.983
6/10/08 10:50	174000	174000	12.107	27.9275	21.955
6/10/08 11:00	174600	174600	12.107	27.9275	21.975
6/10/08 11:10	175200	175200	12.104	27.9205	21.974
6/10/08 11:20	175800	175800	12.103	27.9182	21.969
6/10/08 11:30	176400	176400	12.103	27.9182	21.972
6/10/08 11:40	177000	177000	12.107	27.9275	21.975
6/10/08 11:50	177600	177600	12.106	27.9251	21.986
6/10/08 12:00	178200	178200	12.106	27.9251	21.955
6/10/08 12:10	178800	178800	12.104	27.9205	21.977
6/10/08 12:20	179400	179400	12.102	27.9159	21.974
6/10/08 12:30	180000.001	180000.001	12.102	27.9159	21.969
6/10/08 12:40	180600	180600	12.101	27.9136	21.978
6/10/08 12:50	181200	181200	12.101	27.9136	21.978
6/10/08 13:00	181800	181800	12.101	27.9136	
6/10/08 13:10	182400	182400	12.103	27.9182	
6/10/2008 13:20	0	183000.00	12.099	27.9090	
6/10/2008 13:30	600	183600.00	12.097	27.9044	
6/10/2008 13:40	1200	184200.00	12.094	27.8975	
6/10/2008 13:50	1800	184800.00	12.098	27.9067	
6/10/2008 14:00	2400	185400.00	12.098	27.9067	
6/10/2008 14:10	3000.001	186000.00	12.096	27.9021	
6/10/2008 14:20	3600	186600.00	12.098	27.9067	

6/10/2008 14:30	4200	187200.00	12.094	27.8975
6/10/2008 14:40	4800	187800.00	12.101	27.9136
6/10/2008 14:50	5400	188400.00	12.099	27.9090
6/10/2008 15:00	6000	189000.00	12.102	27.9159
6/10/2008 15:10	6600.001	189600.00	12.103	27.9182
6/10/2008 15:20	7200	190200.00	12.103	27.9182
6/10/2008 15:30	7800	190800.00	12.104	27.9205
6/10/2008 15:40	8400	191400.00	12.103	27.9182
6/10/2008 15:50	9000	192000.00	12.105	27.9228
6/10/2008 16:00	9600	192600.00	12.108	27.9298
6/10/2008 16:10	10200	193200.00	12.106	27.9251
6/10/2008 16:20	10800	193800.00	12.112	27.9390
6/10/2008 16:30	11400	194400.00	12.110	27.9344
6/10/2008 16:40	12000	195000.00	12.111	27.9367
6/10/2008 16:50	12600	195600.00	12.111	27.9367
6/10/2008 17:00	13200	196200.00	12.108	27.9298
6/10/2008 17:10	13800.001	196800.00	12.112	27.9390
6/10/2008 17:20	14400	197400.00	12.114	27.9436
6/10/2008 17:30	15000	198000.00	12.114	27.9436
6/10/2008 17:40	15600	198600.00	12.118	27.9528
6/10/2008 17:50	16200	199200.00	12.117	27.9505
6/10/2008 18:00	16800	199800.00	12.114	27.9436
6/10/2008 18:10	17400	200400.00	12.115	27.9459
6/10/2008 18:20	18000	201000.00	12.115	27.9459
6/10/2008 18:30	18600	201600.00	12.111	27.9367
6/10/2008 18:40	19200	202200.00	12.112	27.9390
6/10/2008 18:50	19800	202800.00	12.109	27.9321
6/10/2008 19:00	20400	203400.00	12.109	27.9321
6/10/2008 19:10	21000	204000.00	12.111	27.9367
6/10/2008 19:20	21600	204600.00	12.110	27.9344
6/10/2008 19:30	22200	205200.00	12.111	27.9367
6/10/2008 19:40	22800	205800.00	12.110	27.9344
6/10/2008 19:50	23400	206400.00	12.114	27.9436
6/10/2008 20:00	24000	207000.00	12.117	27.9505
6/10/2008 20:10	24600	207600.00	12.117	27.9505
6/10/2008 20:20	25200	208200.00	12.117	27.9505
6/10/2008 20:30	25800	208800.00	12.119	27.9551
6/10/2008 20:40	26400	209400.00	12.123	27.9644
6/10/2008 20:50	27000	210000.00	12.122	27.9621
6/10/2008 21:00	27600	210600.00	12.127	27.9736
6/10/2008 21:10	28200.001	211200.00	12.126	27.9713
6/10/2008 21:20	28800	211800.00	12.127	27.9736
6/10/2008 21:30	29400	212400.00	12.130	27.9805
6/10/2008 21:40	30000	213000.00	12.128	27.9759
6/10/2008 21:50	30600	213600.00	12.131	27.9828

6/10/2008 22:00	31200	214200.00	12.129	27.9782
6/10/2008 22:10	31800	214800.00	12.129	27.9782
6/10/2008 22:20	32400	215400.00	12.131	27.9828
6/10/2008 22:30	33000	216000.00	12.132	27.9851
6/10/2008 22:40	33600	216600.00	12.128	27.9759
6/10/2008 22:50	34200	217200.00	12.133	27.9874
6/10/2008 23:00	34800	217800.00	12.132	27.9851
6/10/2008 23:10	35400	218400.00	12.129	27.9782
6/10/2008 23:20	36000	219000.00	12.128	27.9759
6/10/2008 23:30	36600	219600.00	12.130	27.9805
6/10/2008 23:40	37200	220200.00	12.127	27.9736
6/10/2008 23:50	37800	220800.00	12.125	27.9690
6/11/2008 0:00	38400	221400.00	12.128	27.9759
6/11/2008 0:10	39000	222000.00	12.131	27.9828
6/11/2008 0:20	39600	222600.00	12.131	27.9828
6/11/2008 0:30	40200	223200.00	12.129	27.9782
6/11/2008 0:40	40800	223800.00	12.129	27.9782
6/11/2008 0:50	41400	224400.00	12.131	27.9828
6/11/2008 1:00	42000	225000.00	12.134	27.9897
6/11/2008 1:10	42600.001	225600.00	12.130	27.9805
6/11/2008 1:20	43200	226200.00	12.133	27.9874
6/11/2008 1:30	43800	226800.00	12.133	27.9874
6/11/2008 1:40	44400	227400.00	12.129	27.9782
6/11/2008 1:50	45000	228000.00	12.133	27.9874
6/11/2008 2:00	45600	228600.00	12.134	27.9897
6/11/2008 2:10	46200	229200.00	12.136	27.9943
6/11/2008 2:20	46800	229800.00	12.139	28.0013
6/11/2008 2:30	47400	230400.00	12.140	28.0036
6/11/2008 2:40	48000	231000.00	12.141	28.0059
6/11/2008 2:50	48600	231600.00	12.138	27.9990
6/11/2008 3:00	49200	232200.00	12.146	28.0174
6/11/2008 3:10	49800	232800.00	12.148	28.0220
6/11/2008 3:20	50400	233400.00	12.148	28.0220
6/11/2008 3:30	51000	234000.00	12.150	28.0266
6/11/2008 3:40	51600	234600.00	12.152	28.0313
6/11/2008 3:50	52200	235200.00	12.152	28.0313
6/11/2008 4:00	52800	235800.00	12.152	28.0313
6/11/2008 4:10	53400	236400.00	12.153	28.0336
6/11/2008 4:20	54000	237000.00	12.155	28.0382
6/11/2008 4:30	54600	237600.00	12.155	28.0382
6/11/2008 4:40	55200	238200.00	12.154	28.0359
6/11/2008 4:50	55800	238800.00	12.156	28.0405
6/11/2008 5:00	56400	239400.00	12.154	28.0359
6/11/2008 5:10	57000	240000.00	12.154	28.0359
6/11/2008 5:20	57600	240600.00	12.155	28.0382

6/11/2008 5:30	58200	241200.00	12.151	28.0289
6/11/2008 5:40	58800	241800.00	12.152	28.0313
6/11/2008 5:50	59400	242400.00	12.153	28.0336
6/11/2008 6:00	60000	243000.00	12.157	28.0428
6/11/2008 6:10	60600.001	243600.00	12.154	28.0359
6/11/2008 6:20	61200	244200.00	12.155	28.0382
6/11/2008 6:30	61800	244800.00	12.157	28.0428
6/11/2008 6:40	62400	245400.00	12.154	28.0359
6/11/2008 6:50	63000	246000.00	12.152	28.0313
6/11/2008 7:00	63600	246600.00	12.153	28.0336

Recovery Data -
Water Levels

Date and Time	Elapsed Time (secs)	Head (ft)	Uncorrected Displacement (ft)	Baro Pressure Lookup (psi)	Δp (psi)	Δhp (ft)	Corrected Displacement (ft)	Notes/Recovery Time
6/11/2008 7:01	0	21.886	0	12.151	0.0000	0.0000	0.000	0.000
6/11/2008 7:01	0	21.878	0.008	12.151	0.0000	0.0000	0.008	
6/11/2008 7:01	1	21.875	0.011	12.151	0.0000	0.0000	0.011	
6/11/2008 7:01	1	21.902	-0.016	12.151	0.0000	0.0000	-0.016	
6/11/2008 7:01	1	21.885	0.001	12.151	0.0000	0.0000	0.001	
6/11/2008 7:01	1	21.897	-0.011	12.151	0.0000	0.0000	-0.011	
6/11/2008 7:01	2	21.875	0.011	12.151	0.0000	0.0000	0.011	
6/11/2008 7:01	2	21.875	0.011	12.151	0.0000	0.0000	0.011	
6/11/2008 7:01	2	21.873	0.013	12.151	0.0000	0.0000	0.013	
6/11/2008 7:01	2	21.858	0.028	12.151	0.0000	0.0000	0.028	
6/11/2008 7:01	3	21.864	0.022	12.151	0.0000	0.0000	0.022	
6/11/2008 7:01	3	21.865	0.021	12.151	0.0000	0.0000	0.021	
6/11/2008 7:01	3	21.866	0.02	12.151	0.0000	0.0000	0.020	
6/11/2008 7:01	3	21.866	0.02	12.151	0.0000	0.0000	0.020	
6/11/2008 7:01	4	21.858	0.028	12.151	0.0000	0.0000	0.028	
6/11/2008 7:01	4	21.853	0.033	12.151	0.0000	0.0000	0.033	
6/11/2008 7:01	4	21.851	0.035	12.151	0.0000	0.0000	0.035	
6/11/2008 7:01	4	21.855	0.031	12.151	0.0000	0.0000	0.031	
6/11/2008 7:01	5	21.837	0.049	12.151	0.0000	0.0000	0.049	
6/11/2008 7:01	5	21.835	0.051	12.151	0.0000	0.0000	0.051	
6/11/2008 7:01	5	21.843	0.043	12.151	0.0000	0.0000	0.043	
6/11/2008 7:01	5	21.832	0.054	12.151	0.0000	0.0000	0.054	
6/11/2008 7:01	6	21.835	0.051	12.151	0.0000	0.0000	0.051	
6/11/2008 7:01	6	21.841	0.045	12.151	0.0000	0.0000	0.045	
6/11/2008 7:01	6	21.835	0.051	12.151	0.0000	0.0000	0.051	
6/11/2008 7:01	6	21.831	0.055	12.151	0.0000	0.0000	0.055	
6/11/2008 7:01	7	21.819	0.067	12.151	0.0000	0.0000	0.067	
6/11/2008 7:01	7	21.825	0.061	12.151	0.0000	0.0000	0.061	
6/11/2008 7:01	8	21.826	0.06	12.151	0.0000	0.0000	0.060	
6/11/2008 7:01	8	21.81	0.076	12.151	0.0000	0.0000	0.076	
6/11/2008 7:01	8	21.819	0.067	12.151	0.0000	0.0000	0.067	
6/11/2008 7:01	9	21.81	0.076	12.151	0.0000	0.0000	0.076	
6/11/2008 7:01	9	21.812	0.074	12.151	0.0000	0.0000	0.074	
6/11/2008 7:02	10	21.8	0.086	12.151	0.0000	0.0000	0.086	
6/11/2008 7:02	11	21.799	0.087	12.151	0.0000	0.0000	0.087	
6/11/2008 7:02	11	21.808	0.078	12.151	0.0000	0.0000	0.078	
6/11/2008 7:02	12	21.801	0.085	12.151	0.0000	0.0000	0.085	
6/11/2008 7:02	13	21.796	0.09	12.151	0.0000	0.0000	0.090	
6/11/2008 7:02	13	21.793	0.093	12.151	0.0000	0.0000	0.093	
6/11/2008 7:02	14	21.785	0.101	12.151	0.0000	0.0000	0.101	

Recovery Data -
Water Levels

6/11/2008 7:02	15	21.783	0.103	12.151	0.0000	0.0000	0.103
6/11/2008 7:02	16	21.776	0.11	12.151	0.0000	0.0000	0.110
6/11/2008 7:02	17	21.782	0.104	12.151	0.0000	0.0000	0.104
6/11/2008 7:02	18	21.767	0.119	12.151	0.0000	0.0000	0.119
6/11/2008 7:02	19	21.762	0.124	12.151	0.0000	0.0000	0.124
6/11/2008 7:02	20	21.758	0.128	12.151	0.0000	0.0000	0.128
6/11/2008 7:02	21	21.747	0.139	12.151	0.0000	0.0000	0.139
6/11/2008 7:02	23	21.742	0.144	12.151	0.0000	0.0000	0.144
6/11/2008 7:02	24	21.733	0.153	12.151	0.0000	0.0000	0.153
6/11/2008 7:02	25	21.733	0.153	12.151	0.0000	0.0000	0.153
6/11/2008 7:02	27	21.737	0.149	12.151	0.0000	0.0000	0.149
6/11/2008 7:02	28	21.726	0.16	12.151	0.0000	0.0000	0.160
6/11/2008 7:02	30	21.714	0.172	12.151	0.0000	0.0000	0.172
6/11/2008 7:02	32	21.713	0.173	12.151	0.0000	0.0000	0.173
6/11/2008 7:02	34	21.705	0.181	12.151	0.0000	0.0000	0.181
6/11/2008 7:02	36	21.698	0.188	12.151	0.0000	0.0000	0.188
6/11/2008 7:02	38	21.696	0.19	12.151	0.0000	0.0000	0.190
6/11/2008 7:02	40	21.689	0.197	12.151	0.0000	0.0000	0.197
6/11/2008 7:02	42	21.685	0.201	12.151	0.0000	0.0000	0.201
6/11/2008 7:02	45	21.678	0.208	12.151	0.0000	0.0000	0.208
6/11/2008 7:02	48	21.672	0.214	12.151	0.0000	0.0000	0.214
6/11/2008 7:02	50	21.661	0.225	12.151	0.0000	0.0000	0.225
6/11/2008 7:02	53	21.661	0.225	12.151	0.0000	0.0000	0.225
6/11/2008 7:02	57	21.652	0.234	12.151	0.0000	0.0000	0.234
6/11/2008 7:02	60	21.658	0.228	12.151	0.0000	0.0000	0.228
6/11/2008 7:02	64	21.642	0.244	12.151	0.0000	0.0000	0.244
6/11/2008 7:02	67	21.646	0.24	12.151	0.0000	0.0000	0.240
6/11/2008 7:03	72	21.651	0.235	12.151	0.0000	0.0000	0.235
6/11/2008 7:03	76	21.642	0.244	12.151	0.0000	0.0000	0.244
6/11/2008 7:03	80	21.64	0.246	12.151	0.0000	0.0000	0.246
6/11/2008 7:03	85	21.624	0.262	12.151	0.0000	0.0000	0.262
6/11/2008 7:03	90	21.632	0.254	12.151	0.0000	0.0000	0.254
6/11/2008 7:03	95	21.628	0.258	12.151	0.0000	0.0000	0.258
6/11/2008 7:03	101	21.618	0.268	12.151	0.0000	0.0000	0.268
6/11/2008 7:03	107	21.617	0.269	12.151	0.0000	0.0000	0.269
6/11/2008 7:03	113	21.599	0.287	12.151	0.0000	0.0000	0.287
6/11/2008 7:03	119	21.6	0.286	12.151	0.0000	0.0000	0.286
6/11/2008 7:03	127	21.595	0.291	12.151	0.0000	0.0000	0.291
6/11/2008 7:04	134	21.585	0.301	12.151	0.0000	0.0000	0.301
6/11/2008 7:04	142	21.593	0.293	12.151	0.0000	0.0000	0.293
6/11/2008 7:04	151	21.586	0.3	12.151	0.0000	0.0000	0.300
6/11/2008 7:04	160	21.573	0.313	12.151	0.0000	0.0000	0.313
6/11/2008 7:04	169	21.567	0.319	12.151	0.0000	0.0000	0.319
6/11/2008 7:04	179	21.565	0.321	12.151	0.0000	0.0000	0.321
6/11/2008 7:04	190	21.569	0.317	12.151	0.0000	0.0000	0.317

Recovery Data -
Water Levels

6/11/2008 7:05	201	21.533	0.353	12.151	0.0000	0.0000	0.353	
6/11/2008 7:05	213	21.535	0.351	12.151	0.0000	0.0000	0.351	
6/11/2008 7:05	226	21.544	0.342	12.151	0.0000	0.0000	0.342	
6/11/2008 7:05	239	21.528	0.358	12.151	0.0000	0.0000	0.358	
6/11/2008 7:06	253	21.525	0.361	12.151	0.0000	0.0000	0.361	
6/11/2008 7:06	268	21.524	0.362	12.151	0.0000	0.0000	0.362	
6/11/2008 7:06	284	21.518	0.368	12.151	0.0000	0.0000	0.368	
6/11/2008 7:06	301	21.513	0.373	12.151	0.0000	0.0000	0.373	
6/11/2008 7:07	319	21.514	0.372	12.151	0.0000	0.0000	0.372	
6/11/2008 7:07	337	21.506	0.38	12.151	0.0000	0.0000	0.380	
6/11/2008 7:07	358	21.494	0.392	12.151	0.0000	0.0000	0.392	
6/11/2008 7:08	379	21.493	0.393	12.151	0.0000	0.0000	0.393	
6/11/2008 7:08	401	21.487	0.399	12.151	0.0000	0.0000	0.399	
6/11/2008 7:08	425	21.481	0.405	12.151	0.0000	0.0000	0.405	
6/11/2008 7:09	450	21.473	0.413	12.151	0.0000	0.0000	0.413	
6/11/2008 7:09	476	21.475	0.411	12.151	0.0000	0.0000	0.411	
6/11/2008 7:10	505	21.467	0.419	12.151	0.0000	0.0000	0.419	calculated based on vlookup
6/11/2008 7:10	535	21.469	0.417	12.151	0.0000	0.0000	0.417	calculated based on vlookup
6/11/2008 7:11	566	21.457	0.429	12.151	0.0000	0.0000	0.429	calculated based on vlookup
6/11/2008 7:11	600	21.458	0.428	12.151	0.0000	0.0000	0.428	calculated based on vlookup
6/11/2008 7:12	636	21.443	0.443	12.151	0.0000	0.0000	0.443	calculated based on vlookup
6/11/2008 7:13	672	21.449	0.437	12.151	0.0000	0.0000	0.437	calculated based on vlookup
6/11/2008 7:13	714	21.441	0.445	12.151	0.0000	0.0000	0.445	calculated based on vlookup
6/11/2008 7:14	756	21.43	0.456	12.151	0.0000	0.0000	0.456	calculated based on vlookup
6/11/2008 7:15	798	21.431	0.455	12.151	0.0000	0.0000	0.455	calculated based on vlookup
6/11/2008 7:15	846	21.43	0.456	12.151	0.0000	0.0000	0.456	calculated based on vlookup
6/11/2008 7:16	900	21.42	0.466	12.151	0.0000	0.0000	0.466	calculated based on vlookup
6/11/2008 7:17	948	21.402	0.484	12.151	0.0000	0.0000	0.484	calculated based on vlookup
6/11/2008 7:18	1008	21.409	0.477	12.151	0.0000	0.0000	0.477	calculated based on vlookup
6/11/2008 7:19	1068	21.409	0.477	12.151	0.0000	0.0000	0.477	calculated based on vlookup
6/11/2008 7:20	1128	21.415	0.471	12.151	0.0000	0.0000	0.471	calculated based on vlookup
6/11/2008 7:21	1194	21.392	0.494	12.151	0.0000	0.0000	0.494	calculated based on vlookup
6/11/2008 7:22	1266	21.386	0.5	12.151	0.0000	0.0000	0.500	calculated based on vlookup
6/11/2008 7:24	1344	21.372	0.514	12.151	0.0000	0.0000	0.514	calculated based on vlookup
6/11/2008 7:25	1422	21.378	0.508	12.151	0.0000	0.0000	0.508	calculated based on vlookup
6/11/2008 7:26	1506	21.366	0.52	12.151	0.0000	0.0000	0.520	calculated based on vlookup
6/11/2008 7:28	1596	21.37	0.516	12.151	0.0000	0.0000	0.516	calculated based on vlookup
6/11/2008 7:30	1692	21.35	0.536	12.154	0.0030	-0.0007	0.535	calculated based on vlookup
6/11/2008 7:31	1788	21.361	0.525	12.154	0.0030	-0.0007	0.524	calculated based on vlookup
6/11/2008 7:33	1896	21.357	0.529	12.154	0.0030	-0.0007	0.528	calculated based on vlookup
6/11/2008 7:35	2010	21.356	0.53	12.154	0.0030	-0.0007	0.529	calculated based on vlookup
6/11/2008 7:37	2130	21.348	0.538	12.154	0.0030	-0.0007	0.537	calculated based on vlookup
6/11/2008 7:39	2256	21.352	0.534	12.154	0.0030	-0.0007	0.533	calculated based on vlookup
6/11/2008 7:41	2388	21.334	0.552	12.155	0.0040	-0.0009	0.551	calculated based on vlookup
6/11/2008 7:44	2532	21.336	0.55	12.155	0.0040	-0.0009	0.549	calculated based on vlookup

Recovery Data -
Water Levels

6/11/2008 7:46	2682	21.324	0.562	12.155	0.0040	-0.0009	0.561	calculated based on vlookup
6/11/2008 7:49	2838	21.32	0.566	12.155	0.0040	-0.0009	0.565	calculated based on vlookup
6/11/2008 7:51	3006	21.322	0.564	12.159	0.0080	-0.0018	0.562	calculated based on vlookup
6/11/2008 7:54	3186	21.306	0.58	12.159	0.0080	-0.0018	0.578	calculated based on vlookup
6/11/2008 7:58	3372	21.318	0.568	12.159	0.0080	-0.0018	0.566	calculated based on vlookup
6/11/2008 8:01	3576	21.314	0.572	12.16	0.0090	-0.0020	0.570	calculated based on vlookup
6/11/2008 8:04	3786	21.308	0.578	12.16	0.0090	-0.0020	0.576	calculated based on vlookup
6/11/2008 8:08	4008	21.302	0.584	12.16	0.0090	-0.0020	0.582	calculated based on vlookup
6/11/2008 8:12	4248	21.297	0.589	12.158	0.0070	-0.0016	0.587	calculated based on vlookup
6/11/2008 8:16	4500	21.301	0.585	12.158	0.0070	-0.0016	0.583	calculated based on vlookup
6/11/2008 8:21	4764	21.293	0.593	12.159	0.0080	-0.0018	0.591	calculated based on vlookup
6/11/2008 8:25	5046	21.284	0.602	12.159	0.0080	-0.0018	0.600	calculated based on vlookup
6/11/2008 8:30	5346	21.271	0.615	12.16	0.0090	-0.0020	0.613	calculated based on vlookup
6/11/2008 8:36	5664	21.277	0.609	12.16	0.0090	-0.0020	0.607	calculated based on vlookup
6/11/2008 8:41	6000	21.277	0.609	12.163	0.0120	-0.0027	0.606	calculated based on vlookup
6/11/2008 8:47	6360	21.27	0.616	12.163	0.0120	-0.0027	0.613	calculated based on vlookup
6/11/2008 8:53	6720	21.267	0.619	12.161	0.0100	-0.0022	0.617	calculated based on vlookup
6/11/2008 9:00	7140	21.258	0.628	12.161	0.0100	-0.0022	0.626	calculated based on vlookup
6/11/2008 9:07	7560	21.244	0.642	12.161	0.0100	-0.0022	0.640	calculated based on vlookup
6/11/2008 9:14	7980	21.251	0.635	12.16	0.0090	-0.0020	0.633	calculated based on vlookup
6/11/2008 9:22	8460	21.257	0.629	12.163	0.0120	-0.0027	0.626	calculated based on vlookup
6/11/2008 9:31	9000	21.254	0.632	12.163	0.0120	-0.0027	0.629	calculated based on vlookup
6/11/2008 9:39	9480	21.243	0.643	12.163	0.0120	-0.0027	0.640	calculated based on vlookup
6/11/2008 9:49	10080	21.26	0.626	12.161	0.0100	-0.0022	0.624	calculated based on vlookup
6/11/2008 9:59	10680	21.253	0.633	12.158	0.0070	-0.0016	0.631	calculated based on vlookup
6/11/2008 10:09	11280	21.253	0.633	12.16	0.0090	-0.0020	0.631	calculated based on vlookup
6/11/2008 10:20	11940	21.241	0.645	12.157	0.0060	-0.0013	0.644	calculated based on vlookup
6/11/2008 10:32	12660	21.253	0.633	12.155	0.0040	-0.0009	0.632	calculated based on vlookup
6/11/2008 10:45	13440	21.253	0.633	12.155	0.0040	-0.0009	0.632	calculated based on vlookup
6/11/2008 10:58	14220	21.251	0.635	12.152	0.0010	-0.0002	0.635	calculated based on vlookup
6/11/2008 11:12	15060	21.237	0.649	12.15	-0.0010	0.0002	0.649	calculated based on vlookup
6/11/2008 11:27	15960	21.249	0.637	12.153	0.0020	-0.0004	0.637	calculated based on vlookup
6/11/2008 11:43	16920	21.244	0.642	12.155	0.0040	-0.0009	0.641	calculated based on vlookup
6/11/2008 11:59	17880	21.241	0.645	12.154	0.0030	-0.0007	0.644	calculated based on vlookup
6/11/2008 12:17	18960	21.233	0.653	12.153	0.0020	-0.0004	0.653	calculated based on vlookup
6/11/2008 12:36	20100	21.234	0.652	12.156	0.0050	-0.0011	0.651	calculated based on vlookup
6/11/2008 12:56	21300	21.225	0.661	12.152	0.0010	-0.0002	0.661	calculated based on vlookup
6/11/2008 13:17	22560	21.222	0.664	12.155	0.0040	-0.0009	0.663	calculated based on vlookup
6/11/2008 13:39	23880	21.218	0.668	12.155	0.0040	-0.0009	0.667	calculated based on vlookup
6/11/2008 14:03	25320	21.202	0.684	12.157	0.0060	-0.0013	0.683	calculated based on vlookup
6/11/2008 14:28	26820	21.2	0.686	12.158	0.0070	-0.0016	0.684	calculated based on vlookup
6/11/2008 14:54	28380	21.208	0.678	12.156	0.0050	-0.0011	0.677	calculated based on vlookup
6/11/2008 15:22	30060	21.203	0.683	12.159	0.0080	-0.0018	0.681	calculated based on vlookup
6/11/2008 15:52	31860	21.196	0.69	12.16	0.0090	-0.0020	0.688	calculated based on vlookup
6/11/2008 16:23	33720	21.184	0.702	12.16	0.0090	-0.0020	0.700	calculated based on vlookup

Recovery Data -
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6/11/2008 16:57	35760	21.187	0.699	12.163	0.0120	-0.0027	0.696	calculated based on vlookup
6/11/2008 17:32	37860	21.162	0.724	12.169	0.0180	-0.0040	0.720	calculated based on vlookup
6/11/2008 18:09	40080	21.145	0.741	12.173	0.0220	-0.0049	0.736	calculated based on vlookup
6/11/2008 18:49	42480	21.155	0.731	12.172	0.0210	-0.0047	0.726	calculated based on vlookup
6/11/2008 19:31	45000	21.145	0.741	12.177	0.0260	-0.0058	0.735	calculated based on vlookup
6/11/2008 20:15	47640	21.125	0.761	12.178	0.0270	-0.0060	0.755	calculated based on vlookup
6/11/2008 21:02	50460	21.125	0.761	12.181	0.0300	-0.0067	0.754	calculated based on vlookup
6/11/2008 21:52	53460	21.12	0.766	12.183	0.0320	-0.0072	0.759	calculated based on vlookup
6/11/2008 22:45	56640	21.113	0.773	12.191	0.0400	-0.0090	0.764	calculated based on vlookup
6/11/2008 23:41	60000	21.116	0.77	12.19	0.0390	-0.0087	0.761	calculated based on vlookup
6/12/2008 0:41	63600	21.117	0.769	12.189	0.0380	-0.0085	0.760	calculated based on vlookup
6/12/2008 1:41	67200	21.118	0.768	12.193	0.0420	-0.0094	0.759	calculated based on vlookup
6/12/2008 2:51	71400	21.115	0.771	12.19	0.0390	-0.0087	0.762	calculated based on vlookup
6/12/2008 4:01	75600	21.11	0.776	12.191	0.0400	-0.0090	0.767	calculated based on vlookup
6/12/2008 5:11	79800	21.1	0.786	12.194	0.0430	-0.0096	0.776	calculated based on vlookup
6/12/2008 6:31	84600	21.105	0.781	12.199	0.0480	-0.0108	0.770	calculated based on vlookup
6/12/2008 8:01	90000	21.063	0.823	12.215	0.0640	-0.0143	0.809	calculated based on vlookup
6/12/2008 9:21	94800	20.999	0.887	12.235	0.0840	-0.0188	0.868	calculated based on vlookup
6/12/2008 10:51	100200	20.988	0.898	12.249	0.0980	-0.0220	0.876	calculated based on vlookup
6/12/2008 12:21	105600	20.997	0.889	12.254	0.1030	-0.0231	0.866	calculated based on vlookup
6/12/2008 13:51	111000	21.009	0.877	12.254	0.1030	-0.0231	0.854	calculated based on vlookup
6/12/2008 15:21	116400	21.016	0.87	12.259	0.1080	-0.0242	0.846	calculated based on vlookup
6/12/2008 16:51	121800	21.018	0.868	12.258	0.1070	-0.0240	0.844	calculated based on vlookup
6/12/2008 18:21	127200	21.02	0.866	12.256	0.1050	-0.0235	0.842	calculated based on vlookup
6/12/2008 19:51	132600	21.011	0.875	12.263	0.1120	-0.0251	0.850	calculated based on vlookup
6/12/2008 21:21	138000	20.982	0.904	12.275	0.1240	-0.0278	0.876	calculated based on vlookup
6/12/2008 22:51	143400	20.946	0.94	12.291	0.1400	-0.0314	0.909	calculated based on vlookup
6/13/2008 0:21	148800	20.954	0.932	12.296	0.1450	-0.0325	0.900	calculated based on vlookup
6/13/2008 1:51	154200	20.975	0.911	12.295	0.1440	-0.0323	0.879	calculated based on vlookup
6/13/2008 3:21	159600	20.992	0.894	12.292	0.1410	-0.0316	0.862	calculated based on vlookup
6/13/2008 4:51	165000	20.997	0.889	12.29	0.1390	-0.0311	0.858	calculated based on vlookup
6/13/2008 6:21	170400	20.999	0.887	12.291	0.1400	-0.0314	0.856	calculated based on vlookup
6/13/2008 7:51	175800	20.986	0.9	12.296	0.1450	-0.0325	0.868	calculated based on vlookup
6/13/2008 9:21	181200	20.975	0.911	12.298	0.1470	-0.0329	0.878	calculated based on vlookup
6/13/2008 10:51	186600	20.977	0.909	12.294	0.1430	-0.0320	0.877	calculated based on vlookup
6/13/2008 12:21	192000	20.977	0.909	12.293	0.1420	-0.0318	0.877	calculated based on vlookup
6/13/2008 13:51	197400	21.019	0.867	12.278	0.1270	-0.0284	0.839	calculated based on vlookup
6/13/2008 15:21	202800	21.043	0.843	12.262	0.1110	-0.0249	0.818	
6/13/2008 16:51	208200	21.061	0.825	12.252	0.1010	-0.0226	0.802	
6/13/2008 18:21	213600	21.086	0.8	12.239	0.0880	-0.0197	0.780	
6/13/2008 19:51	219000	21.063	0.823	12.234	0.0830	-0.0186	0.804	
6/13/2008 21:21	224400	21.041	0.845	12.238	0.0870	-0.0195	0.826	
6/13/2008 22:51	229800	21.108	0.778	12.244	0.0930	-0.0208	0.757	
6/14/2008 0:21	235200	21.086	0.8	12.249	0.0980	-0.0220	0.778	
6/14/2008 1:51	240600	21.087	0.799	12.246	0.0950	-0.0213	0.778	

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6/14/2008 3:21	246000	21.095	0.791	12.244	0.0930	-0.0208	0.770		
6/14/2008 4:51	251400	21.084	0.802	12.24	0.0890	-0.0199	0.782		
6/14/2008 6:21	256800	21.056	0.83	12.243	0.0920	-0.0206	0.809		
6/14/2008 7:51	262200	21.042	0.844	12.247	0.0960	-0.0215	0.822	**Elapsed Time (secs.)**	
6/14/2008 8:59	**262727**	**21.035**	**0.8510**	**12.245**	**0.094**	-0.0211	**0.8299**	**Recovery Start**	**0.0**
6/14/2008 8:59	262727	21.041	0.8450	12.245	0.094	-0.0211	0.8239		0.25
6/14/2008 8:59	262728	21.045	0.8410	12.245	0.094	-0.0211	0.8199		0.5
6/14/2008 8:59	262728	21.059	0.8270	12.245	0.094	-0.0211	0.8059		0.75
6/14/2008 8:59	262728	21.061	0.8250	12.245	0.094	-0.0211	0.8039		1.226
6/14/2008 8:59	262728	21.053	0.8330	12.245	0.094	-0.0211	0.8119		1.446
6/14/2008 8:59	262729	21.048	0.8380	12.245	0.094	-0.0211	0.8169		1.667
6/14/2008 8:59	262729	21.059	0.8270	12.245	0.094	-0.0211	0.8059		1.889
6/14/2008 8:59	262729	21.045	0.8410	12.245	0.094	-0.0211	0.8199		2.157
6/14/2008 8:59	262729	21.049	0.8370	12.245	0.094	-0.0211	0.8159		2.378
6/14/2008 8:59	262730	21.055	0.8310	12.245	0.094	-0.0211	0.8099		2.619
6/14/2008 8:59	262730	21.065	0.8210	12.245	0.094	-0.0211	0.7999		2.84
6/14/2008 8:59	262730	21.061	0.8250	12.245	0.094	-0.0211	0.8039		3.061
6/14/2008 8:59	262730	21.065	0.8210	12.245	0.094	-0.0211	0.7999		3.282
6/14/2008 8:59	262731	21.057	0.8290	12.245	0.094	-0.0211	0.8079		3.503
6/14/2008 8:59	262731	21.069	0.8170	12.245	0.094	-0.0211	0.7959		3.75
6/14/2008 8:59	262731	21.068	0.8180	12.245	0.094	-0.0211	0.7969		4
6/14/2008 8:59	262731	21.068	0.8180	12.245	0.094	-0.0211	0.7969		4.25
6/14/2008 8:59	262732	21.06	0.8260	12.245	0.094	-0.0211	0.8049		4.5
6/14/2008 8:59	262732	21.073	0.8130	12.245	0.094	-0.0211	0.7919		4.75
6/14/2008 8:59	262732	21.071	0.8150	12.245	0.094	-0.0211	0.7939		5
6/14/2008 8:59	262732	21.082	0.8040	12.245	0.094	-0.0211	0.7829		5.25
6/14/2008 8:59	262733	21.083	0.8030	12.245	0.094	-0.0211	0.7819		5.5
6/14/2008 8:59	262733	21.082	0.8040	12.245	0.094	-0.0211	0.7829		5.75
6/14/2008 8:59	262733	21.08	0.8060	12.245	0.094	-0.0211	0.7849		6
6/14/2008 8:59	262733	21.091	0.7950	12.245	0.094	-0.0211	0.7739		6.36
6/14/2008 8:59	262734	21.092	0.7940	12.245	0.094	-0.0211	0.7729		6.72
6/14/2008 8:59	262734	21.112	0.7740	12.245	0.094	-0.0211	0.7529		7.14
6/14/2008 8:59	262735	21.097	0.7890	12.245	0.094	-0.0211	0.7679		7.56
6/14/2008 8:59	262735	21.103	0.7830	12.245	0.094	-0.0211	0.7619		7.98
6/14/2008 8:59	262735	21.1	0.7860	12.245	0.094	-0.0211	0.7649		8.46
6/14/2008 8:59	262736	21.109	0.7770	12.245	0.094	-0.0211	0.7559		9
6/14/2008 8:59	262736	21.1	0.7860	12.245	0.094	-0.0211	0.7649		9.48
6/14/2008 8:59	262737	21.118	0.7680	12.245	0.094	-0.0211	0.7469		10.08
6/14/2008 8:59	262738	21.12	0.7660	12.245	0.094	-0.0211	0.7449		10.68
6/14/2008 8:59	262738	21.125	0.7610	12.245	0.094	-0.0211	0.7399		11.28
6/14/2008 8:59	262739	21.111	0.7750	12.245	0.094	-0.0211	0.7539		11.94
6/14/2008 8:59	262740	21.134	0.7520	12.245	0.094	-0.0211	0.7309		12.671
6/14/2008 9:00	262740	21.138	0.7480	12.245	0.094	-0.0211	0.7269		13.44
6/14/2008 9:00	262741	21.138	0.7480	12.245	0.094	-0.0211	0.7269		14.22
6/14/2008 9:00	262742	21.149	0.7370	12.245	0.094	-0.0211	0.7159		15.06

6/14/2008 9:00	262743	21.152	0.7340	12.245	0.094	-0.0211	0.7129	15.96
6/14/2008 9:00	262744	21.158	0.7280	12.245	0.094	-0.0211	0.7069	16.92
6/14/2008 9:00	262745	21.15	0.7360	12.245	0.094	-0.0211	0.7149	17.88
6/14/2008 9:00	262746	21.159	0.7270	12.245	0.094	-0.0211	0.7059	18.96
6/14/2008 9:00	262747	21.162	0.7240	12.245	0.094	-0.0211	0.7029	20.1
6/14/2008 9:00	262748	21.157	0.7290	12.245	0.094	-0.0211	0.7079	21.3
6/14/2008 9:00	262750	21.177	0.7090	12.245	0.094	-0.0211	0.6879	22.56
6/14/2008 9:00	262751	21.183	0.7030	12.245	0.094	-0.0211	0.6819	23.88
6/14/2008 9:00	262752	21.185	0.7010	12.245	0.094	-0.0211	0.6799	25.32
6/14/2008 9:00	262754	21.194	0.6920	12.245	0.094	-0.0211	0.6709	26.82
6/14/2008 9:00	262755	21.194	0.6920	12.245	0.094	-0.0211	0.6709	28.38
6/14/2008 9:00	262757	21.2	0.6860	12.245	0.094	-0.0211	0.6649	30.06
6/14/2008 9:00	262759	21.215	0.6710	12.245	0.094	-0.0211	0.6499	31.86
6/14/2008 9:00	262761	21.214	0.6720	12.245	0.094	-0.0211	0.6509	33.72
6/14/2008 9:00	262763	21.221	0.6650	12.245	0.094	-0.0211	0.6439	35.76
6/14/2008 9:00	262765	21.229	0.6570	12.245	0.094	-0.0211	0.6359	37.86
6/14/2008 9:00	262767	21.233	0.6530	12.245	0.094	-0.0211	0.6319	40.08
6/14/2008 9:00	262769	21.235	0.6510	12.245	0.094	-0.0211	0.6299	42.48
6/14/2008 9:00	262772	21.251	0.6350	12.245	0.094	-0.0211	0.6139	45
6/14/2008 9:00	262775	21.262	0.6240	12.245	0.094	-0.0211	0.6029	47.64
6/14/2008 9:00	262777	21.252	0.6340	12.245	0.094	-0.0211	0.6129	50.46
6/14/2008 9:00	262780	21.262	0.6240	12.245	0.094	-0.0211	0.6029	53.46
6/14/2008 9:00	262784	21.275	0.6110	12.245	0.094	-0.0211	0.5899	56.64
6/14/2008 9:00	262787	21.286	0.6000	12.245	0.094	-0.0211	0.5789	60
6/14/2008 9:00	262791	21.292	0.5940	12.245	0.094	-0.0211	0.5729	63.6
6/14/2008 9:00	262794	21.299	0.5870	12.245	0.094	-0.0211	0.5659	67.2
6/14/2008 9:00	262798	21.3	0.5860	12.245	0.094	-0.0211	0.5649	71.4
6/14/2008 9:01	262803	21.315	0.5710	12.245	0.094	-0.0211	0.5499	75.748
6/14/2008 9:01	262807	21.313	0.5730	12.245	0.094	-0.0211	0.5519	79.8
6/14/2008 9:01	262812	21.324	0.5620	12.245	0.094	-0.0211	0.5409	84.6
6/14/2008 9:01	262817	21.331	0.5550	12.245	0.094	-0.0211	0.5339	90
6/14/2008 9:01	262822	21.329	0.5570	12.245	0.094	-0.0211	0.5359	94.8
6/14/2008 9:01	262828	21.337	0.5490	12.245	0.094	-0.0211	0.5279	100.8
6/14/2008 9:01	262834	21.343	0.5430	12.245	0.094	-0.0211	0.5219	106.8
6/14/2008 9:01	262840	21.348	0.5380	12.245	0.094	-0.0211	0.5169	112.8
6/14/2008 9:01	262846	21.342	0.5440	12.245	0.094	-0.0211	0.5229	119.4
6/14/2008 9:01	262854	21.346	0.5400	12.245	0.094	-0.0211	0.5189	126.6
6/14/2008 9:02	262861	21.362	0.5240	12.245	0.094	-0.0211	0.5029	134.4
6/14/2008 9:02	262869	21.366	0.5200	12.245	0.094	-0.0211	0.4989	142.2
6/14/2008 9:02	262878	21.354	0.5320	12.245	0.094	-0.0211	0.5109	150.781
6/14/2008 9:02	262887	21.363	0.5230	12.245	0.094	-0.0211	0.5019	159.6
6/14/2008 9:02	262896	21.365	0.5210	12.245	0.094	-0.0211	0.4999	169.2
6/14/2008 9:02	262906	21.37	0.5160	12.245	0.094	-0.0211	0.4949	178.8
6/14/2008 9:02	262917	21.369	0.5170	12.245	0.094	-0.0211	0.4959	189.6
6/14/2008 9:03	262928	21.358	0.5280	12.245	0.094	-0.0211	0.5069	201.05

6/14/2008 9:03	262940	21.38	0.5060	12.245	0.094	-0.0211	0.4849	213
6/14/2008 9:03	262953	21.37	0.5160	12.245	0.094	-0.0211	0.4949	225.784
6/14/2008 9:03	262966	21.371	0.5150	12.245	0.094	-0.0211	0.4939	238.8
6/14/2008 9:04	262980	21.381	0.5050	12.245	0.094	-0.0211	0.4839	253.2
6/14/2008 9:04	262995	21.392	0.4940	12.245	0.094	-0.0211	0.4729	268.2
6/14/2008 9:04	263011	21.39	0.4960	12.245	0.094	-0.0211	0.4749	283.8
6/14/2008 9:04	263028	21.387	0.4990	12.245	0.094	-0.0211	0.4779	300.784
6/14/2008 9:05	263046	21.404	0.4820	12.245	0.094	-0.0211	0.4609	318.6
6/14/2008 9:05	263064	21.399	0.4870	12.245	0.094	-0.0211	0.4659	337.2
6/14/2008 9:05	263085	21.407	0.4790	12.245	0.094	-0.0211	0.4579	357.6
6/14/2008 9:06	263106	21.411	0.4750	12.245	0.094	-0.0211	0.4539	378.6
6/14/2008 9:06	263128	21.406	0.4800	12.245	0.094	-0.0211	0.4589	400.8
6/14/2008 9:06	263152	21.42	0.4660	12.245	0.094	-0.0211	0.4449	424.8
6/14/2008 9:07	263177	21.43	0.4560	12.245	0.094	-0.0211	0.4349	450
6/14/2008 9:07	263203	21.421	0.4650	12.245	0.094	-0.0211	0.4439	476.483
6/14/2008 9:08	263232	21.458	0.4280	12.245	0.094	-0.0211	0.4069	504.6
6/14/2008 9:08	263262	21.427	0.4590	12.245	0.094	-0.0211	0.4379	534.6
6/14/2008 9:09	263293	21.434	0.4520	12.245	0.094	-0.0211	0.4309	566.4
6/14/2008 9:09	263327	21.426	0.4600	12.245	0.094	-0.0211	0.4389	600
6/14/2008 9:10	263363	21.431	0.4550	12.245	0.094	-0.0211	0.4339	636
6/14/2008 9:10	263399	21.443	0.4430	12.245	0.094	-0.0211	0.4219	672
6/14/2008 9:11	263441	21.444	0.4420	12.245	0.094	-0.0211	0.4209	714
6/14/2008 9:12	263483	21.456	0.4300	12.245	0.094	-0.0211	0.4089	756
6/14/2008 9:13	263525	21.457	0.4290	12.245	0.094	-0.0211	0.4079	798
6/14/2008 9:13	263573	21.46	0.4260	12.245	0.094	-0.0211	0.4049	846
6/14/2008 9:14	263627	21.46	0.4260	12.245	0.094	-0.0211	0.4049	900
6/14/2008 9:15	263675	21.47	0.4160	12.245	0.094	-0.0211	0.3949	948
6/14/2008 9:16	263735	21.472	0.4140	12.245	0.094	-0.0211	0.3929	1008
6/14/2008 9:17	263795	21.472	0.4140	12.245	0.094	-0.0211	0.3929	1068
6/14/2008 9:18	263855	21.46	0.4260	12.245	0.094	-0.0211	0.4049	1128
6/14/2008 9:19	263921	21.5	0.3860	12.25	0.099	-0.0222	0.3638	1194
6/14/2008 9:20	263993	21.484	0.4020	12.25	0.099	-0.0222	0.3798	1266
6/14/2008 9:22	264071	21.5	0.3860	12.25	0.099	-0.0222	0.3638	1344
6/14/2008 9:23	264149	21.49	0.3960	12.25	0.099	-0.0222	0.3738	1422
6/14/2008 9:24	264233	21.493	0.3930	12.25	0.099	-0.0222	0.3708	1506
6/14/2008 9:26	264323	21.495	0.3910	12.25	0.099	-0.0222	0.3688	1596
6/14/2008 9:27	264419	21.499	0.3870	12.25	0.099	-0.0222	0.3648	1692
6/14/2008 9:29	264515	21.505	0.3810	12.249	0.098	-0.0220	0.3590	1788
6/14/2008 9:31	264623	21.521	0.3650	12.249	0.098	-0.0220	0.3430	1896
6/14/2008 9:33	264737	21.52	0.3660	12.249	0.098	-0.0220	0.3440	2010
6/14/2008 9:35	264857	21.509	0.3770	12.249	0.098	-0.0220	0.3550	2130
6/14/2008 9:37	264983	21.519	0.3670	12.249	0.098	-0.0220	0.3450	2256
6/14/2008 9:39	265115	21.516	0.3700	12.249	0.098	-0.0220	0.3480	2388
6/14/2008 9:41	265259	21.52	0.3660	12.249	0.098	-0.0220	0.3440	2532
6/14/2008 9:44	265409	21.524	0.3620	12.249	0.098	-0.0220	0.3400	2682

Recovery Data -
Water Levels

6/14/2008 9:47	265565	21.523	0.3630	12.249	0.098	-0.0220	0.3410	2838
6/14/2008 9:49	265733	21.528	0.3580	12.249	0.098	-0.0220	0.3360	3006
6/14/2008 9:52	265913	21.538	0.3480	12.249	0.098	-0.0220	0.3260	3186
6/14/2008 9:55	266099	21.551	0.3350	12.249	0.098	-0.0220	0.3130	3372
6/14/2008 9:59	266303	21.537	0.3490	12.251	0.1	-0.0224	0.3266	3576
6/14/2008 10:02	266513	21.538	0.3480	12.251	0.1	-0.0224	0.3256	3786
6/14/2008 10:06	266735	21.551	0.3350	12.251	0.1	-0.0224	0.3126	4008
6/14/2008 10:10	266975	21.557	0.3290	12.25	0.099	-0.0222	0.3068	4248
6/14/2008 10:14	267227	21.564	0.3220	12.25	0.099	-0.0222	0.2998	4500
6/14/2008 10:19	267491	21.566	0.3200	12.248	0.097	-0.0217	0.2983	4764
6/14/2008 10:23	267773	21.565	0.3210	12.248	0.097	-0.0217	0.2993	5046
6/14/2008 10:28	268073	21.576	0.3100	12.248	0.097	-0.0217	0.2883	5346
6/14/2008 10:34	268391	21.573	0.3130	12.248	0.097	-0.0217	0.2913	5664
6/14/2008 10:39	268727	21.583	0.3030	12.252	0.101	-0.0226	0.2804	6000
6/14/2008 10:45	269087	21.579	0.3070	12.252	0.101	-0.0226	0.2844	6360
6/14/2008 10:51	269447	21.582	0.3040	12.25	0.099	-0.0222	0.2818	6720
6/14/2008 10:58	269867	21.579	0.3070	12.25	0.099	-0.0222	0.2848	7140
6/14/2008 11:05	270287	21.594	0.2920	12.249	0.098	-0.0220	0.2700	7560
6/14/2008 11:12	270707	21.597	0.2890	12.25	0.099	-0.0222	0.2668	7980
6/14/2008 11:20	271187	21.607	0.2790	12.25	0.099	-0.0222	0.2568	8460
6/14/2008 11:29	271727	21.604	0.2820	12.25	0.099	-0.0222	0.2598	9000
6/14/2008 11:37	272207	21.61	0.2760	12.25	0.099	-0.0222	0.2538	9480
6/14/2008 11:47	272807	21.623	0.2630	12.247	0.096	-0.0215	0.2415	10080
6/14/2008 11:57	273407	21.608	0.2780	12.249	0.098	-0.0220	0.2560	10680
6/14/2008 12:07	274007	21.626	0.2600	12.247	0.096	-0.0215	0.2385	11280
6/14/2008 12:18	274667	21.635	0.2510	12.247	0.096	-0.0215	0.2295	11940
6/14/2008 12:30	275387	21.632	0.2540	12.246	0.095	-0.0213	0.2327	12660
6/14/2008 12:43	276167	21.632	0.2540	12.241	0.09	-0.0202	0.2338	13440
6/14/2008 12:56	276947	21.63	0.2560	12.243	0.092	-0.0206	0.2354	14220
6/14/2008 13:10	277787	21.646	0.2400	12.239	0.088	-0.0197	0.2203	15060
6/14/2008 13:25	278687	21.658	0.2280	12.239	0.088	-0.0197	0.2083	15960
6/14/2008 13:41	279647	21.664	0.2220	12.238	0.087	-0.0195	0.2025	16920
6/14/2008 13:57	280607	21.66	0.2260	12.236	0.085	-0.0190	0.2070	17880
6/14/2008 14:15	281687	21.687	0.1990	12.231	0.08	-0.0179	0.1811	18960
6/14/2008 14:34	282827	21.669	0.2170	12.231	0.08	-0.0179	0.1991	20100
6/14/2008 14:54	284027	21.681	0.2050	12.231	0.08	-0.0179	0.1871	21300
6/14/2008 15:15	285287	21.689	0.1970	12.23	0.079	-0.0177	0.1793	22560
6/14/2008 15:37	286607	21.694	0.1920	12.222	0.071	-0.0159	0.1761	23880
6/14/2008 16:01	288047	21.698	0.1880	12.223	0.072	-0.0161	0.1719	25320
6/14/2008 16:26	289547	21.706	0.1800	12.218	0.067	-0.0150	0.1650	26820
6/14/2008 16:52	291107	21.708	0.1780	12.216	0.065	-0.0146	0.1634	28380
6/14/2008 17:20	292787	21.719	0.1670	12.207	0.056	-0.0125	0.1545	30060
6/14/2008 17:50	294587	21.727	0.1590	12.208	0.057	-0.0128	0.1462	31860
6/14/2008 18:21	296447	21.728	0.1580	12.205	0.054	-0.0121	0.1459	33720
6/14/2008 18:55	298487	21.726	0.1600	12.202	0.051	-0.0114	0.1486	35760

Recovery Data -
Water Levels

6/14/2008 19:30	300587	21.718	0.1680	12.202	0.051	-0.0114	0.1566	37860
6/14/2008 20:07	302807	21.716	0.1700	12.2	0.049	-0.0110	0.1590	40080
6/14/2008 20:47	305207	21.703	0.1830	12.201	0.05	-0.0112	0.1718	42480
6/14/2008 21:29	307727	21.688	0.1980	12.205	0.054	-0.0121	0.1859	45000
6/14/2008 22:13	310367	21.671	0.2150	12.205	0.054	-0.0121	0.2029	47640
6/14/2008 23:00	313187	21.651	0.2350	12.216	0.065	-0.0146	0.2204	50460
6/14/2008 23:50	316187	21.634	0.2520	12.221	0.07	-0.0157	0.2363	53460
6/15/2008 0:43	319367	21.632	0.2540	12.224	0.073	-0.0164	0.2376	56640
6/15/2008 1:39	322727	21.621	0.2650	12.228	0.077	-0.0172	0.2478	60000
6/15/2008 2:39	326327	21.643	0.2430	12.228	0.077	-0.0172	0.2258	63600
6/15/2008 3:39	329927	21.661	0.2250	12.225	0.074	-0.0166	0.2084	67200
6/15/2008 4:49	334127	21.637	0.2490	12.225	0.074	-0.0166	0.2324	71400
6/15/2008 5:59	338327	21.637	0.2490	12.23	0.079	-0.0177	0.2313	75600
6/15/2008 7:09	342527	21.626	0.2600	12.236	0.085	-0.0190	0.2410	79800
6/15/2008 8:29	347327	21.629	0.2570	12.24	0.089	-0.0199	0.2371	84600
6/15/2008 9:59	352727	21.626	0.2600	12.239	0.088	-0.0197	0.2403	90000

Revovery Data -
Barometric Pressure

Date and Time	Elapsed Time Seconds	Elapsed Time Pump Seconds	Sensor: Baro Pres SN#: 121043 Barometric Pressure (PSI)
6/11/2008 7:00	63600	-109.92	12.1530
6/11/2008 7:10	64200	490	12.1510
6/11/2008 7:20	64800	1090	12.1510
6/11/2008 7:30	65400	1690	12.1540
6/11/2008 7:40	66000	2290	12.1550
6/11/2008 7:50	66600	2890	12.1590
6/11/2008 8:00	67200	3490	12.1600
6/11/2008 8:10	67800	4090	12.1580
6/11/2008 8:20	68400	4690	12.1590
6/11/2008 8:30	69000	5290	12.1600
6/11/2008 8:40	69600	5890	12.1630
6/11/2008 8:50	70200	6490	12.1610
6/11/2008 9:00	70800	7090	12.1610
6/11/2008 9:10	71400	7690	12.1600
6/11/2008 9:20	72000	8290	12.1630
6/11/2008 9:30	72600	8890	12.1630
6/11/2008 9:40	73200	9490	12.1610
6/11/2008 9:50	73800	10090	12.1580
6/11/2008 10:00	74400	10690	12.1600
6/11/2008 10:10	75000	11290	12.1570
6/11/2008 10:20	75600	11890	12.1570
6/11/2008 10:30	76200	12490	12.1550
6/11/2008 10:40	76800	13090	12.1550
6/11/2008 10:50	77400	13690	12.1520
6/11/2008 11:00	78000	14290	12.1520
6/11/2008 11:10	78600	14890	12.1500
6/11/2008 11:20	79200	15490	12.1530
6/11/2008 11:30	79800	16090	12.1520
6/11/2008 11:40	80400	16690	12.1550
6/11/2008 11:50	81000	17290	12.1540
6/11/2008 12:00	81600	17890	12.1530
6/11/2008 12:10	82200	18490	12.1530
6/11/2008 12:20	82800	19090	12.1570
6/11/2008 12:30	83400	19690	12.1560
6/11/2008 12:40	84000	20290	12.1540
6/11/2008 12:50	84600	20890	12.1520
6/11/2008 13:00	85200	21490	12.1480
6/11/2008 13:10	85800	22090	12.1550
6/11/2008 13:20	86400	22690	12.1560
6/11/2008 13:30	87000	23290	12.1550
6/11/2008 13:40	87600	23890	12.1550
6/11/2008 13:50	88200	24490	12.1570
6/11/2008 14:00	88800	25090	12.1570
6/11/2008 14:10	89400	25690	12.1580
6/11/2008 14:20	90000	26290	12.1580
6/11/2008 14:30	90600	26890	12.1560
6/11/2008 14:40	91200	27490	12.1560
6/11/2008 14:50	91800	28090	12.1560
6/11/2008 15:00	92400	28690	12.1570
6/11/2008 15:10	93000	29290	12.1550
6/11/2008 15:20	93600	29890	12.1590
6/11/2008 15:30	94200	30490	12.1590
6/11/2008 15:40	94800	31090	12.1600
6/11/2008 15:50	95400	31690	12.1600
6/11/2008 16:00	96000	32290	12.1600
6/11/2008 16:10	96600	32890	12.1600
6/11/2008 16:20	97200	33490	12.1600
6/11/2008 16:30	97800	34090	12.1630

6/11/2008 16:40	98400	34690	12.1630
6/11/2008 16:50	99000	35290	12.1630
6/11/2008 17:00	99600	35890	12.1620
6/11/2008 17:10	100200	36490	12.1690
6/11/2008 17:20	100800	37090	12.1660
6/11/2008 17:30	101400	37690	12.1690
6/11/2008 17:40	102000	38290	12.1670
6/11/2008 17:50	102600	38890	12.1710
6/11/2008 18:00	103200	39490	12.1730
6/11/2008 18:10	103800	40090	12.1720
6/11/2008 18:20	104400	40690	12.1730
6/11/2008 18:30	105000	41290	12.1730
6/11/2008 18:40	105600	41890	12.1720
6/11/2008 18:50	106200	42490	12.1720
6/11/2008 19:00	106800	43090	12.1740
6/11/2008 19:10	107400	43690	12.1760
6/11/2008 19:20	108000	44290	12.1750
6/11/2008 19:30	108600	44890	12.1770
6/11/2008 19:40	109200	45490	12.1760
6/11/2008 19:50	109800	46090	12.1770
6/11/2008 20:00	110400	46690	12.1800
6/11/2008 20:10	111000	47290	12.1780
6/11/2008 20:20	111600	47890	12.1780
6/11/2008 20:30	112200	48490	12.1790
6/11/2008 20:40	112800	49090	12.1800
6/11/2008 20:50	113400	49690	12.1800
6/11/2008 21:00	114000	50290	12.1810
6/11/2008 21:10	114600	50890	12.1810
6/11/2008 21:20	115200	51490	12.1780
6/11/2008 21:30	115800	52090	12.1810
6/11/2008 21:40	116400	52690	12.1810
6/11/2008 21:50	117000	53290	12.1830
6/11/2008 22:00	117600	53890	12.1850
6/11/2008 22:10	118200	54490	12.1860
6/11/2008 22:20	118800	55090	12.1870
6/11/2008 22:30	119400	55690	12.1880
6/11/2008 22:40	120000	56290	12.1910
6/11/2008 22:50	120600	56890	12.1920
6/11/2008 23:00	121200	57490	12.1920
6/11/2008 23:10	121800	58090	12.1900
6/11/2008 23:20	122400	58690	12.1890
6/11/2008 23:30	123000	59290	12.1900
6/11/2008 23:40	123600	59890	12.1900
6/11/2008 23:50	124200	60490	12.1900
6/12/2008 0:00	124800	61090	12.1900
6/12/2008 0:10	125400	61690	12.1880
6/12/2008 0:20	126000	62290	12.1880
6/12/2008 0:30	126600	62890	12.1920
6/12/2008 0:40	127200	63490	12.1890
6/12/2008 0:50	127800	64090	12.1900
6/12/2008 1:00	128400	64690	12.1910
6/12/2008 1:10	129000	65290	12.1910
6/12/2008 1:20	129600	65890	12.1940
6/12/2008 1:30	130200	66490	12.1910
6/12/2008 1:40	130800	67090	12.1930
6/12/2008 1:50	131400	67690	12.1910
6/12/2008 2:00	132000	68290	12.1910
6/12/2008 2:10	132600	68890	12.1900
6/12/2008 2:20	133200	69490	12.1900
6/12/2008 2:30	133800	70090	12.1900
6/12/2008 2:40	134400	70690	12.1880
6/12/2008 2:50	135000	71290	12.1900
6/12/2008 3:00	135600	71890	12.1900

6/12/2008 3:10	136200	72490	12.1860
6/12/2008 3:20	136800	73090	12.1860
6/12/2008 3:30	137400	73690	12.1870
6/12/2008 3:40	138000	74290	12.1880
6/12/2008 3:50	138600	74890	12.1860
6/12/2008 4:00	139200	75490	12.1910
6/12/2008 4:10	139800	76090	12.1890
6/12/2008 4:20	140400	76690	12.1900
6/12/2008 4:30	141000	77290	12.1880
6/12/2008 4:40	141600	77890	12.1910
6/12/2008 4:50	142200	78490	12.1900
6/12/2008 5:00	142800	79090	12.1890
6/12/2008 5:10	143400	79690	12.1940
6/12/2008 5:20	144000	80290	12.1980
6/12/2008 5:30	144600	80890	12.1940
6/12/2008 5:40	145200	81490	12.1950
6/12/2008 5:50	145800	82090	12.1970
6/12/2008 6:00	146400	82690	12.1950
6/12/2008 6:10	147000	83290	12.1950
6/12/2008 6:20	147600	83890	12.1960
6/12/2008 6:30	148200	84490	12.1990
6/12/2008 6:40	148800	85090	12.1980
6/12/2008 6:50	149400	85690	12.2020
6/12/2008 7:00	150000	86290	12.2020
6/12/2008 7:10	150600	86890	12.2040
6/12/2008 7:20	151200	87490	12.2060
6/12/2008 7:30	151800	88090	12.2090
6/12/2008 7:40	152400	88690	12.2110
6/12/2008 7:50	153000	89290	12.2130
6/12/2008 8:00	153600	89890	12.2150
6/12/2008 8:10	154200	90490	12.2170
6/12/2008 8:20	154800	91090	12.2170
6/12/2008 8:30	155400	91690	12.2230
6/12/2008 8:40	156000	92290	12.2270
6/12/2008 8:50	156600	92890	12.2280
6/12/2008 9:00	157200	93490	12.2300
6/12/2008 9:10	157800	94090	12.2340
6/12/2008 9:20	158400	94690	12.2350
6/12/2008 9:30	159000	95290	12.2400
6/12/2008 9:40	159600	95890	12.2430
6/12/2008 9:50	160200	96490	12.2470
6/12/2008 10:00	160800	97090	12.2450
6/12/2008 10:10	161400	97690	12.2480
6/12/2008 10:20	162000	98290	12.2460
6/12/2008 10:30	162600	98890	12.2440
6/12/2008 10:40	163200	99490	12.2440
6/12/2008 10:50	163800	100090	12.2490
6/12/2008 11:00	164400	100690	12.2530
6/12/2008 11:10	165000	101290	12.2530
6/12/2008 11:20	165600	101890	12.2520
6/12/2008 11:30	166200	102490	12.2540
6/12/2008 11:40	166800	103090	12.2540
6/12/2008 11:50	167400	103690	12.2580
6/12/2008 12:00	168000	104290	12.2540
6/12/2008 12:10	168600	104890	12.2530
6/12/2008 12:20	169200	105490	12.2540
6/12/2008 12:30	169800	106090	12.2510
6/12/2008 12:40	170400	106690	12.2520
6/12/2008 12:50	171000	107290	12.2550
6/12/2008 13:00	171600	107890	12.2530
6/12/2008 13:10	172200	108490	12.2510
6/12/2008 13:20	172800	109090	12.2530
6/12/2008 13:30	173400	109690	12.2530

6/12/2008 13:40	174000	110290	12.2570
6/12/2008 13:50	174600	110890	12.2540
6/12/2008 14:00	175200	111490	12.2530
6/12/2008 14:10	175800	112090	12.2550
6/12/2008 14:20	176400	112690	12.2580
6/12/2008 14:30	177000	113290	12.2620
6/12/2008 14:40	177600	113890	12.2570
6/12/2008 14:50	178200	114490	12.2550
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6/12/2008 19:40	195600	131890	12.2660
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6/12/2008 20:10	197400	133690	12.2700
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6/13/2008 7:50	239400	175690	12.2960
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6/13/2008 13:30	259800	196090	12.2790
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6/13/2008 14:40	264000	200290	12.269
6/13/2008 14:50	264600	200890	12.266
6/13/2008 15:00	265200	201490	12.265
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6/13/2008 18:00	276000	212290	12.239
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6/13/2008 20:50	286200	222490	12.238
6/13/2008 21:00	286800	223090	12.238

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6/13/2008 21:50	289800	226090	12.237
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6/13/2008 22:30	292200	228490	12.239
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6/13/2008 23:10	294600	230890	12.243
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6/13/2008 23:40	296400	232690	12.246
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6/14/2008 0:10	298200	234490	12.245
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6/14/2008 1:00	301200	237490	12.25
6/14/2008 1:10	301800	238090	12.25
6/14/2008 1:20	302400	238690	12.251
6/14/2008 1:30	303000	239290	12.248
6/14/2008 1:40	303600	239890	12.247
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6/14/2008 2:00	304800	241090	12.247
6/14/2008 2:10	305400	241690	12.247
6/14/2008 2:20	306000	242290	12.247
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6/14/2008 2:40	307200	243490	12.247
6/14/2008 2:50	307800	244090	12.242
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6/14/2008 3:20	309600	245890	12.244
6/14/2008 3:30	310200	246490	12.24
6/14/2008 3:40	310800	247090	12.243
6/14/2008 3:50	311400	247690	12.241
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6/14/2008 5:50	318600	254890	12.242
6/14/2008 6:00	319200	255490	12.243
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6/14/2008 6:50	322200	258490	12.241
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6/14/2008 7:10	323400	259690	12.245
6/14/2008 7:20	324000	260290	12.247
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6/14/2008 7:50	325800	262090	12.247
6/14/2008 8:00	326400	262690	12.245
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6/14/2008 10:30	335400	271690	12.25
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6/14/2008 11:10	337800	274090	12.247
6/14/2008 11:20	338400	274690	12.243
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6/14/2008 11:40	339600	275890	12.241
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6/14/2008 12:00	340800	277090	12.244
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6/14/2008 12:50	343800	280090	12.236
6/14/2008 13:00	344400	280690	12.234
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6/14/2008 14:40	350400	286690	12.225
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6/14/2008 15:00	351600	287890	12.223
6/14/2008 15:10	352200	288490	12.222
6/14/2008 15:20	352800	289090	12.218
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6/14/2008 17:20	360000	296290	12.205
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6/14/2008 19:50	369000	305290	12.2
6/14/2008 20:00	369600	305890	12.201
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6/14/2008 20:20	370800	307090	12.201
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6/14/2008 20:40	372000	308290	12.202
6/14/2008 20:50	372600	308890	12.202
6/14/2008 21:00	373200	309490	12.202
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6/15/2008 1:50	390600	326890	12.229
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6/15/2008 2:30	393000	329290	12.227
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6/15/2008 2:50	394200	330490	12.226
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6/15/2008 3:10	395400	331690	12.223
6/15/2008 3:20	396000	332290	12.224
6/15/2008 3:30	396600	332890	12.223
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6/15/2008 3:50	397800	334090	12.225
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6/15/2008 4:10	399000.001	335290	12.227
6/15/2008 4:20	399600	335890	12.23
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6/15/2008 5:00	402000	338290	12.23
6/15/2008 5:10	402600	338890	12.228
6/15/2008 5:20	403200	339490	12.231
6/15/2008 5:30	403800	340090	12.232
6/15/2008 5:40	404400	340690	12.235
6/15/2008 5:50	405000	341290	12.232
6/15/2008 6:00	405600	341890	12.233
6/15/2008 6:10	406200	342490	12.236
6/15/2008 6:20	406800	343090	12.234
6/15/2008 6:30	407400	343690	12.236
6/15/2008 6:40	408000	344290	12.236
6/15/2008 6:50	408600	344890	12.24
6/15/2008 7:00	409200	345490	12.239
6/15/2008 7:10	409800.001	346090	12.238
6/15/2008 7:20	410400	346690	12.24
6/15/2008 7:30	411000	347290	12.24
6/15/2008 7:40	411600	347890	12.239
6/15/2008 7:50	412200	348490	12.241
6/15/2008 8:00	412800	349090	12.239
6/15/2008 8:10	413400	349690	12.237
6/15/2008 8:20	414000	350290	12.236
6/15/2008 8:30	414600	350890	12.239
6/15/2008 8:40	415200	351490	12.242
6/15/2008 8:50	415800	352090	12.239
6/15/2008 9:00	416400	352690	12.239
6/15/2008 9:10	417000	353290	12.24
6/15/2008 9:20	417600	353890	12.239
6/15/2008 9:30	418200	354490	12.238
6/15/2008 9:40	418800	355090	12.239
6/15/2008 9:50	419400	355690	12.239
6/15/2008 10:00	420000	356290	12.239

ATTACHMENT 10.3-1

MARKUPS

Table of Contents for ER Chapter 3 (List of Tables)

ER Sections 3.4.6.1 and 3.4.7

ER Table 3.4-15 (non-proprietary)

LIST OF TABLES

Insert 1 for ER Section 3.4.6.1

wells that produce an average daily usage of about 76,000 m^3/d (20,000,000 gal/d) and maximum usage of 220,000 m^3/d (58,000,000 gal/d). The City of Pocatello obtains drinking water from the ESRP and the tributary Portneuf Aquifer through a system of 21 water supply wells. These wells provide an average of 57,160 m^3/d (15,000,000 gal/d) (IDC, 2008a).

The use of groundwater by the EREF will be covered by a 1961 water right appropriation that will be transferred to the property for use as industrial water. The water transfer will occur concurrently with the purchase of the property by AES and will change the original water use from agriculture to industrial use. The primary point of diversion will be from the existing agricultural well, Lava Well 3, near the center of Section 13, or a replacement well. The water will be assigned to other points of diversion to allow for the use of water from another well if the primary well should happen to fail. The original 1961 appropriation will decrease to approximately 1,713 m^3/d (452,500 gal/d) for industrial use and 147 m^3/d (38,800 gal/d) for seasonal irrigation use. # The predicted daily water consumption during operations of the EREF is anticipated to be approximately 68.2 m^3/d (18,000 gal/d) and the peak water consumption rate is anticipated to be 47 L/s (739 gpm). The normal annual water usage rate for the EREF will be 24,870,000 L/yr (6,570,000 gal/yr), which is a very small fraction (i.e., about 4%) of the water appropriation value of 625,000,000 L/yr (165,000,000 gal/yr) for industrial use. The peak water usage is developed based on the assumption that all water users are operating simultaneously. Furthermore, the peak water usage assumes that each water user is operating at maximum demand. This combination of assumptions is very unlikely to occur during the lifetime of the EREF. Nevertheless, the peak water usage is used to size the piping system and pumps. Given that the normal annual water usage rate for the EREF is a very small fraction of the appropriation value, momentary usages of water beyond the expected normal water usage rate are expected to be well within the water appropriation value for the EREF.

3.4.6.2 Regional Groundwater Use

The SRP Aquifer is relied upon for drinking water and irrigation throughout southeastern Idaho (Garabedian, 1992)(Lindholm, 1996). A breakdown of the water withdrawals by use from the SRP Aquifer is provided in Table 3.4-8, Total Groundwater Withdrawals from the SRP Aquifer for Irrigation, Public-Supply, and Self-Supplied Industrial Water Uses in 2000. The data in this table indicate that irrigation is the primary use, accounting for 97% of the total withdrawals in 2000 (Maupin, 2005). Public water supply accounts for 3% of the total withdrawals, and industrial uses amount to a fraction of 1% (Maupin, 2005).

At the current time, about 1.2 million ha (3 million ac) of the SRP are irrigated farmlands. About one third of the irrigation water is pumped from the SRP Aquifer and two thirds from surface water diversions (DGI, 2008). Irrigation with groundwater is possible because of high rates of water yield from the basaltic units of the SRP Aquifer.

3.4.6.3 Idaho National Laboratory

The INL is a significant user of groundwater in the general area of the proposed site. The ESRP Aquifer is the source of all the water used at INL. In 2007, the INL pumped 3.97E+06 m^3 (1.05E+09 gal) from a total of 29 production wells at 8 facilities (INL, 2008). The water uses at the INL include drinking water for employees and water for use in chemical processing, facilities operations, wastewater treatment, and environmental remediation (ATSDR, 2004).

3.4.6.4 Site Groundwater Management

The proposed site location is within the Bonneville-Jefferson groundwater management district. According to the Idaho Department of Water Resources (IDWR, 2008a), groundwater districts were defined by the Idaho State Legislature in the "Ground Water District Act" of 1995. This Act allows groundwater users to organize their own Districts that have broader authorities than water measurement districts. The groundwater districts can perform the measurement and reporting functions required by law and levy assessments similar to water measurement districts. Additionally, groundwater districts may represent their members in various water use issues and related legal matters, develop and operate mitigation and recharge plans, and perform other duties. It is unlikely that stipulations of the Bonneville-Jefferson Groundwater Management District will have any impact on the proposed EREF use of ground water.

The proposed site location is not within the service areas of any irrigation companies. It also is not located in established groundwater critical groundwater areas, contamination areas, or groundwater vulnerability areas (IDWR, 2008a).

3.4.7 Quantitative Description of Water Use

The source of water for the proposed facility would come from on-site groundwater wells. Anticipated water use by the facility is shown in Table 3.4-2, Anticipated Normal Plant Water Consumption, and Table 3.4-3, Anticipated Peak Facility Water Consumption. The water supply will be adequate for construction, operation and maintenance of the proposed site.

Insert 2 for ER Section 3.4.7

3.4.8 Non-Consumptive Water Use

The EREF will have a water appropriation of approximately 1,713 m^3/d (452,500 gal/d) for industrial use and 147 m^3/day (38,800 gal/day) for seasonal irrigation use from an existing water right associated with the property. This water right will transfer to AES with the purchase of the property. Non-consumptive use of water is not planned.

3.4.9 Contaminant Sources

There will be no direct discharges to native groundwater or surface waters from the operations at the proposed facility, other than potential infiltration from the Site Stormwater Detention Basin. There is no history of industrial use at the site. With the exception of agricultural products (fertilizers, pesticides, etc.) used at or near the site, the closest source of known hazardous releases and contaminants to the groundwater system is the INL. However, the INL is hydrologically cross gradient to the proposed site based on predominant flow directions in the ESRP Aquifer (DOE-ID, 2007a; DOE-ID, 2007b; Ackerman, 2006). Agricultural influences are the only potential upgradient impacts. Additional industrial development could occur in the vicinity, but no plans for such operations are known at this time.

Stormwater runoff from the proposed site will be controlled during construction and operation. Appropriate stormwater construction runoff permits for construction activities will be obtained before construction begins. Designs for stormwater runoff controls for the operating plant are described in Section 4.4, Water Resources Impacts. Appropriate routine erosion control measures and best management practices (BMPs) will be implemented as is normally required by such permits.

ER Section 3.4.6.1 (Insert 1)

The annual water usage during the construction years will increase to a maximum estimate of 98,458,000 L/yr (26,010,000 gal/yr) in the second year and decrease to 84,374,000 L/yr (22,289,000 gal/yr) during the seventh year of construction. The maximum annual water usage rate during construction is about 16% of the water appropriation value of 625,000,000 L/yr (165,000,000 gal/yr) for industrial use. It is assumed that construction water usage during construction years 8 through 11 will diminish markedly as most of the remaining construction activities are for assembly of systems and components and not concrete mixing, dust control or soil compaction. The heavy construction period includes the years when both construction and operation of cascades overlap. Section 3.4.7 provides the details of the water use values for construction and operation.

ER Section 3.4.7 (Insert 2)

Anticipated water use to construct the facility is shown in Table 3.4-15, Heavy Construction Period Water Use. The heavy construction period includes the years when both construction and operation of cascades overlap.

Table 3.4-15 Heavy Construction Period Water Use

Construction Year/ Major Use	Units	2011	2012	2013	2014	2015	2016	2017
People [(1)]	Liters (Gallons)	19,555,438 (5,166,000)	30,213,266 (7,981,500)	23,223,503 (6,135,000)	31,241,005 (8,253,000)	31,241,005 (8,253,000)	28,242,959 (7,461,000)	29,475,111 (7,786,500)
Concrete Mixing and Curing [(2)]	Liters (Gallons)	1,216,370 (321,331)	3,649,110 (963,993)	10,947,329 (2,891,978)	7,298,219 (1,927,985)	6,081,849 (1,606,655)	4,561,387 (1,204,991)	2,432,740 (642,662)
Dust Control [(3)]	Liters (Gallons)	52,465,810 (13,860,000)	52,465,810 (13,860,000)	52,465,810 (13,860,000)	52,465,810 (13,860,000)	52,465,810 (13,860,000)	52,465,810 (13,860,000)	52,465,810 (13,860,000)
Soil Compaction [(4)]	Liters (Gallons)	16,981,736 (4,486,100)	12,129,784 (3,204,350)	9,703,903 (2,563,500)	4,851,952 (1,281,750)	4,851,952 (1,281,750)	0	0
Totals	Liters (Gallons)	**90,219,351 (23,833,431)**	**98,457,966 (26,009,843)**	**96,340,539 (25,450,478)**	**95,856,979 (25,322,735)**	**94,640,613 (25,001,405)**	**85,270,156 (22,525,991)**	**84,373,661 (22,289,162)**

Notes:

1 Estimate of [ ] usage per day per person for 252 days per year for construction related activities (5 days a week) and 114 L (30 gal) for operating staff for 365 days per year. The following is the yearly man-power loading estimate:

Milestone			**Construction**	**Operations**
Start Construction	2011	First Year:	[ ] people	0 people
	2012	Second Year:	[ ] people	50 people
	2013	Third Year:	[ ] people	100 people
1st cascade on-line	Feb 2014	Fourth Year:	[ ] people	420 people
	2015	Fifth Year:	[ ] people	420 people
	2016	Sixth Year:	[ ] people	480 people

Notes:	(cont.) Heavy Construction Finished	2017	Seventh Year:	[ ] people	550 people

2 Estimate of 151.4 L (40 gal) used per cubic yard of concrete mixing and curing.

3 Estimate of 208,198 L (55,000 gal) per day.

4 Earthwork and soil compaction is assumed to be complete in 2015.

ATTACHMENT 11.1

MARKUPS

ER Section 4.1.2 and ER Section 8.8

obtained from Region 10 of the U.S. Environmental Protection Agency (EPA). A Spill Prevention, Control and Countermeasures (SPCC) plan will also be implemented during construction to minimize environmental impacts from potential spills and to ensure prompt and appropriate remediation. Potential spills during construction are likely to occur around vehicle maintenance and fueling locations, storage tanks, and painting operations. The SPCC plan will identify sources, locations and quantities of potential spills and response measures. The plan will also identify individuals and their responsibilities for implementation of the plan and provide for prompt notifications to state and local authorities, as required.

Waste management BMPs will be used to minimize solid waste and hazardous waste. These practices include the placement of waste receptacles and trash dumpsters at convenient locations and the designation of vehicle and equipment maintenance areas for the collection of oil, grease and hydraulic fluids. Where practicable, materials suitable for recycling will be collected. If external washing of construction vehicles is necessary, no detergents will be used, and the runoff will be diverted to an on-site retention basin. Adequately maintained sanitary facilities will be provided for construction crews.

4.1.2 Utilities Impacts

The site's electrical transmission lines will not cross any Bureau of Land Management (BLM) lands.

The EREF will require the installation of water and electrical utility lines. Sanitary waste will be treated in a packaged domestic Sanitary Sewage Treatment Plant. Solid wastes from the treatment system will be temporarily stored in a holding tank and disposed of at an off-site location. Residual treated sanitary effluent will be directed to an on-site retention basin (see Section 3.4, Water Resources).

Water will be provided from on-site groundwater wells for the proposed facility. Since there are no bodies of water between the site and Idaho Falls, no waterways will be disturbed.

Electrical transmission lines to provide a dual source of electrical feed will be installed as follows. A 161 kV transmission line originating at the existing Bonneville substation approximately 10 miles east of the EREF site will be constructed. This new transmission line will be relocated with an existing 69 kV transmission line right-of-way (row) between the Bonneville substation and the Kettle substation just to the east of the EREF site on Route 20. The new transmission line will then be constructed for a short distance along Route 20 to the site access road. The second 161 kV transmission line to the site will be from the existing Antelope substation which is 27 miles to the west. This transmission line will be constructed entirely along Route 20 to the site access road. Both transmission lines will then be run along the EREF access road to the facility substation. By installing the new transmission lines along existing row and Route 20, land use impacts are minimized. If needed, application for easements along Route 20 will be submitted to the state (IDAPA, 2008k).

Overall land use impacts to the site and vicinity will be changing the use from agriculture to industrial. The area is currently zoned G-1 (grazing), which permits manufacturing process facilities. A majority of the site (approximately 86%) will remain undeveloped, and the placement of most utilities will be along highway easements. Therefore, the impacts to land use will be small.

Federal actions that could have cumulative effects on the area include a Component Test Facility (CTF) supporting the High Temperature Gas Reactor at Idaho National Laboratory. This facility will be > 32 km (20 mi) from the EREF. Although the impact on land use in the region will vary depending on the exact location of the CTF in the INL boundary, additional impacts from the construction of the CTF are expected to be small. AES is unaware of any additional Federal or non-federal actions that will have cumulative land use impacts.

8.8 NONRADIOLOGICAL IMPACTS

Numerous design features and administrative procedures are employed to minimize gaseous and liquid effluent releases and keep them within regulatory limits. Potential nonradiological impacts of operation of the EREF include releases of inorganic and organic chemicals to the atmosphere and surface water impoundments during normal operations. Other potential impacts involve land use, transportation, soils, water resources, ecological resources, air quality, historic and cultural resources, socioeconomic and public health. Impacts from hazardous, radiological, and mixed wastes and radiological effluents have been discussed earlier.

The other potential nonradiological impacts from the construction and operation of EREF are discussed below:

The site's electrical transmission lines will not cross any Bureau of Land Management (BLM) lands.

Land-Use Impacts

The anticipated effects on the soil during construction activities are limited to a potential short-term increase in soil erosion. However, this will be mitigated by proper construction best management practices (BMPs). These practices include minimizing the construction footprint to the extent possible, limiting site slopes, using a sedimentation detention basin, protecting undisturbed areas with silt fencing and straw bales as appropriate, and employing site stabilization practices such as placing crushed stone on top of disturbed soil in areas of concentrated runoff. In addition, onsite construction roads will be periodically watered when required, to control fugitive dust emissions. After construction is complete, the site will be stabilized with natural, low-water maintenance landscaping, and pavement.

A Spill Prevention, Control, and Countermeasures (SPCC) plan will also be implemented during construction to minimize environmental impacts from potential spills and ensure prompt and appropriate remediation. Spills during construction are likely to occur around vehicle maintenance and fueling locations, storage tanks, and painting operations. The SPCC plan will identify sources, locations and quantities of potential spills, and response measures. The plan will also identify individuals and their responsibilities for implementation of the plan and provide for prompt notification of state and local authorities, as required.

Waste management BMPs will be used to minimize solid waste and hazardous materials. These practices include the placement of waste receptacles and trash dumpsters at convenient locations and the designation of vehicle and equipment maintenance areas for the collection of oil, grease and hydraulic fluids. Where practicable, materials suitable for recycling will be collected. If external washing of construction vehicles is necessary, no detergents will be used, and the runoff will be diverted to onsite retention basins. Adequately maintained sanitary facilities will be provided for construction crews.

The EREF facility will require the installation of water well(s) and electrical utility lines. In lieu of connecting to a public sewer system, an on-site domestic sanitary sewage treatment plant will be installed for the treatment of sanitary and non contaminated wastes.

Potable water will be provided from one or more site wells. Since there are no bodies of surface water on the site, no waterways will be disturbed. No natural gas will be used at the EREF.

The two electrical transmission lines that will provide a dual source of electrical feed to the EREF will be constructed along an existing right-of-way, Route 20, and the site access road. In this way, land use impacts will be minimized.

Overall land use impacts to the site and vicinity will be changing the use from agriculture to industrial. However, a majority of the site (approximately 86%) will remain undeveloped, and

LAND USE

ATTACHMENT 11.2

MARKUP

ER SECTION 4.1.1, CONSTRUCTION IMPACTS

The temporary construction area, including temporary

4.1 LAND USE IMPACTS

4.1.1 Construction Impacts

The proposed Eagle Rock Enrichment Plant (EREF) will be built on land which is currently *privately owned by a single landowner. Since the site is currently used for crops and grazing,* potential land use impacts will be from site preparation and construction activities.

The proposed EREF site is approximately 1,700 ha (4,200 ac) in size. Construction activities, including permanent plant structures, will disturb about 186 ha (460 ac). Temporary construction facilities, parking areas, material storage, and excavated areas for underground utilities will disturb an additional 53.6 ha (132.5 ac). The total disturbed area will, therefore, be 240 ha (592 acres). The temporary construction area will be restored after completion of plant construction. The balance of the property, 1,460 ha (3,608 ac), will be left in a natural state with no designated use. The plot plan and site boundaries of the permanent facilities indicating the areas to be cleared for construction activities are shown in ER Figure 2.1-2, Site Area and Facility Layout Map, and Figure 2.1-3, Existing Conditions Site Aerial Photograph.

using native vegetation

During the construction phase of the facility, conventional earth, and rock moving and earth grading equipment will be used. Blasting and mass rock excavation may be required. However, only about 14% of the total site area will be disturbed, affording wildlife of the site an opportunity to move to undisturbed on-site areas as well as additional areas of suitable habitat bordering the plant (see Section 4.5, Ecological Resources Impacts). The construction will also result in a small loss of seasonal cattle grazing lands. No mitigation is necessary to offset this impact.

According to the Kettle Butte, Idaho, U.S.G.S. Quadrangle Map, the proposed property terrain currently ranges in elevation from about 1,556 m (5,106 ft) near U.S. Highway Route 20 to about 1,600 m (5,250 ft) in a small area at the eastern edge of the property. The terrain in the area of the developed site facility footprint ranges in elevation from about 1,573 m (5,161 ft) above msl in the vicinity of the stormwater basins to 1,588 m (5,210 ft) above msl. Approximately 164.9 ha (407.5 ac) will be graded to bring the developed central footprint portion (i.e., building clusters and storage pads that drain to the stormwater basins) of the site to a final grade between 1,573 m (5,161 ft) to 1,585 m (5,200 ft) above msl at the stormwater detention basin. The material excavated will be used for on-site fill. Site preparation will include the cutting and filling of approximately 778,700 m^3 (27,500,000 ft^3) of soil with the deepest cut being 6 m (20 ft) and the deepest fill being 6 m (20 ft). Blasting will be used as necessary to aid in the removal of fractured basalt (hardened lava) where depth to bedrock interferes with the installation of utilities and installation of substructures.

The anticipated effects on the soil during construction activities are limited to a potential short-term increase in soil erosion. However, this will be mitigated by proper construction best management practices (BMPs). These practices include minimizing the construction footprint to the extent possible, limiting site slopes to a horizontal to vertical ratio of four to one or less, the use of a sedimentation detention basin, protection of undisturbed areas with silt fencing and straw bales as appropriate, and site stabilization practices such as placing crushed stone on top of disturbed soil in areas of concentrated runoff. In addition, as indicated in Section 4.2.5, Mitigation Measures (Transportation Impacts), on-site construction roads will be periodically watered down, if required, to control fugitive dust emissions. After construction is complete, the site will be stabilized with natural, low maintenance landscaping and pavement.

Impacts to land and groundwater will be controlled during construction through compliance with the National Pollutant Discharge Elimination System (NPDES) Construction General Permit

1a

ATTACHMENT 12.1

MARKUPS

ER SECTIONS 4.7.5, 5.2.7, and 7.2.1.7

4.7.5 Mitigation

Mitigation of operational noise sources would occur primarily from the plant design, as cooling systems, valves, transformers, pumps, generators, and other facility equipment would generally be located inside plant structures. The buildings themselves would absorb the majority of the noise generated within. Natural land contours, vegetation (such as scrub brush), and site buildings and structures would mitigate noise from equipment located outside of the site structures. Distance from the noise source is also a key factor in the control of noise levels to area receptors. It is generally true that the sound pressure level from an outdoor noise source decreases 6 dB per doubling of distance. Thus, a noise that measures 80 dBA at 15 m (50 ft) away from the source would measure 74 dB at 30.5 m (100 ft), 68 dB at 61 m (200 ft), and 62 dB at 122 m (400 ft). As noted above, the nearest home is located approximately 7.7 km (4.8 mi) east of the proposed site; and the WSA is located immediately south of the proposed site. Both the residence and the WSA are near U.S. Highway 20. To minimize noise impacts to the residence, most use of U.S. Highway 20 would be restricted after twilight through early morning hours. Similarly, heavy truck and earth moving equipment usage during construction of the access roads and highway entrances would be restricted after twilight through early morning hours to minimize noise impacts to the WSA. ~~All noise suppression systems on construction vehicles would be kept in proper operation.~~

Insert A

4.7.6 Cumulative Impacts

Cumulative noise sources would include the proposed EREF, existing traffic along U.S. Highway 20, farm and ranch operations, infrequent small aircraft; and environmental noise (e.g., wind, thunder). AES does not know of any other Federal, State, or private development plans within 16 km (10 mi) of the EREF. Expected noise levels would mostly affect a 1.6-km (1-mi) radius. Much of the area within that radius is on the proposed EREF site. Offsite property is primarily grazing and agriculture land with the exception of portions of the WSA. Cumulative impacts from all noise sources at the EREF footprint would generally remain at or below HUD guidelines of 60 dBA Ldn (HUD, 1985), during construction and decommissioning, and below 60 dBA L_{dn} (HUD, 1985) and the EPA guidelines of 55 dBA L_{dn} (EPA, 1974) during operations.

The affected portion of the WSA is also near U.S. Highway 20 and would receive cumulative noise impacts from the highway and construction of the proposed EREF. Maximum cumulative noise levels near the WSA during construction of the highway entrances and visitor center would be in excess of 70 dBA but less than 75 dBA. The cumulative effects would be relatively temporary because construction of the highway entrances, visitor center and access roads would be completed within 12 months. Residences closest to the site boundary would also experience noise from traffic along U.S. Highway 20. The primary sources of cumulative noise would be from existing traffic (e.g., Idaho National Laboratory commuters). Overall noise levels are not likely to increase; however, the duration of peak noise levels associated with commuting may increase. Therefore, cumulative noise impacts from the EREF will be small.

4.7.7 Comparative Noise Impacts of No Action Alternative Scenarios

ER Chapter 2, Alternatives, provides a discussion of possible alternatives to the construction and operation of the EREF, including an alternative of "no action," i.e., not building the EREF. The following information provides comparative conclusions specific to the concerns addressed in this subsection for each of the two "no action" alternative scenarios addressed in Section 2.4, Table 2.4-2, Comparison of Environmental Impacts for the Proposed Action and the No-Action Alternative Scenarios.

Highway 20. To minimize noise impacts to the residence, most of U.S. Highway 20 use will be restricted after twilight through early morning hours. Similarly, heavy truck and earth moving equipment usage during construction of the access roads and highway entrances will be restricted after twilight through early morning hours to minimize noise impacts on the WSA. ~~All noise suppression systems on vehicles will be kept in proper operation.~~

Insert A

5.2.8 Historical and Cultural Resources

Mitigation measures will be in place to minimize any potential impact on historical and cultural resources. In the event that any inadvertent discovery of human remains or other item of archeological significance is made during construction, the facility will cease construction activities in the area around the discovery and notify the State Historic Preservation Officer (SHPO) to make the determination of appropriate measures to identify, evaluate, and treat these discoveries.

Mitigation of the impact to historical and cultural sites within the EREF project boundary can take a variety of forms. Avoidance and data collection are the two most common forms of mitigation recommended for sites considered eligible for inclusion in the National Register of Historic Places (NRHP). Significance criteria (a-d) serve as the basis for a determination that a site is eligible for inclusion in the NRHP. When possible, avoidance is the preferred alternative because the site is preserved in place and mitigation costs are minimized. When avoidance is not possible, data collection becomes the preferred alternative.

Data collection can take place after sites recommended eligible in the field have been officially determined eligible by the SHPO and a treatment plan has been submitted and approved. The plan describes the expected data content of the sites and the methodology for collection, analysis, and reporting. For the EREF, one site, MW004, has been recommended eligible for inclusion in the NRHP under criteria a and d. A treatment/mitigation plan for MW004 will be developed by AES to recover significant information.

Procedures to deal with unexpected discoveries will be developed in a plan prepared by AES. The plan will set forth the process for dealing with discoveries of human remains or previously unidentified archaeological materials that are discovered during ground disturbing activities and will establish procedures for the evaluation and treatment of these resources.

Materials that may be recovered for analysis during discovery or data recovery activities include artifacts and samples (e.g., bone, charcoal, sediments). Certain types of samples, such as radiocarbon samples, are usually submitted to outside analytical laboratories. All resources within the EREF are located on private land.

AES has also assessed the potential visual impact of the EREF on the Wasden Complex viewshed and has provided the assessment to the SHPO. AES is currently working with SHPO to address their concerns. AES has consulted with the Shoshone-Bannock Tribe. Consultation letters are included in ER Appendix A.

5.2.9 Visual/Scenic Resources

Mitigation measures will be in place to minimize the impact to visual and scenic resources. These include the following items:

- *Accepted natural, low water consumption landscaping techniques will be used to limit any potential visual impacts. These techniques will incorporate, but not be limited to, the use of native landscape plantings and crushed stone pavements on difficult to reclaim areas.*

7.2.1.7 Noise and Dust Control Measures

~~Objectionable construction noises would be reduced by use of noise control equipment on all powered equipment.~~ Shrub and vegetation outside of the construction areas would be left in place and, combined with the distances from construction areas to the public, would reduce noise. There is considerable existing traffic already present on U.S. Highway 20. Therefore, maximum noise levels from EREF traffic would not increase noise levels along U.S. Highway 20, although the duration of noise that is associated with peak commute traffic may increase.

Dust resulting from traffic and excavation activities during construction would be abated by water spraying as necessary. All potential air pollution and dust emission conditions would be monitored to demonstrate compliance with applicable health, safety, and environmental regulations.

Insert A

7.2.1.8 Historic and Cultural Resources

A pedestrian cultural resource survey of the area where the proposed EREF is to be located was conducted. The survey resulted in the recording of 11 sites and 17 isolated occurrences (finds); there are three prehistoric, four historic, and four multi-component sites. Further investigation was conducted to determine the National Register of Historic Places (NRHP) eligibility for the prehistoric components of three sites (MW002, MW012, and MW015). Subsequent testing of these sites resulted in a recommendation of not eligible. This historic component of one site (MW004) is recommended as eligible. Seven sites (MW003, MW006, MW007, MW009, MW011, MW013, and MW014) are recommended not eligible for inclusion in the NRHP. The potentially eligible site is within the proposed plant footprint. A treatment mitigation plan for MW004 will be developed by AES in consultation with the Idaho State Historic Officer (SHPO) to recover significant information.

7.2.1.9 Socioeconomic

Construction of the EREF is expected to have positive socioeconomic impacts on the region. The Regional Input-Output Modeling System (RIMS II) allows estimation of various indirect impacts associated with each of the expenditures associated with the EREF. According to the RIMS II analysis, the region's residents can anticipate an annual impact of [*] in increased economic activity for local businesses, [*] in increased earnings by households, and [*] new jobs during the 7-year heavy construction period and four-year assemblage and testing period. The temporary influx of labor is not expected to overload local services and facilities within the Bonneville-BinghamJefferson Idaho area.

* Proprietary Commercial Information withheld in accordance with 10 CFR 2.390

7.2.1.9.1 Yearly Purchases of Steel, Concrete, and Related Construction Materials

The initial construction period for EREF is approximately three years. This period will encompass site preparation and construction of most site structures. Due to the phased installation of centrifuge equipment, production will commence in the fourth year of the construction period (2014). The manpower and materials used during this phase of the project will vary depending on the construction plan. Table 7.2-2, Estimated Construction Material Yearly Purchases, provides the estimated total quantities of purchased construction materials and Table 7.2-3, Estimated Yearly Labor Costs for Construction, provides the estimated labor that will be required to install these materials. The scheduling of materials and labor

Insert A for ER Sections 4.7.5, 5.2.7, and 7.2.1.7

AES will minimize and manage noise and vibration impacts during construction and decommissioning by:

1. Performing construction or decommissioning activities with the potential for noise or vibration at residential areas that could have a negative impact on the quality of life during the day-time hours (7:00 a.m. - 7:00 pm). If it is necessary to perform an activity that could result in excessive noise or vibration in a residential area after hours, the community will be notified in accordance with the site procedures.
2. Engineered and administrative controls for equipment noise abatement, including the use of equipment and vehicle mufflers, acoustic baffles, shrouding, barriers and noise blankets.
3. Sequencing construction or decommissioning activities to minimize the overall noise and vibration impact (e.g., establishing the activities that can occur simultaneously or in succession).
4. Utilizing blast mats, if necessary.
5. Creating procedures for notifying State and local government agencies, residents and businesses of construction or decommissioning activities that may produce high noise or vibration that could affect them.
6. Posting appropriate State Highway signs warning of blasting.
7. Creating a Complaint Response Protocol for dealing with and responding to noise or vibration complaints, including entering the complaint into the site's Corrective Action Program.

SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

ATTACHMENT 13.1

MARKUPS

ER Sections 4.11.3 (new), 8.11, and 9.0

Insert 4.11.3, Recreational/Subsistence Harvests (see attached)

They also indicated that if they did, this information would be kept confidential. Thus, information was not available about where such populations might reside, what their concerns might be, or how they might be affected by the EREF.

Based on this analysis of the above described data, performed in accordance with the criteria, guidelines, and procedures set forth in NUREG-1748, it is concluded that no minority or low income populations exist that would warrant further examination of environmental impacts upon such populations.

~~4.11.3~~ 4.11.4 Comparative Environmental Justice Impacts of No Action Alternative Scenarios

ER Chapter 2, Alternatives, provides a discussion of possible alternatives to the construction and operation of the EREF, including an alternative of "no action," i.e., not building the EREF. The following information provides comparative conclusions specific to the concerns addressed in this subsection for each of the two "no action" alternative scenarios addressed in ER Section 2.4, Table 2.4-2, Comparison of Environmental Impacts for the Proposed Action and the No-Action Alternative Scenarios.

Alternative Scenario C - No EREF; LES and USEC deploy gas centrifuge plants, USEC phases out the Paducah gaseous diffusion plant (GDP) and GEH deploys their plant using Silex enrichment technology: The environmental justice impacts would be the same since it is assumed there are no disproportionate impacts associated with this alternative scenario.

Alternative Scenario D - No EREF; LES and USEC deploy gas centrifuge plants, USEC phases out the Paducah gaseous diffusion plant (GDP) and USEC increases its centrifuge plant capacity: The environmental justice impacts would be the same since it is assumed that there are no disproportionate impacts associated with this alternative scenario.

4.11.3 Recreational/Subsistence Harvests

Subsistence is the use of natural resources as food for consumption and for ceremonial and traditional cultural purposes. Often these types of activities are discussed for minority populations, but sometimes also for low-income populations. Common major classifications of subsistence uses include gathering plants for consumption, for medicinal purposes, and use in ceremonial activities; fishing; and hunting. These activities are in addition to or replace portions of the foods that might be bought from businesses, and thus can represent reduced costs of living. They also often represent an important part of the cultural identity or lifestyle of the participants.

The proposed EREF site is privately-owned land and, thus, collection of subsistence resources do not occur on the site. Any recreational activities are limited to those conducted by the property owner. For the broader 80 km (50 mi) and ROI study areas, subsistence and/or recreational activities might be occurring; but they don't seem very likely activities for the 6.4 km (4 mi) study area because it is also private land.

Subsistence information is often difficult to collect, partially because it is relatively site specific and because it is difficult to differentiate between subsistence uses and recreational uses of natural resources. Often, a number of different informational sources have to be relied upon that collect data via different methods, for different classifications of groups, and for differing types of uses. For this description, general internet searches were conducted to attempt to identify subsistence agencies, studies, and informational sources. In addition, state and county agency websites were viewed to attempt to obtain subsistence information. However, none of these searches proved fruitful. Specific subsistence information for the 80 km (50 mi) and ROI study areas is not readily available. In an effort to provide some overview of the potential subsistence uses that are occurring in these areas, total recreational harvest levels are discussed below.

4.11.3.1 Plant Gathering

Although no information could be found, it is assumed that collection of plants for ceremonial and food purposes (i.e., culturally significant plants, berries, or other vegetation) could be occurring in the three county region of influence (ROI). Again, minority and low-income populations might be conducting these collection activities at a greater frequency, or could be harvesting greater quantities of plants, than the general population.

4.11.3.2 Wildlife

Only statewide recreational harvest information was available for some of the species. Thus, the figures presented here only act as indicators about what the potential greatest species of harvest might be in the ROI. As shown in Table 4.11-3, Statewide Recreational Harvest Data, 1991 to 2006, in 2006 the greatest statewide harvests of wildlife occurred for quail (157,200), forest grouse (129,800), chukar partridge (108,900), pheasant (99,300), and gray partridge (55,000) (IDGF, 2008a-g, and j). Significantly smaller quantities of sage grouse, sharptail grouse, and turkey were harvested (IDGF, 2008a-g, and j).

For the purposes of managing and tracking deer, elk, and moose harvests, the Idaho Department of Fish and Game (IDFG) divides the state into a number of wildlife management units (WMUs). As shown in Table 4.11-4 (IDGF, 2008k), Deer Harvest by Wildlife Management Units, 2004 to 2007; Table 4.11-5 (IDGF, 2008l), Elk Harvest by Wildlife Management Units, 2004 to 2007; and Table 4.11-6 (IDFG, 2000i) Moose Harvest by Wildlife Management Units, 2000 to 2007, Bonneville, Bingham, and Jefferson counties are covered by nine WMU's. In 2007, 8,223 hunters harvested 1,894 deer, 6,489 hunters harvested 858 elk, and 155 moose were harvested.

Table 4.11-7 (IDGF, 2008p), Pronghorn Antelope Harvest by Wildlife Management Units, 2004 to 2007, shows that pronghorn harvesting in WMUs 60A, 63, and 68 were also relatively low. In 2007, a total of 171 pronghorn antelope were harvested in the three WMUs, with 21 harvested in WMU 60A, 92 harvested in WMU 63, and 58 harvested in WMU 68.

The IDFG also divides the state into eight management regions. Two of these management regions, the Upper Snake Region and the Southeast Region, cover both Bonneville and Bingham counties. A majority of Bonneville County and the northern one-third of Bingham County are in the Upper Snake Region. The extreme southern sections of Bonneville County and the southern two-thirds of Bingham County are in the Southeast Region. Table 4.11-8 (IDGF, 2008m-o), Mountain Lion, River Otter, and Bobcat Harvest Data by Region, 1996 to 2006, shows that bobcat, mountain lion, and river otter harvests were not very large within the Upper Snake and Southeast regions.

Mountain goat harvest figures were available for Game Management Unit 67 within the ROI. This unit covers the northeast corner of Bonneville County and small portions of Madison and Teton counties to the north. Annual harvest rates ranged from zero in 2003 and 2004 to nine in 2000, with typical harvest levels ranging from two to four annually. (IDGF, 2008h).

4.11.3.3 Fish

Although information was collected about the major waterbodies in the three county ROI, surrounding area, and the major types of fish that exist in them, no information could be readily found about the harvest rates within the counties. The major waterbodies within Bonneville County, located mainly within the Upper Snake Region, used to harvest fish include the Snake River, and the North and South Forks of the Snake River. Major creeks include Brockman Creek, Burns Creek, Cellars Creek, Hell Creek, Lava Creek, McCoy Creek, Pine Creek, and Willow Creek. Other waterbodies include the Gray's Lake National Wildlife Refuge (NWR), Palisades Reservoir, and Ririe Reservoir.

The major waterbodies within Jefferson County, also located in the Upper Snake Region, used to harvest fish include Mud Lake, Market Lake, and the South Fork of the Snake River. Major creeks include Camas Creek.

The IDFG's Upper Snake Region Map & Exceptions Fishing Seasons and Rules (IDFG, 2008q) list the following fish species as regulated in the region: largemouth and smallmouth bass, brook trout, bull trout (no take), cutthroat trout, sturgeon (no take), tiger muskie, trout (excluding brook or bull trout), whitefish, and protected nongame fish (e.g., leatherside chub). The U.S. Fish and Wildlife Service (USFWS) lists the bull trout as a threatened species (USFWS, 2008). The IDFG also identifies the fish species that may be encountered in the following waterbodies (IDFG, 2008r):

- the Palisades Reservoir covers 6,474 hectares (16,000 acres) and has brown trout, cutthroat trout (stocked), kokanee salmon (i.e., blueback), and lake trout;
- Mud Lake covers 2,833 hectares (7,000 acres) and has cutthroat trout (stocked), largemouth bass, bullhead catfish, channel catfish (stocked), tiger muskie (stocked) and yellow perch;
- the South Fork Snake River which has brown trout, cutthroat trout, rainbow trout, hybrid trout (i.e., a rainbow/cutthroat trout hybrid), and whitefish;
- Willow Creek which has brook trout, brown trout, and cutthroat trout; and
- Camas Creek which has brook trout and brown trout.

Within Bingham County, located mainly within the Southeast Region, major waterbodies used to harvest fish include the Snake River, Blackfoot River, and the Portneuf River. Major creeks include Brush Creek, Cedar Creek, Cellars Creek, and Willow Creek. Other waterbodies include the American Falls Reservoir and Rose Pond.

The IDFG's Southeast Region Map & Exceptions Fishing Seasons and Rules (IDFG, 2008s) list the following fish species as regulated in the region: largemouth and smallmouth bass, brook trout, cutthroat trout, sturgeon (no take), tiger muskie, trout (excluding brook or bull trout), walleye, whitefish, and protected nongame fish (such as the leatherside chub and Bear Lake sculpin). The IDFG also identifies the fish species that may be encountered in the following waterbodies (IDFG, 2008t):

- the American Falls Reservoir covers 22,662 hectares (56,000 acres) and has brown trout, cutthroat trout, rainbow trout (stocked), largemouth bass, and yellow perch;
- Rose Pond covers 8 hectares (20 acres) and has rainbow trout (stocked) and yellow perch; and
- the Snake River, from the Tiden Bridge to the Bingham-Bonneville county line, has brown trout, cutthroat trout, rainbow trout (stocked), and whitefish.

Table 4.11-3 Statewide Recreational Harvest Data, 1991 to 2006

Year	Turkey	Chukar Partridge	Gray Partridge	Quail	Pheasant	Forest Grouse	Sage Grouse	Sharptail Grouse
2006	5,630	108,900	55,000	157,200	99,300	129,800	12,500	6,860
2005	6,463	104,069	44,400	178,730	97,569	95,147	n/a	n/a
2004	5,133	110,800	26,800	124,100	69,300	134,100	8,050	4,850
2003	6,377	130,759	52,500	140,400	77,469	182,800	n/a	n/a
2002	5,068	109,040	26,600	88,600	58,575	147,700	7,600	3,520
2001	4,394	89,342	41,800	119,600	87,110	149,400	7,247	5,820
2000	4,896	134,386	94,800	168,800	113,111	85,900	7,250	5,800
1999	5,458	96,800	103,100	114,900	110,100	80,600	4,700	12,400
1998	2,662	74,900	43,400	112,400	94,000	136,100	17,500	n/a
1997	2,703	37,300	32,100	87,200	63,300	43,900	16,000	10,300
1996	1,720	208,600	109,300	350,500	166,500	292,800	21,000	14,700
1995	1,526	125,200	42,500	175,300	114,600	252,600	27,500	7,900
1994	n/a	88,800	34,800	118,500	115,400	283,100	38,500	8,200
1993	n/a	72,800	39,000	117,200	129,100	190,600	37,400	14,400
1992	n/a	54,600	27,800	91,100	132,400	112,100	29,900	9,300
1991	n/a	72,700	32,400	73,300	117,700	103,400	39,500	6,000

Notes: n/a = not available

Sources: IDFG, 2008a-g, and j

Table 4.11-4 Deer Harvest by Wildlife Management Units, 2004 to 2007
Page 1 of 1

Year	Wildlife Management Units									Totals
	60A	63	63A	66	66A	67	68	68A	69	
2007										
No. of Hunters	634	472	699	1,215	921	1,092	441	56	2,693	8,223
Total Harvest	185	87	211	225	231	257	102	17	579	1,894
% Harvest Success	29	18	30	19	25	24	23	31	21	23
Days/Hunter	4.7	4.4	8.2	4.5	4.9	4.4	4.1	13.5	4.6	n/a
2006										
No. of Hunters	412	503	420	957	685	751	379	28	2,363	6,498
Total Harvest	120	98	155	107	109	134	81	1	464	1,269
% Harvest Success	29	19	37	11	16	18	21	4	20	20
Days/Hunter	3.6	4.9	5.3	4.3	4.5	4.4	3.7	1.5	4.2	n/a
2005										
No. of Hunters	690	390	485	929	632	636	360	0	2,503	6,625
Total Harvest	119	75	96	145	144	151	106	0	542	1,378
% Harvest Success	17	19	20	16	23	24	29	0	22	21
Days/Hunter	4.0	3.0	5.0	4.0	4.0	4.0	3.0	3.0	4.0	n/a
2004										
No. of Hunters	454	534	601	1,048	658	630	345	68	2,291	6,629
Total Harvest	44	86	177	112	130	92	53	2	345	1,041
% Harvest Success	10	16	29	11	20	15	15	3	15	16
Days/Hunter	4.6	4.7	7.3	4.3	5.1	4.6	3.6	4.9	3.7	n/a

Note: n/a = not available

Source: IDFG, 2008k

Table 4.11-5 Elk Harvest by Wildlife Management Units, 2003 to 2007

Year	Wildlife Management Units									Total
	60A	63	63A	66	66A	67	68	68A	69	
2007										
No. of Hunters	151	513	0	2,102	795	711	0	28	2,189	6,489
Total Harvest	16	121	0	287	85	112	0	1	236	858
% Harvest Success	11	24	0	14	11	16	0	4	11	13
Days/Hunter	6.8	6.5	0	4.7	8.2	5.4	0	12.6	5.1	n/a
2006										
No. of Hunters	83	327	81	1,720	26	506	0	46	2,056	4,845
Total Harvest	2	112	19	339	2	104	0	3	313	894
% Harvest Success	2	34	23	20	8	21	0	7	15	18
Days/Hunter	3.8	7.2	5.5	4.7	6.5	5	0	9.9	5.4	n/a
2005										
No. of Hunters	50	331	28	1,683	35	442	0	24	2,417	5,010
Total Harvest	3	79	1	365	4	101	0	1	434	988
% Harvest Success	6	24	4	22	12	23	0	4	18	20
Days/Hunter	4.5	5.5	5.2	4.4	5.6	4.2	0	3.9	5	n/a
2004										
No. of Hunters	173	473	71	1,699	722	549	8	34	2,116	5,845
Total Harvest	10	116	19	413	97	88	2	2	559	1,306
% Harvest Success	6	25	27	24	13	16	25	6	26	22
Days/Hunter	5.1	7.7	6.8	4.1	8.1	4.9	5.0	7.5	3.6	n/a
2003										
No. of Hunters	99	554	0	1,258	0	285	0	0	998	3,194
Total Harvest	3	109	0	235	0	37	0	0	173	557
% Harvest Success	3	20	0	19	0	13	0	0	17	17
Days/Hunter	3.8	7.5	0.0	3.9	0.0	3.9	0.0	0.0	4.0	n/a

Sources: IDFG, 2008l

Table 4.11-6 Moose Harvest by Wildlife Management Units, 2000 to 2007

Year	Wildlife Management Units									Total
	60A	63	63A	66	66A	67	68	68A	69	
2007	11	8	14	29	19	24	0	0	50	155
2006	8	7	13	29	23	20	0	0	50	150
2005	8	9	16	35	23	22	0	0	49	162
2004	11	10	19	46	36	32	0	0	73	227
2003	10	10	17	40	40	25	0	0	70	212
2002	13	0	25	31	41	18	0	0	71	199
2001	21	0	24	40	40	26	0	0	71	222
2000	5	0	10	36	27	23	0	0	47	148

Sources: IDFG, 2008i

Table 4.11-7 Pronghorn Antelope Harvest by Wildlife Management Units, 2004 to 2007
Page 1 of 1

Year	Wildlife Management Unit									Totals
	60A			63			68			
	Archery	Controlled Hunt	Subtotal	Archery	Controlled Hunt*	Subtotal	Archery	Controlled Hunt	Subtotal	
2007										
No. of Hunters	17	24	41	75	140	215	78	48	126	382
Harvest	1	20	21	11	81	92	23	35	58	171
% Harvest Success	6	84	51	15	58	43	29	73	46	45
Days/Hunter	5.5	4.0	n/a	5.2	n/a	n/a	4.7	4.4	n/a	n/a
2006										
No. of Hunters	18	18	36	63	119	182	44	48	92	310
Harvest	4	17	21	8	74	82	12	29	41	144
% Harvest Success	22	94	58	13	62	45	27	60	45	46
Days/Hunter	4.9	2.8	n/a	4.7	n/a	n/a	3.8	5.2	n/a	n/a
2005										
No. of Hunters	10	22	32	30	114	144	36	49	85	373
Harvest	2	19	21	4	74	78	10	39	49	148
% Harvest Success	19	86	66	13	65	54	29	79	58	40
Days/Hunter	5.8	2.0	n/a	4.5	n/a	n/a	4.0	4.4	n/a	n/a
2004										
No. of Hunters	3	25	28	32	108	140	29	46	75	243
Harvest	1	22	23	4	63	67	3	28	31	121
% Harvest Success	33	88	82	13	58	48	10	61	41	50
Days/Hunter	2.0	2.8	n/a	5.2	n/a	n/a	4.2	3.3	n/a	n/a

Notes: n/a = not available
* Controlled Hunt for Pronghorn Antelope was conducted in only sections of Wildlife Management Unit (WMU) 63.

Source: IDFG, 2008p

Table 4.11-8 Mountain Lion, River Otter, and Bobcat Harvest Data by Region, 1996 to 2006

Year	Region					
	Southeast			Upper Snake		
	Mountain Lion	River Otter	Bobcat	Mountain Lion	River Otter	Bobcat
2006	56	n/a	n/a	35	n/a	n/a
2005	73	2	125	32	11	179
2004	37	n/a	n/a	39	n/a	n/a
2003	47	n/a	n/a	35	n/a	n/a
2002	55	n/a	n/a	46	n/a	n/a
2001	25	n/a	n/a	45	n/a	n/a
2000	42	n/a	n/a	24	n/a	n/a
1999	37	n/a	n/a	18	n/a	n/a
1998	91	n/a	n/a	16	n/a	n/a
1997	42	n/a	n/a	22	n/a	n/a
1996	21	n/a	n/a	13	n/a	n/a

Note: n/a = not available

Source: IDFG, 2008m-o

8.11 ENVIRONMENTAL JUSTICE

An analysis of census block groups (CBGs) within a 6.4-km (4-mi) radius of the site was conducted to assess whether any disproportionately large minority or low-income populations were present that warranted further analysis of the potential for disproportionately high and adverse environmental impacts upon those populations. The analysis is more fully described in ER Section 4.11.1, Census Block Group Procedure and Evaluation Criteria. As stated in Section 4.11, the evaluation was performed using the 2000 population and economic data available from the U.S. Census Bureau for that area, and was done in accordance with the procedures contained in NUREG-1748 (NRC, 2003a). This guidance was endorsed by the NRC Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions (FR, 2004).

The nearest residence is approximately 7.7 km (4.8 mi) from the proposed site (see Section 3.1, Land Use). Because this is outside of the 6.4-km (4-mi) radius (130-km^2 [50-mi^2] area) required by the NRC to be examined (NRC, 2003a), no environmental justice disproportionate adverse impacts would occur to minority or low-income populations. However, the proposed site does extend across four census block groups and to show additional compliance with the NRC requirements, a census block group analysis was conducted to determine whether the remainder of those census block groups (i.e., the portions lying outside of the 6.4-km [4-mi] radius) had potential minority or low-income populations. The analysis demonstrates that none of these four CBGs are comprised of more than 50% of any individual or aggregate minority population. The percentages for the Hispanic or Latino population, the largest minority population in the four census block groups, are as follows:

- Census Tract 9715, CBG Bonneville 1 – 23.4%
- Census Tract 9715, CBG Bonneville 2 – 8.2%
- Census Tract 9503, CBG Bingham 1 – 18.2%
- Census Tract 9601, CBG Jefferson 3 – 23.1%

Moreover, none of these percentages exceeds the State of Idaho or applicable county percentages for this minority population by more than 20 percentage points.

In addition, the AREVA analysis demonstrates that no individual CBG is comprised of more than 50% of low-income households. The percentages of low-income households are as follows:

- Census Tract 9715, CBG Bonneville 1 – 15.8%
- Census Tract 9715, CBG Bonneville 2 – 6.6%
- Census Tract 9503 CBG Bingham 1 – 11.7%
- Census Tract 9601, CBG Jefferson 3 – 23.3%.

None of these populations exceeds the percentage of low-income households in the State of Idaho or applicable county by more than 20%.

Insert Text

Based on this analysis, AREVA has concluded that no disproportionately high minority or low income populations exist that would warrant further examination of disproportionately high and adverse environmental impacts upon such populations.

Insert in Section 8.11:

In addition to the percentage of minority and low-income populations within the census tracts contained in Bonneville, Bingham, and Jefferson Counties, the presence of subsistence activities also can be used to assess whether any disproportionately large minority or low-income populations are located within a specified radius of the site.

As noted in Section 4.11.3, Recreational/Subsistence Harvest, subsistence is the use of natural resources as food for consumption and for ceremonial and traditional cultural purposes. Often these types of activities are discussed for minority populations and at times for low-income populations. Common classifications of subsistence activities include gathering plants for consumption; for medicinal purposes and use in ceremonial activities; fishing; and hunting. These activities are in addition to or to replace portions of the foods that might be bought from businesses, and thus can represent reduced costs of living. They also often represent an important part of the cultural identity or lifestyle of the participants.

The proposed EREF site is to be located on privately-owned land and, thus, collection of subsistence resources do not occur on the site. Any recreational activities involving subsistence activities would be limited to those conducted by the property owner. Consequently, these types of activities do not seem very likely for the 6.4 km (4 mi) study area, because it is private land.

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SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

ATTACHMENT 13.2

MARKUP

ER SECTION 7.1.2

The RIMS II model for the Bonneville County, Idaho area is based on the National Input-Output table, employment statistics from the Bureau of Labor Statistics, and the Regional Economic Information System (REIS). The National table is regionalized using location quotients, which compare the local proportion of industry employment to total employment to a similar proportion for the Nation. The model is solved to generate a very large table of multipliers for the entire set of industries existing in a 80 km (50 mi) region of Idaho.

Since the 1970s, the USBEA has provided models designated as RIMS (Regional Input-Output Modeling). RIMS II is the latest version of this system. The following comments are based on Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II) (USBEA, 1997).

7.1.2 Insert (see attached)

RIMS II is based on an accounting framework called an input-output (I-O) table. For each industry, an I-O table shows the distribution of the inputs purchased and the outputs sold. A typical I-O table in RIMS II is derived mainly from two data sources: USBEA's national I-O table, which shows the input and output structure of nearly 500 U.S. industries, and USBEA's regional economic accounts, which are used to adjust the national I-O table in order to reflect a region's industrial structure and trading patterns.

The RIMS II model and its multipliers are prepared in three major steps. First, an adjusted national industry-by-industry direct requirements table is prepared. Second, the adjusted national table is used to prepare a regional industry-by-industry direct requirements table. Third, a regional industry-by-industry total requirements table is prepared, and the multipliers are derived from this table.

Unlike the national I-O tables, RIMS II includes households as both suppliers of labor inputs to regional industries and as purchasers of regional output, because it is customary in regional impact analysis to account for the effects of changes in household earnings and expenditures. Thus, both a household row and a household column are added to the national direct requirements table before the table is regionalized.

The regional industry-by-industry direct requirements table is derived from the adjusted national industry-by-industry direct requirements table. Location quotients (LQ's) are used to "regionalize" the national data. The LQ based on wages and salaries is the ratio of the industry's share of regional wages and salaries to that industry's share of national wages and salaries. The LQ is used as a measure of the extent to which regional supply of an industry's output is sufficient to meet regional demand. If the LQ for a row industry in the regional direct requirements table is greater than, or equal to, one, it is assumed that the region's demand for the output of the row industry is met entirely from regional production. In this instance, all row entries for the industry in the regional direct requirements table are set equal to the corresponding entries in the adjusted national direct requirements table.

Conversely, if the LQ is less than one, it is assumed that the regional supply of the industry's output is not sufficient to meet regional demand. In this instance, all row entries for the industry in the regional direct requirements table are set equal to the product of the corresponding entries in the adjusted national direct requirements table and the LQ for the industry.

The household row and the household column that were added to the national direct requirements table also are adjusted regionally. The household-row entries are adjusted downward, on the basis of commuting data from the Census of Population, in order to account for the purchases made outside the region by commuters working in the region. The household-column entries are adjusted downward, on the basis of tax data from the Internal Revenue Service, in order to account for the dampening effect of State and local taxes on household expenditures.

1a

7.1.2 Insert

As noted in the RIMS II User Handbook, if a one county region is used, impacts at times are underestimated because the RIMS II multipliers do not reflect "feedback" effects. "Feedback" effects can include purchases made by commuters from nearby counties. As such, the choice of a region should account for the specific facility. For this particular facility, workers may choose to live in counties surrounding the proposed location. In addition, non-labor inputs may be purchased from businesses in other counties. A smaller region would be selected if the impacts were expected only in the immediate vicinity of the proposed facility (USBEA, 1997).

ATTACHMENT 14.1

TABLE 1, RADIONUCLIDE INVENTORY PER RADIOACTIVE MATERIAL CONTAINER, CURIE

TABLE 2, RADIONUCLIDE INVENTORY PER RADIOACTIVE MATERIAL CONTAINER, BECQUEREL

Attachment 14.1

Table 1, Radionuclide Inventory per Radioactive Material Container, Curie

Radionuclide	48Y Feed	30B Product	48Y Tails	55-gal drum Radwaste	Empty 48Y Feed	Empty 30B Product	Empty 48Y Tails
TL207	3.84E-08	4.92E-08	1.94E-08	1.01E-11	6.96E-11	2.45E-10	3.53E-11
TL208	1.77E-15	2.26E-15	8.94E-16	4.63E-19	3.20E-18	1.13E-17	1.62E-18
PB210	3.76E-11	5.68E-11	1.80E-11	9.87E-15	6.83E-14	2.83E-13	3.27E-14
PB211	3.85E-08	4.93E-08	1.95E-08	1.01E-11	6.98E-11	2.45E-10	3.53E-11
PB212	4.92E-15	6.30E-15	2.49E-15	1.29E-18	8.92E-18	3.14E-17	4.52E-18
PB214	3.74E-09	5.64E-09	1.79E-09	9.82E-13	6.79E-12	2.81E-11	3.25E-12
BI210	3.76E-11	5.68E-11	1.80E-11	9.87E-15	6.83E-14	2.83E-13	3.27E-14
BI211	3.85E-08	4.93E-08	1.95E-08	1.01E-11	6.98E-11	2.45E-10	3.53E-11
BI212	4.92E-15	6.30E-15	2.49E-15	1.29E-18	8.92E-18	3.14E-17	4.52E-18
BI214	3.74E-09	5.64E-09	1.79E-09	9.82E-13	6.79E-12	2.81E-11	3.25E-12
PO210	1.21E-11	1.82E-11	5.78E-12	3.17E-15	2.19E-14	9.08E-14	1.05E-14
PO211	1.08E-10	1.38E-10	5.46E-11	2.83E-14	1.96E-13	6.87E-13	9.90E-14
PO212	3.15E-15	4.03E-15	1.60E-15	8.26E-19	5.71E-18	2.01E-17	2.89E-18
PO214	3.74E-09	5.64E-09	1.79E-09	9.82E-13	6.79E-12	2.81E-11	3.25E-12
PO215	3.85E-08	4.93E-08	1.95E-08	1.01E-11	6.98E-11	2.45E-10	3.53E-11
PO216	4.92E-15	6.30E-15	2.49E-15	1.29E-18	8.92E-18	3.14E-17	4.52E-18
PO218	3.74E-09	5.65E-09	1.79E-09	9.82E-13	6.79E-12	2.81E-11	3.25E-12
RN219	3.85E-08	4.93E-08	1.95E-08	1.01E-11	6.98E-11	2.45E-10	3.53E-11
RN220	4.92E-15	6.30E-15	2.49E-15	1.29E-18	8.92E-18	3.14E-17	4.52E-18
RN222	3.74E-09	5.65E-09	1.79E-09	9.82E-13	6.79E-12	2.81E-11	3.25E-12
FR223	6.13E-10	7.85E-10	3.10E-10	1.61E-13	1.11E-12	3.91E-12	5.63E-13
RA223	3.85E-08	4.93E-08	1.95E-08	1.01E-11	6.98E-11	2.45E-10	3.53E-11
RA224	4.92E-15	6.30E-15	2.49E-15	1.29E-18	8.92E-18	3.14E-17	4.52E-18
RA226	3.74E-09	5.65E-09	1.79E-09	9.82E-13	6.79E-12	2.81E-11	3.25E-12
RA228	4.41E-14	5.65E-14	2.23E-14	1.16E-17	8.01E-17	2.81E-16	4.05E-17
AC227	4.44E-08	5.69E-08	2.25E-08	1.17E-11	8.06E-11	2.83E-10	4.08E-11
AC228	4.41E-14	5.65E-14	2.23E-14	1.16E-17	8.01E-17	2.82E-16	4.05E-17
TH227	3.79E-08	4.85E-08	1.92E-08	9.94E-12	6.87E-11	2.41E-10	3.48E-11
TH228	4.91E-15	6.29E-15	2.49E-15	1.29E-18	8.91E-18	3.13E-17	4.51E-18
TH230	1.73E-05	2.61E-05	8.27E-06	4.53E-09	3.13E-08	1.30E-07	1.50E-08
TH231	1.30E-01	1.67E-01	6.58E-02	3.41E-05	2.36E-04	8.29E-04	1.19E-04
TH232	8.83E-13	1.13E-12	4.47E-13	2.32E-16	1.60E-15	5.63E-15	8.11E-16
TH234	2.82E+00	4.92E-01	2.83E+00	7.41E-04	5.12E-03	2.45E-03	5.14E-03
PA231	2.80E-06	3.58E-06	1.42E-06	7.34E-10	5.07E-09	1.78E-08	2.57E-09
PA234M	2.82E+00	4.92E-01	2.83E+00	7.41E-04	5.12E-03	2.45E-03	5.14E-03
PA234	3.67E-03	6.39E-04	3.68E-03	9.63E-07	6.66E-06	3.18E-06	6.68E-06
U234	1.92E+00	2.90E+00	9.18E-01	5.04E-04	0.00E+00	0.00E+00	0.00E+00
U235	1.30E-01	1.67E-01	6.58E-02	3.41E-05	0.00E+00	0.00E+00	0.00E+00
U236	1.79E-02	2.29E-02	9.06E-03	4.69E-06	0.00E+00	0.00E+00	0.00E+00
U238	2.82E+00	4.92E-01	2.83E+00	7.41E-04	0.00E+00	0.00E+00	0.00E+00
TOTAL	1.07E+01	4.73E+00	9.56E+00	2.80E-03	1.05E-02	5.73E-03	1.04E-02
Weight, lb	27560	5020	27560	617	50	25	50

Attachment 14.1

Table 2, Radionuclide Inventory per Radioactive Material Container, Becquerel

Radionuclide	48Y Feed	30B Product	48Y Tails	55-gal drum Radwaste	Empty 48Y Feed	Empty 30B Product	Empty 48Y Tails
TL207	1.42E+03	1.82E+03	7.19E+02	3.73E-01	2.58E+00	9.06E+00	1.30E+00
TL208	6.53E-05	8.37E-05	3.31E-05	1.71E-08	1.19E-07	4.17E-07	6.00E-08
PB210	1.39E+00	2.10E+00	6.66E-01	3.65E-04	2.53E-03	1.05E-02	1.21E-03
PB211	1.42E+03	1.82E+03	7.21E+02	3.74E-01	2.58E+00	9.08E+00	1.31E+00
PB212	1.82E-04	2.33E-04	9.21E-05	4.77E-08	3.30E-07	1.16E-06	1.67E-07
PB214	1.38E+02	2.09E+02	6.62E+01	3.63E-02	2.51E-01	1.04E+00	1.20E-01
BI210	1.39E+00	2.10E+00	6.66E-01	3.65E-04	2.53E-03	1.05E-02	1.21E-03
BI211	1.42E+03	1.82E+03	7.21E+02	3.74E-01	2.58E+00	9.08E+00	1.31E+00
BI212	1.82E-04	2.33E-04	9.21E-05	4.77E-08	3.30E-07	1.16E-06	1.67E-07
BI214	1.38E+02	2.09E+02	6.62E+01	3.63E-02	2.51E-01	1.04E+00	1.20E-01
PO210	4.47E-01	6.75E-01	2.14E-01	1.17E-04	8.12E-04	3.36E-03	3.88E-04
PO211	3.99E+00	5.11E+00	2.02E+00	1.05E-03	7.24E-03	2.54E-02	3.66E-03
PO212	1.17E-04	1.49E-04	5.90E-05	3.06E-08	2.11E-07	7.43E-07	1.07E-07
PO214	1.38E+02	2.09E+02	6.62E+01	3.63E-02	2.51E-01	1.04E+00	1.20E-01
PO215	1.42E+03	1.82E+03	7.21E+02	3.74E-01	2.58E+00	9.08E+00	1.31E+00
PO216	1.82E-04	2.33E-04	9.21E-05	4.77E-08	3.30E-07	1.16E-06	1.67E-07
PO218	1.38E+02	2.09E+02	6.62E+01	3.63E-02	2.51E-01	1.04E+00	1.20E-01
RN219	1.42E+03	1.82E+03	7.21E+02	3.74E-01	2.58E+00	9.08E+00	1.31E+00
RN220	1.82E-04	2.33E-04	9.21E-05	4.77E-08	3.30E-07	1.16E-06	1.67E-07
RN222	1.38E+02	2.09E+02	6.62E+01	3.63E-02	2.51E-01	1.04E+00	1.20E-01
FR223	2.27E+01	2.90E+01	1.15E+01	5.95E-03	4.11E-02	1.45E-01	2.08E-02
RA223	1.42E+03	1.82E+03	7.21E+02	3.74E-01	2.58E+00	9.08E+00	1.31E+00
RA224	1.82E-04	2.33E-04	9.21E-05	4.77E-08	3.30E-07	1.16E-06	1.67E-07
RA226	1.38E+02	2.09E+02	6.62E+01	3.63E-02	2.51E-01	1.04E+00	1.20E-01
RA228	1.63E-03	2.09E-03	8.27E-04	4.28E-07	2.96E-06	1.04E-05	1.50E-06
AC227	1.64E+03	2.10E+03	8.32E+02	4.31E-01	2.98E+00	1.05E+01	1.51E+00
AC228	1.63E-03	2.09E-03	8.27E-04	4.28E-07	2.96E-06	1.04E-05	1.50E-06
TH227	1.40E+03	1.79E+03	7.09E+02	3.68E-01	2.54E+00	8.93E+00	1.29E+00
TH228	1.82E-04	2.33E-04	9.20E-05	4.77E-08	3.30E-07	1.16E-06	1.67E-07
TH230	6.39E+05	9.64E+05	3.06E+05	1.68E+02	1.16E+03	4.80E+03	5.55E+02
TH231	4.81E+09	6.16E+09	2.43E+09	1.26E+06	8.73E+06	3.07E+07	4.42E+06
TH232	3.27E-02	4.18E-02	1.65E-02	8.57E-06	5.93E-05	2.08E-04	3.00E-05
TH234	1.04E+11	1.82E+10	1.05E+11	2.74E+07	1.89E+08	9.06E+07	1.90E+08
PA231	1.03E+05	1.32E+05	5.24E+04	2.71E+01	1.88E+02	6.60E+02	9.50E+01
PA234M	1.04E+11	1.82E+10	1.05E+11	2.74E+07	1.89E+08	9.06E+07	1.90E+08
PA234	1.36E+08	2.37E+07	1.36E+08	3.56E+04	2.46E+05	1.18E+05	2.47E+05
U234	7.10E+10	1.07E+11	3.40E+10	1.86E+07	0.00E+00	0.00E+00	0.00E+00
U235	4.81E+09	6.16E+09	2.43E+09	1.26E+06	0.00E+00	0.00E+00	0.00E+00
U236	6.62E+08	8.48E+08	3.35E+08	1.74E+05	0.00E+00	0.00E+00	0.00E+00
U238	1.04E+11	1.82E+10	1.05E+11	2.74E+07	0.00E+00	0.00E+00	0.00E+00
TOTAL	3.95E+11	1.75E+11	3.54E+11	1.04E+08	3.88E+08	2.12E+08	3.85E+08
Weight, kg	12512	2279	12512	280	23	11	23

ATTACHMENT 14.2-1

MARKUPS

ER Table 2.1-7, ER Chapter 4 Table of Contents – List of Tables, ER Section 4.2.4, ER Tables 4.2-3 and 4.2-4, and ER Section 5.1.2

Table 2.1-7 Summary of Environmental Impacts for the Proposed Action (Page 1 of 2)

Environmental Impact	Proposed Action[a]	ER Reference Section
Land Use	Small impact; about 86% of the site would remain undeveloped and current activities on nearby properties would not change.	4.1
Transportation	Construction Period – Moderate to Large Impact; The impact of traffic volume increases associated with construction of the EREF would be mitigated by constructing highway entrances early in the construction process and designing the highway entrances to minimize the disruption of traffic flow, particularly during the times of peak commute. Operation Period-Small Impact; ~5,025 radiological and 3,700 non-radiological additional heavy truck shipments/yr; traffic patterns impact predicted to be inconsequential. DECOMMISSIONING PERIOD-SMALL IMPACT; ~363 ADDITIONAL VEHICLE TRIPS/DAY; TRAFFIC PATTERNS IMPACT PREDICTED TO BE INCONSEQUENTIAL.	4.2
Geology and Soils	Small impact; potential short-term erosion during construction, but enhanced afterward due to soil stabilization.	4.3
Water Resources	No impact from operation on surface waters. Small impact from operation to groundwater. Stormwater discharges to basins controlled by NPDES permit.	4.4
Ecological Resources	Small impact. No rare, threatened, or endangered (RTE) species present.	4.5
Air Quality	Small impact; vehicle and fugitive emissions less than NAAQS regulatory limits during construction or operation.	4.6
Noise	Small impact; operational noise levels would be within HUD guidelines of 60 dBA_{Ldn} (residential use) and EPA limit of 55 dBA_{Ldn}	4.7
Historic and Cultural	Small impact; NRHP sites can be avoided or mitigated, if required.	4.8
Visual/Scenic	Small impact; facility would be out of character but distant from public observation areas.	4.9
Socioeconomic	Small impact to economy and local public services.	4.10
Environmental Justice	Small Impact.	4.11

LIST OF TABLES

As reflected in Table 3.12-2, Estimated Annual Non-Radiological Wastes, non-radiological, non-hazardous wastes primarily consist of miscellaneous combustible wastes, miscellaneous scrap metals, spent vehicle motor oil, spent vehicle oil filters and building ventilation air filters. Non-radiological, non-hazardous wastes come from various operations throughout the facility, and will be disposed of at a standard waste disposal site (e.g., landfill). The estimated volume of building ventilation air filters for disposal will fill approximately 206 6 m^3 (8 yd^3) dumpsters per year. It is expected that the waste disposal company will unload at least two of these dumpsters into the truck per trip. Therefore, approximately 103 truck shipments per year are expected for disposal of these filters.

Based on discussions with waste disposal companies and experience, it is expected that all other non-radiological, non-hazardous wastes will fill three 6 m^3 (8 yd^3) dumpsters per week. It is expected that the waste disposal company will empty two of these dumpsters every week using one truck. Therefore, approximately 78 truck shipments per year are expected for disposal of all other non-radiological, non-hazardous wastes. Based on the above, it is expected that approximately 181 truck shipments will be required per year to remove all non-radiological, non-hazardous wastes from the EREF.

The non-radiological, non-hazardous wastes could be disposed of at a county landfill. The Peterson Hill Landfill in Idaho Falls, ID has a remaining capacity of more than 50-years, which is expected to be adequate for disposal of EREF wastes and other local area wastes. Other regional landfills (e.g., Aberdeen Landfill, Bingham County, Idaho) are also options for disposal of this type of waste material. As discussed in Section 3.12.2, Solid Waste Management industrial waste, including miscellaneous trash, vehicle air filters, empty cutting oil cans, miscellaneous scrap metal, and paper will be shipped off site for minimization and then sent to a licensed waste landfill. During operation, a non-hazardous materials waste recycling plan will be implemented. A waste assessment will be performed to identify which materials will be recycled. Brokers and haulers will be contacted to find an end-market for the materials. Employees will be trained to recycle the identified materials. Recycling bins and containers will be labeled and placed in appropriate locations in the facility. The annual number of deliveries to the non-radiological, non-hazardous waste receiver is expected to be no more than 181.

The combined daily trips (employees, deliveries, waste shipments) during operations will be about 851 vehicle trips per day (780 plus 71). This represents a 37% increase over current daily traffic volume of 2,282 vehicles per day on U.S. Highway 20. Refer to Table 4.2-1, current Traffic Volumes for the Major Roads in the Vicinity of the Proposed EREF Site. Car pooling would be encouraged to minimize the traffic due to employee travel. Shift change times and shipment times to and from the facility could be set so as to occur at times when the traffic volume on U.S. Highway 20 is typically at a minimum.

Referring to Table 4.10-2, Estimated Number of Construction Craft Workers by Annual Pay Ranges, the maximum number of construction workers is expected to be 590 during the peak of the eleven-year construction period. Thus, the maximum potential increase to traffic due to construction workers will be 1,180 trips per day. In addition, there will be an average of about 15 roundtrips per day (30 vehicle trips per day) on U.S. Highway 20 due to construction deliveries and waste removal during the first three years of construction (i.e., period of site preparation and major building construction) with reduced delivery and waste removal trips for the remaining construction period (refer to Table 4.2-3, Supply Materials Shipped to the Proposed EREF During ~~the First Three Years of~~ Construction, and Table 4.2-4, Waste Materials Shipped from the Proposed EREF During ~~the First Three Years of~~ Construction. This value does not include the number of truck deliveries for centrifuge and process equipment. Based on experience at European enrichment plants, there will be about two trucks per day delivering

THE INCREASE IN TRAFFIC DUE TO D&D REPRESENTS A 16% INCREASE OVER THE CURRENT DAILY TRAFFIC VOLUME OF 2,282 VEHICLES ON U.S. HIGHWAY 20. THE MAXIMUM POTENTIAL INCREASE TO TRAFFIC WILL BE 53% WHEN OPERATION AND D&D ACTIVITIES OVERLAP, WHICH IS EQUIVALENT TO THAT NOTED ABOVE FOR CONSTRUCTION.

centrifuge and process equipment to the facility. These deliveries will occur during the four to five year period that the centrifuges are being assembled for installation in the facility.

Therefore, the combined daily trips (employee and delivery) during construction will be about 1,210 vehicle trips per day on U.S. Highway 20. This represents a 53% increase over current daily traffic volume of 2,282 vehicles per day on U.S. Highway 20. This is the maximum number of additional vehicle trips anticipated even when project construction and operations activities overlap. Car pooling will be encouraged to minimize the traffic due to employee travel. Shift change times and shipment times to and from the site could be set so as to occur at times when traffic volume on U.S. Highway 20 is typically at a minimum.

The impacts of traffic volume increases associated with construction of the EREF will be moderate to large, while the impacts of traffic volume increases associated with operation of the EREF will be small. The moderate to large impact of traffic volume increases associated with construction of the EREF will be mitigated by constructing the highway entrances early in the construction process and designing the highway entrances to minimize the disruption of traffic flow, particularly during the times of peak commute.

Impacts from on-site construction traffic, after the highway entrances and access roads are constructed, will include vehicle emissions, changes in scenic value, increased noise levels, potential vehicle-wildlife collisions, and disturbance of adjacent habitat by wildlife. Traffic volumes will be observable during shift changes and will reduce the scenic quality of the view of the site. Noise levels will be lower than noise levels on U.S. Highway 20 because traffic will be traveling much slower. Wildlife will likely avoid the access roads, particularly when shift changes occur, due to noise; however, some wildlife mortality of birds and small mammals will occur as animals become habituated to the activities on site. Reduced traffic speeds and lighting at night will reduce wildlife mortality.

Impacts of Decontamination and Decommissioning (D&D) will be similar to operations with aN ~~slight~~ increase OF APPROXIMATELY SEVEN ~~due to a few~~ more daily deliveries of material and waste removal trips and an increase ~~in~~ OF 356 worker trips when operation and D&D activities are concurrent. ~~The increase in worker trips will not approach the number of workers during construction and, therefore, will be a small increase.~~ THEREFORE, transportation impacts from D&D will be small.

4.2.5 Mitigation Measures

Mitigation measures will be used to reduce traffic volumes, and minimize fugitive dust production, noise, and wildlife mortality. These measures may include the following:

- Encouraging car pooling to minimize traffic due to employee travel.
- Staggering shift changes to reduce the peak traffic volume on U.S. Highway 20.
- Construction and use of acceleration and deceleration lanes to improve traffic flow and safety on U.S. Highway 20 at the proposed EREF highway entrances.
- Using water or surfactants for dust suppression on dirt roads, in clearing and grading operations, and construction activities. Water conservation will be considered when deciding how often dust suppression water sprays would be applied.
- Using adequate containment methods during excavation and other similar operations including minimizing the construction footprint, limiting site slopes to a horizontal to vertical ratio of four to one or less, constructing a sedimentation detention basin, protecting undisturbed areas with silt fencing and straw bales, and placing crushed stone on top of disturbed soil in areas of concentrated runoff.

Table 4.2-3 Supply Materials Shipped to the Proposed EREF During ~~the First Three Years of~~ Construction
(Page 1 of ~~1~~ 3)

Mode of Shipment	Year	Type of Supply Material	Origin of Shipment	Estimated Number of Shipments
Truck	1	Concrete	Local	[ ]
Truck	1	Steel Panels	U.S.A.	[ ]
Truck	1	Structural and Miscellaneous Steel	Idaho	[ ]
Truck	1	Piping Spool Pieces	Idaho	[ ]
Truck	1	Overhead Cranes	U.S.A.	[ ]
Truck	1	HVAC Units	U.S.A	[ ]
Truck	1	Ductwork	Local	[ ]
Truck	1	Electric Motors	Local	[ ]
Truck	1	Electrical Wire, Conduit, and Cable Tray	Local	[ ]
Truck	2	Concrete	Local	[ ]
Truck	2	Steel Panels	U.S.A.	[ ]
Truck	2	Structural and Miscellaneous Steel	~~Local~~ IDAHO	[ ]
Truck	2	Built-up Roofing	Local	[ ]
Truck	2	Piping Spool Pieces	Idaho	[ ]
Truck	2	Overhead Cranes	U.S.A.	[ ]
Truck	2	HVAC Units	U.S.A.	[ ]
Truck	2	Ductwork	Local	[ ]
Truck	2	Electric Motors	Local	[ ]
Truck	2	Electrical Wire, Conduit, and Cable Tray	Local	[ ]
Truck	3	Concrete	Local	[ ]
Truck	3	Steel Panels	U.S.A.	[ ]
Truck	3	Piping Spool Pieces	Idaho	[ ]
Truck	3	Electrical Wire, Conduit, and Cable Tray	Local	[ ]
~~Truck~~		~~Centrifuges or Parts~~		~~[ ]~~

Information in "[ ]" is Proprietary Commercial Information withheld in accordance with 10 CFR 2.390

INSERT A

INSERT A
P. 1 OF 2

Table 4.2-3 Supply Materials Shipped to the Proposed EREF During Construction (Page 2 of 3)

Mode of Shipment	Year	Type of Supply Material	Origin of Shipment	Estimated Number of Shipments[1]
Truck	4	Concrete	Local	[ ]
Truck	4	Steel Panels	U.S.A.	[ ]
Truck	4	Structural and Miscellaneous Steel	Idaho	[ ]
Truck	4	Piping Spool Pieces	Idaho	[ ]
Truck	4	Overhead Cranes	U.S.A.	[ ]
Truck	4	HVAC Units	U.S.A	[ ]
Truck	4	Ductwork	Local	[ ]
Truck	4	Electric Motors	Local	[ ]
Truck	4	Electrical Wire, Conduit, and Cable Tray	Local	[ ]
Truck	5	Concrete	Local	[ ]
Truck	5	Steel Panels	U.S.A.	[ ]
Truck	5	Structural and Miscellaneous Steel	Idaho	[ ]
Truck	5	Built-up Roofing	Local	[ ]
Truck	5	Piping Spool Pieces	Idaho	[ ]
Truck	5	Overhead Cranes	U.S.A.	[ ]
Truck	5	HVAC Units	U.S.A.	[ ]
Truck	5	Ductwork	Local	[ ]
Truck	5	Electric Motors	Local	[ ]
Truck	5	Electrical Wire, Conduit, and Cable Tray	Local	[ ]
Truck	6	Concrete	Local	[ ]
Truck	6	Steel Panels	U.S.A.	[ ]
Truck	6	Structural and Miscellaneous Steel	Idaho	[ ]
Truck	6	Built-up Roofing	Local	[ ]
Truck	6	Piping Spool Pieces	Idaho	[ ]
Truck	6	Overhead Cranes	U.S.A.	[ ]
Truck	6	HVAC Units	U.S.A.	[ ]

Information in "[ ]" is Proprietary Commercial Information withheld in accordance with 10 CFR 2.390

INSERT A
P. 2 OF 2

Table 4.2-3 Supply Materials Shipped to the Proposed EREF During Construction (Page 3 of 3)

Mode of Shipment	Year	Type of Supply Material	Origin of Shipment	Estimated Number of Shipments[1]
Truck	6	Ductwork	Local	[ ]
Truck	6	Electric Motors	Local	[ ]
Truck	6	Electrical Wire, Conduit, and Cable Tray	Local	[ ]
Truck	7	Concrete	Local	[ ]
Truck	7	Steel Panels	U.S.A.	[ ]
Truck	7	Structural and Miscellaneous Steel	Idaho	[ ]
Truck	7	Built-up Roofing	Local	[ ]
Truck	7	Piping Spool Pieces	Idaho	[ ]
Truck	7	Overhead Cranes	U.S.A.	[ ]
Truck	7	HVAC Units	U.S.A.	[ ]
Truck	7	Ductwork	Local	[ ]
Truck	7	Electric Motors	Local	[ ]
Truck	7	Electrical Wire, Conduit, and Cable Tray	Local	[ ]
Truck		Centrifuges or Parts		[ ]

Information in "[ ]" is Proprietary Commercial Information withheld in accordance with 10 CFR 2.390

NOTE:

1. The total estimated number of shipments for Years 8 through 11 will be [ ].

Table 4.2-4 Waste Materials Shipped from the Proposed EREF During ~~the First Three Years of~~ Construction

(Page 1 of 1)

Mode of Shipment	Year	Type of Waste Material	Destination of Shipment	Estimated Number of Shipments[1]
Truck	1	Construction Debris	Landfill	[ ]
Truck	2	Construction Debris	Landfill	[ ]
Truck	3	Construction Debris	Landfill	[ ]

Information in "[ ]" is Proprietary Commercial Information withheld in accordance with 10 CFR 2.390

NOTE:

1. THE TOTAL ESTIMATED NUMBER OF SHIPMENTS FOR YEARS 8 THROUGH 11 IS [ ].

TRUCK	4	CONSTRUCTION DEBRIS	LANDFILL	[ ]
TRUCK	5	CONSTRUCTION DEBRIS	LANDFILL	[ ]
TRUCK	6	CONSTRUCTION DEBRIS	LANDFILL	[ ]
TRUCK	7	CONSTRUCTION DEBRIS	LANDFILL	[ ]

5.1 <u>IMPACT SUMMARY</u>

This section summarizes the environmental impacts that may result from the construction and operation of the EREF. Complete details of these potential impacts are provided in Chapter 4 of this Environmental Report (ER).

5.1.1 Land Use

Impacts from land use have been characterized in Section 4.1, Land Use Impacts. The site will be converted largely from agricultural to industrial use although much of the site will remain open space. Of the approximate 1,700 ha (4,200 ac) available, only a small portion, approximately 240 ha (592 ac), will be used for construction and permanent structures.

Construction impacts to land will be limited to grading activities necessary to prepare the site and subsequent construction of structures. Impacts to land are expected to be small on a short-term and long-term basis with little cumulative impact to the region.

Impacts will not be substantive as related to the following:

- Land use impact and impact of any related Federal action that may have cumulatively significant impacts. As noted in Section 4.1, construction of the Component Test Facility supporting the High Temperature Gas Reactor at INL is not anticipated to be significant.
- Area and location of land disturbed on either a short-term or long-term basis.

Minor impacts related to erosion control on the site may occur but will be short-term and limited. Mitigation measures associated with these impacts are listed in Section 5.2.1, Land Use.

5.1.2 Transportation

Transportation impact has been characterized in Section 4.2, Transportation Impacts.

With respect to construction-related transportation, no substantive impacts will exist related to the following:

- Construction of the access roads to the facility. Two construction access roads will be constructed from U.S. Highway 20.
- Transportation route and mode for conveying construction material to the facility.
- Impacts of construction transportation such as fugitive dust, emissions, scenic quality, and noise.

Impacts related to construction traffic such as fugitive dust, noise, and emissions will be small and are discussed in Section 4.2.1, Impacts of Construction of Highway Entrances and Access Roads. Additional information on noise impacts is contained in Section 4.7.1, Predicted Noise Levels. Impacts due to traffic volume increases during construction (e.g., from heavy haul vehicles and construction worker commuting) are anticipated to be moderate to large, while the impacts of traffic volume increases associated with operation AND DECOMMISSIONING of the EREF will ~~be small as~~ discussed in Section 4.2.4, Traffic Impacts. Mitigation measures associated with transportation impacts are listed in Section 5.2.2, Transportation.

With respect to the transport of radioactive materials, no substantive impacts will exist related to the following activities:

- Transportation by truck and routes from originating site to the destination.

ATTACHMENT 14.2-2

MARKUPS

SAR Table 10.1-7

Table 10.1-7 Total Work Days by Labor Category
(Based on a 7.5 hr Working Day)
(Page 1 of 1)

Task	Shift-worker (multi-functional)	Craftsman	Supervision	Project Management	Health Physics & Surveys	Cleaner
Planning and Preparation (see Table 10.1-2)	82	0	0	1,969	144	0
Decontamination and/or Dismantling of Radioactive Facility Components (Note 2)	192,270 ~~1,442,028~~	33,268	27,071 ~~159,802~~	10,587 ~~42,455~~	13,057 ~~52,471~~	9,610 ~~72,073~~
Restoration of Contaminated Areas on Facility Grounds (Note 1)(see Table 10.1-4)	0	0	0	0	0	0
Final Radiation Survey (see Table 10.1-5)	1,700	0	0	2,278	1,373	0
Site Stabilization and Long-Term Surveillance (Note 1) (see Table 10.1-6)	0	0	0	0	0	0

Notes:

1. European experience with the decommissioning of gas centrifuge uranium enrichment plants has been that there is no resulting radiological contamination of the facility grounds. Therefore, restoration of contaminated areas on the facility grounds and site stabilization and long-term surveillance will not be required and associated decommissioning provisions are not provided.
2. The values shown are inclusive of the Separations Building Module.

ATTACHMENT 14.3

ER TABLE 4.2-2 - MARKUP

Table 4.2-2 Annual Shipments To/From the Proposed EREF (by Truck) During Operation (Page 1 of 1)

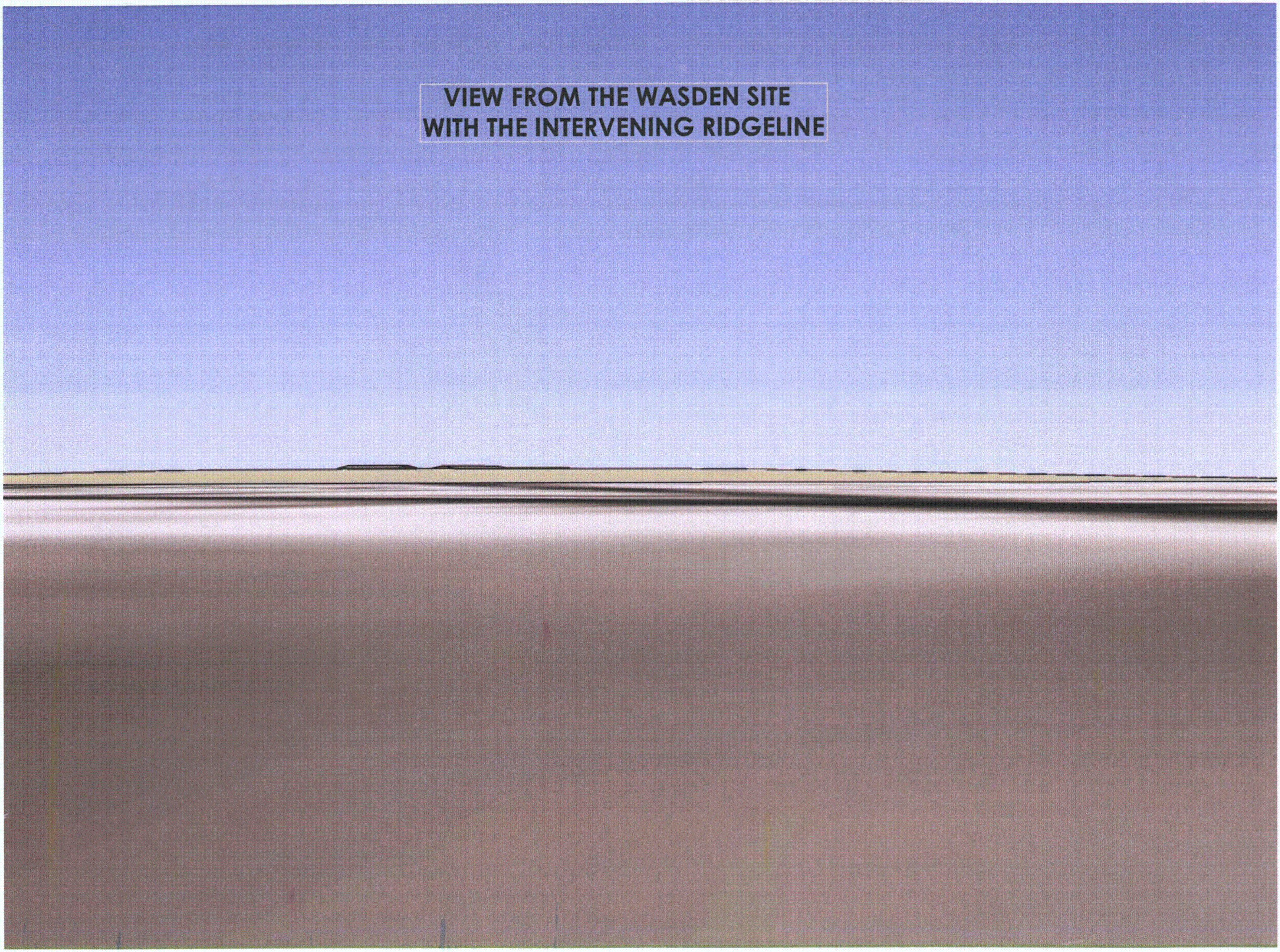
Material	Container Type	Estimated Number of Shipments per Year [a]
Natural U Feed (UF_6)	48Y	~~424~~ 1,424
Enriched U Product (UF_6)	30B	516
Depleted U (UF_6)	48Y	1,222
Hazardous Waste	208 liter (55 gallon) drum	8
Non-radiological, Non-Hazardous Waste	6 m^3 (8 yd^3) waste receptacle	181
Solid Waste (low-level waste)	208 liter (55 gallon) drum	16
Empty Feed (UF_6)	48Y	712
Empty Product	30B	516
Empty Depleted Uranium Tails	48Y	611

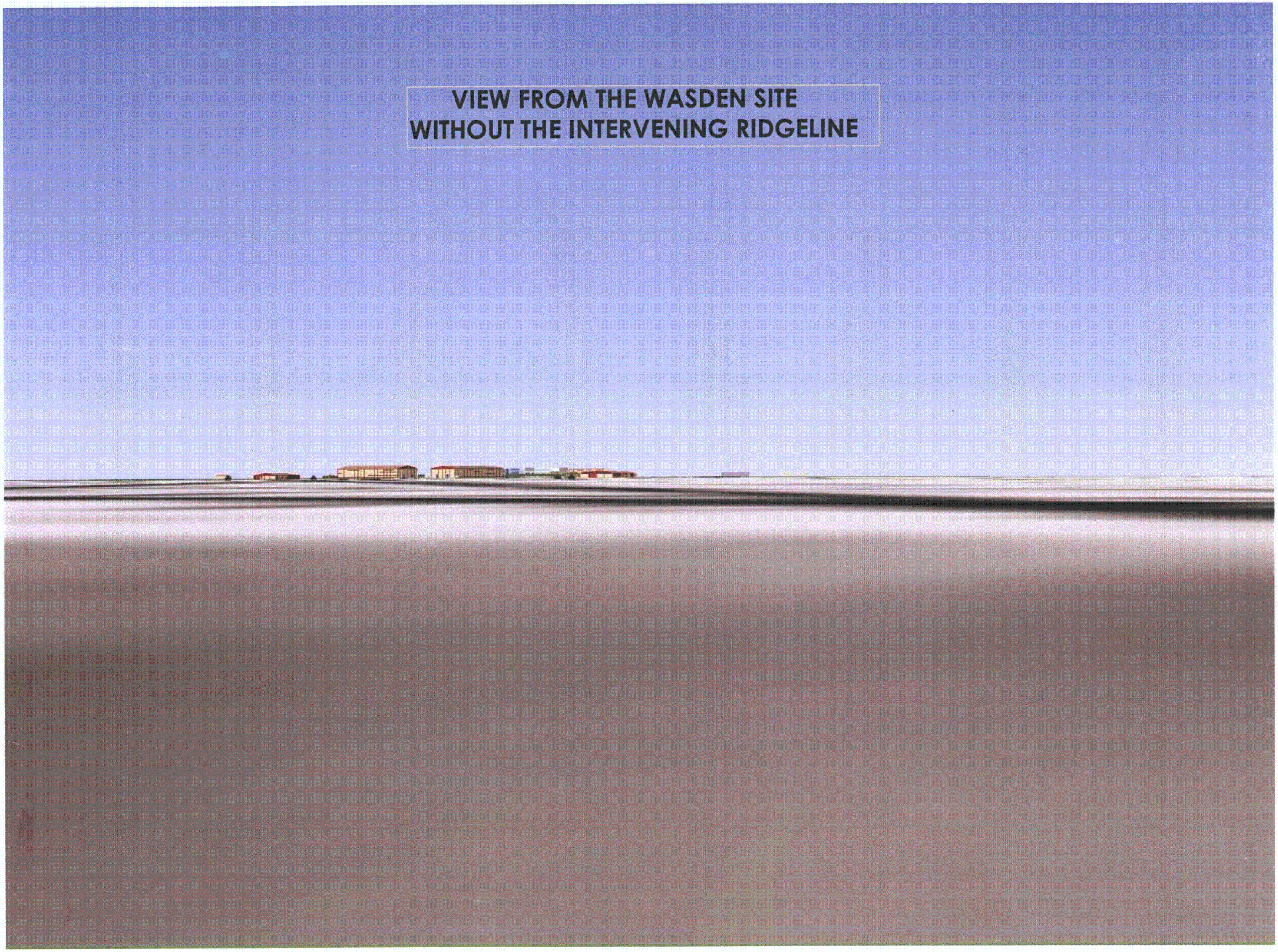
(a) 48Y cylinders are shipped one per truck when full and two per truck when empty. 30B cylinders are typically shipped two per truck, although up to five cylinders per truck can be shipped.

ATTACHMENT 15.1-1

EREF View from the Wasden Site with Intervening Ridgeline

EREF View from the Wasden Site without Intervening Ridgeline


VIEW FROM THE WASDEN SITE
WITH THE INTERVENING RIDGELINE


VIEW FROM THE WASDEN SITE
WITHOUT THE INTERVENING RIDGELINE

VISUAL AND SCENIC RESOURCES

ATTACHMENT 15.1-2

MARKUPS

ER Section 5.1.8, Historical and Cultural Resources (p. 5.1-4)

ER Section 7.2.1.3, Aesthetic Changes (p. 7.2.2)

These effluents are significantly below regulatory limits. Mitigation measures associated with air quality impacts are listed in Section 5.2.6, Air Quality.

5.1.7 Noise

The potential impacts related to noise generated by the facility have been characterized in Section 4.7, Noise Impacts. No substantive impacts will exist related to the following activities:

- Predicted typical noise levels at facility perimeter
- Impacts to sensitive receptors (i.e., hospitals, schools, residences, wildlife).

Noise levels will increase during construction and operation of the EREF, but not to a level that will cause significant impact to nearby residents or users of the Bureau of Land Management Hell's Half Acre Wilderness Study Area (WSA) and the Wasden Complex. The nearest residence is about 7.7 km (4.8 mi) east of the proposed site. While the WSA borders the south boundary of the site, the WSA is approximately 2.4 km (1.5 mi) away from the proposed EREF footprint. Mitigation measures associated with noise impacts are listed in Section 5.2.7, Noise.

5.1.8 Historical and Cultural Resources

The potential impacts to historical and cultural resources have been characterized in Section 4.8, Historical and Cultural Resources Impacts. No substantive impacts are anticipated pursuant to the following activities:

- Construction, operation, or decommissioning
- Impact on historic properties
- Potential for human remains to be present in the project area
- Impact on archeological resources.

2 3 7 10

Most of the facilities, when constructed, would be obscured due to an intervening ridgeline and due to distance from the EREF. Construction activities would also be difficult to observe due to these topographical features. As a result of consultation between AES and the Idaho State Historic Preservation Officer, AES is considering planting ~~0.6~~ m to ~~0.9~~ m (~~2~~ ft to ~~3~~ ft) tall native vegetation to further mask the portions of the EREF buildings that may be visible from the Wasden Complex. Within the EREF area of direct effects, impacts to historical and cultural resources are expected to be small. Mitigation measures associated with these impacts, if required, are listed in Section 5.2.8, Historical and Cultural Resources.

5.1.9 Visual/Scenic Resources

The potential impacts to visual/scenic resources have been characterized in Section 4.9, Visual/Scenic Resources Impacts. No substantive negative impacts will exist related to the following:

- Impacts on the aesthetic and scenic quality of the site
- Impacts from physical structures
- Impacts on historical, archaeological, or cultural properties of the site
- Impacts on the character of the site setting.

industrial facilities have been constructed west of the proposed site. Construction cranes and the form of taller buildings would be observable off-site. The construction area of the proposed facility would be about 2.4 km (1.5 mi) from public viewing areas such as U.S. Highway 20 and the WSA, making details of the construction of the proposed facility difficult to observe. Therefore, the impact on views would be small.

The Wasden Complex, an important group of archaeological sites, is about 1.0 km (0.6 mi) from the boundary of the proposed EREF site. AES has assessed the potential visual impact of the EREF on the Wasden Complex viewshed and has provided the results to the Idaho SHPO. The assessment of the viewshed looking from the Wasden Complex to the EREF indicates most of the facilities when constructed would be obscured due to an intervening ridgeline, and due to distance. Construction activities should also be difficult to observe due to this topographical feature. As a result of consultation between AES and the Idaho State Historic Preservation Officer (SHPO), AES is considering planting ~~0.6~~ 2 to ~~0.9~~ 3 m (~~2~~ 7 to ~~3~~ 10 ft) tall native vegetation to further mask the portion of the EREF buildings that may be visible from the Wasden Complex of sites. Therefore, the construction of the proposed EREF would have a small impact on the Wasden Complex.

7.2.1.4 Ecological Resources

Pre-construction and construction activities at the site would have a small impact on vegetation and wildlife. AES anticipates that construction activities would remove some shrub vegetation and cause wildlife to relocate on the site. Similarly, some wildlife that were using the immediate area would be displaced due to noise, lighting, traffic, and human presence. Limited direct mortality of wildlife may occur from vehicle collisions or collisions with construction cranes and fences. Proposed activities would not impact communities or habitats defined as rare or unique, or that support threatened and endangered species, since no such communities or habitats have been identified anywhere within or adjacent to the proposed site.

7.2.1.5 Access Roads and Local Traffic

All traffic into and out of the site would be along U.S. Highway 20. U.S. Highway 20 is dedicated to heavy-duty use and built to industrial standards; it would be able to handle increased heavy-duty traffic adequately. Traffic volume is low except during commute times. Therefore, the proposed EREF would potentially add to commute traffic and durations but would result in little effect during non-commute times.

7.2.1.6 Water Resources

Water quality impacts would be controlled during construction by compliance with the State of Idaho's and EPA Region 10's water quality regulations and the use of BMPs as detailed in the site Stormwater Pollution Prevention Plan (SWPPP). In addition, a Spill Prevention, Control, and Countermeasure (SPCC) plan would be implemented to minimize the possibility of spills of hazardous substances, minimize the environmental impact of any spills, and promptly initiate appropriate remediation. Spills that may occur during construction would most likely occur near vehicle maintenance and fueling operations, storage tanks, painting operations, and warehouses. The SPCC plan will identify sources, locations and quantities of potential spills, and response measures. The plan will also identify individuals and their responsibilities for implementation of the plan and provide for prompt notifications of state and local authorities as needed.

ATTACHMENT 15.2

VISUAL RESOURCES INVENTORY STUDY FOR THE EREF, REVISION 1, PREPARED BY MWH

VISUAL RESOURCE INVENTORY STUDY
PROPOSED SITE FOR THE
EAGLE ROCK ENRICHMENT FACILITY
BONNEVILLE, IDAHO

Prepared for:

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Revision 1
December 8, 2008

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1.0 INTRODUCTION

A visual resource inventory was conducted on the proposed site for the Eagle Rock Enrichment Facility (EREF) during the week of June 1, 2008. The purpose of this field study was to collect site-specific visual resource inventory at the proposed EREF site. In addition, the inventory was conducted to identify locations of sensitive receptors.

2.0 METHODS

The inventory was conducted using the Bureau of Land Management (BLM) Visual Resource Classification System (VRCS). Scenic quality (visual appeal measure) was estimated using the process described in BLM Manual 8410 and BLM Handbook H-8410-1. The BLM process consists of a scenic quality evaluation, sensitivity level analysis, and a delineation of distance zones. The process considers seven attributes:

- landform
- vegetation
- water
- color
- adjacent scenery
- scarcity
- cultural modifications

These attributes were described and then scored (1-5) for the proposed EREF site. The scoring also considered 'users' (e.g., workers traveling past the area, farm workers, recreational sightseers), level of use, public interest in the visual resources of the area, and adjacent land uses.

Prior to and during the field survey, maps of the site and surrounding area were reviewed to identify unique features in the area, viewsheds, and likely users. The Bonneville County planner and BLM planner were contacted to confirm potential, current, and future use (e.g., industrial, agriculture). In addition, facility plans (type, location, size, color, etc.) were used to identify where and how far any facilities (including roads) or plumes might be seen.

The BLM Snake River Field Office visual resource specialist visited the proposed site and provided input during the inventory. During the site survey, photographs were taken from facility locations and toward facilities from likely visual locations (e.g., U.S. Highway 20).

Site scoring, photographs, and narratives were used to determine the visual resource class and visual quality of the site.

3.0 RESULTS

3.1 GENERAL AREA CHARACTERISTICS

The 1,700 ha (4,200 ac) proposed EREF site, in Bonneville County, is located in the eastern portion of the Snake River Plain geologic province. The Snake River Plain is a crescent shaped area of topographic depression that is bounded on three sides by mountain ranges and extends across much of the southern portion of Idaho, covering about 40,400 km^2 (15,600 mi^2). The geology of the Snake River Plain is dominated by extensive volcanism that has deposited a thick sequence of rhyolitic and basaltic rocks, ranging up to 1,524 m (5,000 ft) thick.

Landscape characteristics surrounding the proposed site include Kettle Butte about 1.6 km (1 mi) east of the proposed site, the Lemhi Range about 45 km (28 mi) northwest of the proposed site, and East and Middle Buttes about 18 km (11 mi) west, southwest of the proposed site. In addition, the lava flow known as Hell's Half Acre is immediately south of the proposed site and U.S. Highway 20.

The proposed site is located in Sections 13-15 and portions of Sections 21-26, Township 3 North, Range 34 East. The 1,700-ha (4,200-acre) proposed site slopes gently from east to west with an average slope of approximately 1.4 percent. The elevation varies from about 1,554 m (5,100 ft) near U.S. Highway 20 to about 1,585 m (5,200 ft) to the north of the property. No major defined drainage features are evident on the proposed site. There is a minor drainage feature that runs from near the center of the proposed site toward the southwest portion of the site.

The proposed EREF site is within the sagebrush steppe vegetation type. The vegetation in this area is dominated by Wyoming big sagebrush (*Artemisia tridentata wyomingensis*). The site has been modified by farming. Sagebrush has been removed from about 30% of the site and seeded with crested wheatgrass (*Agropyron cristatum*). In addition, about 22 percent of the site 390 ha (960 acres) is in irrigated crops (grains and potatoes). The remainder of the site is native sagebrush steppe vegetation.

There are a few structures and features on the proposed site and within site of the proposed site. The on-site structures include an irrigation well, six pivot irrigation systems, dirt roads, livestock handling pens, and barbed wire fences. In addition, there are two potato sheds and four grain bins on the property adjacent to U.S. Highway 20

There are similar structures within sight of the proposed EREF site. Structures include a few potato storage facilities to the southwest of the site, stock handling areas immediately across U.S. Highway 20 and immediately east of the site, and several irrigation systems within 3.2 km (2 mi) of the proposed site. In addition, there is a powerline that runs to a substation near the southeast boundary of the proposed site. A seismic station with a communication tower is visible on Kettle Butte and several other communication towers are located west of the proposed site near and on East and Middle Buttes. In addition, a tower is located about 9.2 km (5.7 mi) east of the proposed site. The proposed location of the EREF buildings can be observed from approximately 0.4 km (0.25 mi) east of the site to about 6.4 km (4 mi) west of the site along U.S. Highway 20.

3.2 SENSITIVE RECEPTORS

The proposed EREF site is surrounded by State of Idaho, BLM, and private property. The property of the north, east, and west sides are primarily used for grazing and agricultural activities. However, BLM property also is used for recreation. In addition, BLM property to the south is designated as the BLM Hell's Half Acre Wilderness Study Area (WSA) and National Park Service (NPS) National Landscape Landmark (NLL).

3.3 VISUAL RATING

3.3.1 Visual Resource Class

The visual resource inventory process provides a means for determining visual values (BLM, 1984a; BLM, 1984b; BLM, 1986; BLM 2008). The inventory consists of a scenic quality evaluation, sensitivity level analysis, and a delineation of distance zones. Based on these three factors, lands are placed into one of four Visual Resource Classes that are established through the Resource Management Planning (RMP) process. These classes represent the relative value of the visual resources: Classes I and II are the most valued, Class III represents a moderate value, and Class IV is of least value. The classes provide the basis for considering visual values in the RMP process. The objectives of each class are described below, using BLM Manual and Handbook 8410:

> Class I Objective is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
>
> Class II Objective is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
>
> Class III Objective is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
>
> Class IV Objectives is to provide for management activities which require major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

BLM's draft classification of BLM lands surrounding the proposed site is VRM Class II (**Figure 1**). These lands serve as a buffer to the Class I designation for the Hell's Half Acre WSA and provide an open visual landscape to the north of U.S. Highway 20. As described above, the objective of VRM Class II is to retain the existing character of the landscape. There should be a low level of change to the characteristic landscape of VRM Class II areas on BLM-managed lands. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Private lands and Department of Energy Idaho National Laboratory lands within this Class II area have some development, including potato cellars, equipment barns, and industrial facilities. In addition, the county has zoned this area G-1 which allows for industrial development along with agriculture and grazing. Therefore, the site could be considered a VRM Class III or IV area.

3.3.2 Scenic Quality Inventory and Evaluation

The proposed site was evaluated the week of June 3, 2008 using the BLM visual resource inventory process (BLM, 1984b; BLM 1986) to determine the scenic quality of the site.

The AREVA site received a "B" rating (see Table 1, Scenic Quality Inventory and Evaluation Chart). Scenic quality is a measure of the visual appeal of a tract of land which is given an A, B, or C rating (A-highest, C-lowest) based on the apparent scenic quality using the seven factors outlined in Table 1, Scenic Quality Inventory and Evaluation Chart. The supporting scores using the BLM VRM process are provided in Tables 2 and 3. Below is a discussion of the visual characteristics of the site and surrounding area.

The scenic quality of the site from the four cardinal directions is relatively similar, although variation due to vegetation on site and adjacent scenery does result in some differences in the scores (Table 2). The landform on the proposed site is open with rolling topography. Adjacent topography is similar but has increased variation with buttes and mountains in the background, Kettle Butte immediately to the east of the site, and a lava flow immediately south of the site. Vegetation is relatively simple composed of three types: sagebrush, seeded crested wheatgrass, and crops (potatoes and grains). There are no water features on the site or on adjacent areas, although there are dry drainages on the site and throughout the area. The colors on the site and area are relatively muted with light greens (sagebrush and wheatgrass), dark greens (crops), and dark browns (buttes, lava flows, and rock outcrops). Adjacent scenery is similar to the site, but does have increased complexity with the lava flow and buttes. The site and surrounding area reflects limited development and a focus on grazing and crops. Development has generally been limited to farming and grazing, although there are towers in the area and an industrial complex to the west that is not observed from the site.

Four sensitivity units were identified to assess the potential viewer response to the viewshed (Table 3). The units were U.S. Highway 20, the WSA, BLM Land other than the WSA, and private land. Sensitivity would generally be low for U.S. Highway 20, BLM Land other than the WSA, and private land. The sensitivity was assessed as moderate or high from the WSA. This increased sensitivity is related to WSA users that may consider any type of activity or structure as substantially reducing the viewing quality and recreational experience on the WSA. This reduction in quality would be minimized because the proposed facility would be some distance from the WSA.

4.0 REFERENCES

BLM, 1984a. Visual Resource Management, BLM Manual 8400, U.S. Department of Interior, Washington, DC, 1984, Website: http://www.blm.gov:80/nstc/VRM/8400.html, Date accessed: April 4, 2008.

BLM, 1984b. Visual Resource Manual, BLM Manual 8410b, U.S. Department of the Interior, 1984, Website: http://www.blm.gov/nstc/VRM/8410.html, Date accessed: April 4, 2008.

BLM, 1986. Visual Resource Contrast Rating, BLM Manual Handbook H_8431_1. U.S. Department of Interior, Washington, DC, 1986, Website: http://www.blm.gov:80/nstc/VRM/8431.html, Date accessed: April 4, 2008.

BLM, 2008. Visual Resource Management, U.S. Department of Interior, Washington, DC, 2008, Website: http://www.blm.gov:80/nstc/VRM/index.html, Date accessed: May 9, 2008.

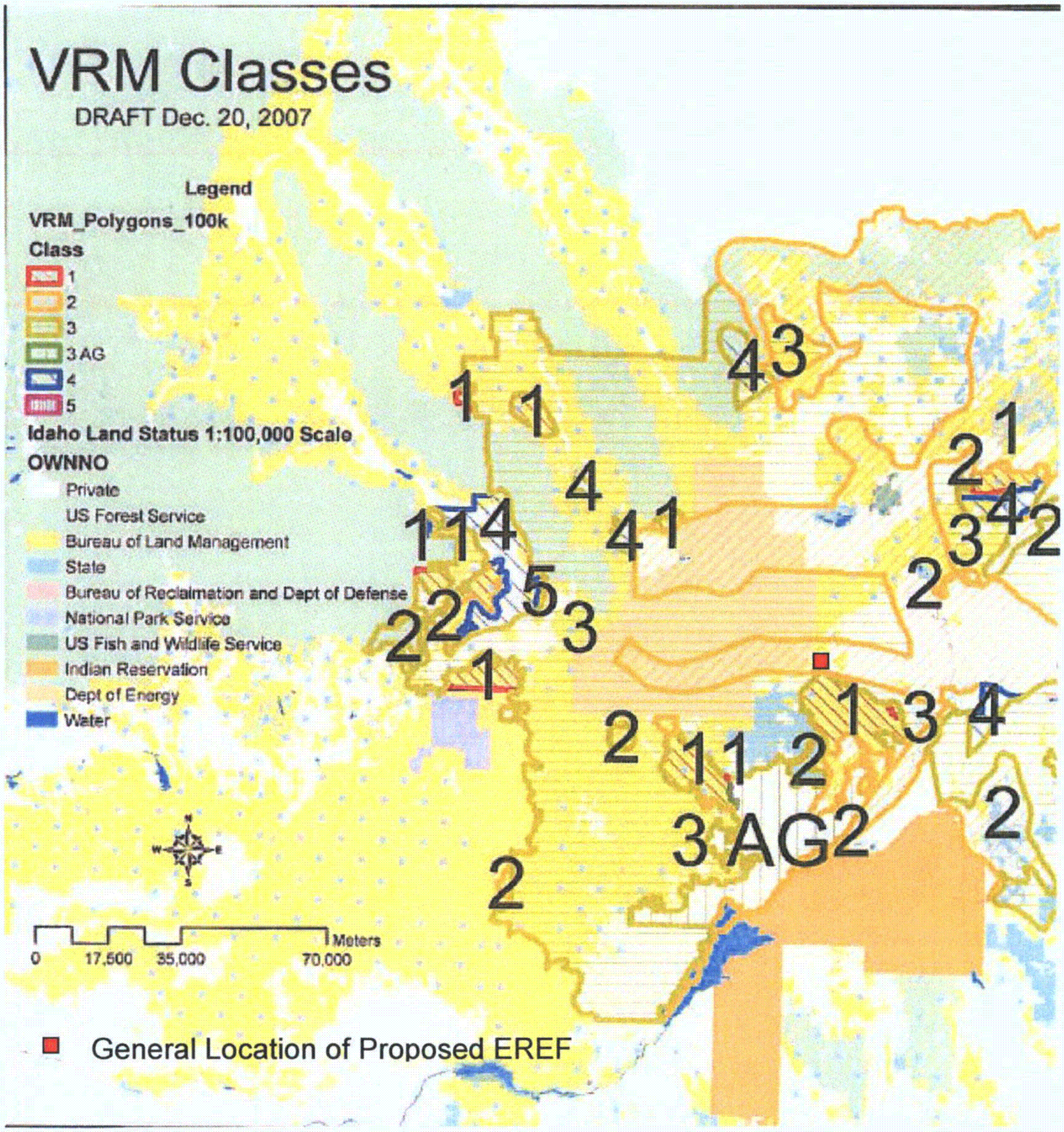

Figure 1. Draft VRM Classes for BLM Properties Including the Area Surrounding the Proposed EREF Site. (provided by the Bureau of Land Management Upper Snake River Field Office)

TABLES

Table 1 Scenic Quality Inventory And Evaluation Chart

Key Factors	Rating Criteria and Score		
Landform	High vertical relief as expressed in prominent cliffs, spires, or massive rock outcrops, or severe surface variations or highly eroded formations including major badlands or dune systems; or detail features dominant and exceptionally striking and intriguing such as glaciers. Score: 5	Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosion patterns or variety in size and shape or landforms; or detail features which are interesting though not dominant or exceptional. Score: **3**	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. Score: 1
Vegetation	A variety of vegetative types as expressed in interesting forms, textures, and patterns. Score: 5	Some variety of vegetation, but only one or two major types. Score: **3**	Little or no contrast in vegetation. Score: 1
Water	Clear and clean appearing, still, or cascading white water; any of which are a dominant factor in the landscape. Score: 5	Flowing or still; but not dominant in the landscape. Score: 3	Absent or present, but not noticeable Score: **0**
Color	Rich color combinations, variety or vivid color; or pleasing contrasts in the soil, rock, vegetation, water, or snow fields Score: 5	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element Score: **3**	Subtle color variations, contrast, or interest; generally mute tones. Score: 1
Influence of Adjacent Scenery	Adjacent scenery greatly enhances visual quality. Score: 5	Adjacent scenery moderately enhances overall visual quality. Score: **3**	Adjacent scenery has little or no influence on overall visual quality. Score: 0
Scarcity	One of a kind; or unusually memorable or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc. Score: 5	Distinctive, though somewhat similar to others within the region. Score: 3	Interesting within its setting, but fairly common within the region. Score: **1**
Cultural Modifications	Modifications add favorably to visual variety while promoting visual harmony. Score: 2	Modifications add little or no visual variety to the area, and introduce no discordant elements. Score: **0**	Modifications add variety but are very discordant and promote strong disharmony. Score: -4

Notes:

Total score for the proposed site: 13 (sum of key factor scores)

Scenic Quality: A = 19 or more; B = 12-18; C = 11 or less

Scores in bold represent scores assigned to the proposed site. Unbold scores are from the BLM rating guide.

Table 2. Scenic Quality Rating by View

View Location	2. Landform	3. Vegetation	4. Water	5. Color	6. Adjacent Scenery	7. Scarcity	8. Cultural Modification	9. Total Score	Scenic Quality Rating Explanation
South Boundary View								**10**	
2	2								Level to rolling topography, Kettle Butte to the northeast
3		3							Crested wheatgrass area, low rolling hills
4			0						None
5				1					Mute tones w/ crested wheatgrass
6					3				Sagebrush and lava flows, and crop areas
7						1			Common
8							0		Farm structures, U.S. Highway 20, fences
East Boundary View								**13**	
2	3								Rolling topography; buttes and mtns in background
3		3							Crop circles, crested wheatgrass, sage areas
4			0						None
5				3					Variations from 3 vegetation types
6					3				Lava flow to the south, Kettle Butte immediately east
7						1			Common
8							0		Pivot irrigation systems, dirt roads, fences, antenna in background
North Boundary View								**7**	
2	2								Low rolling hills, Kettle Butte to the east
3		2							Crop circles & sagebrush,
4			0						None
5				1					Simple color in crop area; more complex in sagebrush
6					1				Similar; Kettle Butte to east, crested wheatgrass areas
7						1			Common
8									Irrigation, fences, dirt roads
West Boundary View								**13**	
2	4								Rolling topography; Kettle Butte in immediate background
3		3							Mainly sage; some crested wheatgrass
4			0						None
5				2					Sage brush lava outcrops, grass areas
6					3				Lava flow to the south, Kettle Butte immediately east
7						1			Common
8							0		Fences, dirt roads

Table 3. Sensitivity Level Rating

SENSITIVITY LEVEL RATING UNIT	2. Type of User	3. Amount of Use	4. Public Interest	5. Adjacent Land Uses	6. Special Areas	7. Other Factors	8. Overall Rating	EXPLANATION
U.S. Highway 20	L[a]	M	L	L	L		L	Primarily workers and through travelers; grazing and limited recreation use; likely low interested related to U.S. Highway 20.
WSA	M/H	L/M	M/H	M/H	H		M/H	Site is not visible from WSA trailhead; but is visible for those walking trails although over 1.5 miles away.
Other BLM Land	M	L	L/M	L	L		L	Generally used for grazing although some recreational/hunting use. EREF would be partially screened on north and west boundaries of site but fully visible form northeast side of boundary.
Private Land	L	L	L	L	L		L	Land use is grazing; limited use; some owners are absentee.

[a] L = low; M = Moderate; H = High

ATTACHMENT 16.1

MARKUP

ER TABLE 4.13-2

Table 4.13-2 Summary of Estimated Costs for Disposal of DUF_6 at DOE Deconversion Facilities

Activity	Cost per Kilogram	Total Cost per Activity
Transportation of 321,235 MT DUF_6 in 25,718 48Y cylinders to DOE conversion facilities	\$0.66 per kilogram DUF_6	\$212,015,100
Conversion/disposal of 321,235 MT DUF_6	\$5.78 per kilogram DUF_6	\$1,856,738,300
Disposal of unused empty depleted uranium tails cylinders	\$1.22 per kilogram DUF_6	\$391,906,700
TOTAL (2007 Dollars)	\$7.76 per kilogram DUF_6	\$2,460,660,100

7.66

1a