AREVA

10 CFR 70.5

September 9, 2009

AES-O-NRC-09-01234-0

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 Requests for Additional Information – AREVA Enrichment Services LLC Environmental Report for the Eagle Rock Enrichment Facility

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 (Ref. 1).

On August 10, 2009, the U.S. Nuclear Regulatory Commission (NRC) transmitted to AES Requests for Additional Information (RAI) regarding the EREF Environmental Report (Ref. 2). AES hereby submits the responses to those NRC RAI.

Enclosure 2 provides the AES responses to the RAI. The AES responses include a description of each RAI, the AES response, the associated markups of the EREF Environmental Report, additional supporting information (reports, figures, tables, etc.), and associated commitments. Enclosure 3 provides supporting information that is non-proprietary. Enclosure 4 provides supporting information that is proprietary that should be withheld in accordance with 10 CFR 2.390. Enclosures 3 and 4 include markup pages of the EREF Environmental Report, reports, and other information.

Some AES responses contain proprietary information that AES is requesting be withheld from public disclosure in accordance with 10 CFR 2.390. Enclosure 1 provides an affidavit supporting our request to withhold the information identified in Enclosure 4 in accordance with 10 CFR 2.390(b). The proprietary information is provided in Enclosure 4.

The EREF License Application will be revised to include the changes identified in the markups of the Environmental Report provided in Enclosures 3 and 4 in Revision 2 of the EREF License Application.

NMSS01

If you have any questions regarding this submittal, please contact me at (508) 573-6554.

Respectfully,

Jim A. Kay
Licensing 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.
2) B. Reilly (U.S. Nuclear Regulatory Commission) Letter to Jim Kay, Licensing Manager, Eagle Rock Enrichment Facility, AREVA Enrichment Services LLC, Request for Additional Information - AREVA Enrichment Services LLC Environmental Report for the Eagle Rock Enrichment Facility, dated August 10, 2009.

Enclosures:

1) Affidavit of Jim Kay
2) Responses to NRC Requests for Additional Information
3) Non-Proprietary Supporting Information
4) Proprietary Supporting Information to be withheld in accordance with 10 CFR 2.390

Commitments:
The EREF License Application will be revised to include the changes identified in the markups of the Environmental Report provided in Enclosures 3 and 4 in Revision 2 of the EREF License Application.

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

a) I am the Licensing 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 Enclosure 4.

1. New Environmental Report Table 3.4-15, Construction Water Use (2011-2022); the number of construction workers is considered Proprietary Commercial Information to AES.
2. Engineering Service Report, Completed for AREVA New 161 kV Delivery to AREVA, dated February 26, 2009; the cost estimate is considered Proprietary Commercial Information to AES.
3. Traffic Breakdown during Construction and Operations Overlap.
4. Amendment to Class III Cultural Resource Inventory of the Proposed Eagle Rock Enrichment Facility, Bonneville County, Idaho.

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. For Items 1 through 3 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.
2. Item 4 in Section (d) 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.
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.
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 September 8, 2009.

J. A. Kay

Mr. Jim A. Kay
Licensing Manager of AES LLC
400 Donald Lynch Boulevard
Marlborough, MA 01752

Maureen L. Lyons
Notary Public

RAI 1

Provide additional information regarding air emissions during construction and operation of the Eagle Rock Enrichment Facility (EREF).

a. Provide volume throughputs for vehicle and equipment fueling activities during construction and operation to facilitate the proper inclusion of these activities in impacts to air quality.

b. Provide details regarding the combined gasoline and diesel fueling station that will be operational on site, including size and design of storage tanks, spill prevention measures, fuel delivery systems, fuel dispensing equipment, and other factors that must be addressed to safely incorporate such fueling operations into site operating plans (e.g. safe distances from buildings housing UF_6, the Full Tails, Full Feed and Empty Cylinder Storage Pads, Full Product Cylinder Storage Pad, and Cylinder Transportation Path, amendments to Hazardous material management plans and training regimens, fire safety, etc.). Provide an air impact analysis for the fuel storage and dispensing activities.

The evaluation of air quality impacts requires consideration of all sources of potential air emissions for evaluation against the National Ambient Air Quality Standards. Because vehicle and equipment refueling on-site would be required during construction and operation of the EREF, impacts to air quality would occur. Sections 4.6.1 and 4.6.2 (AES, 2009a) do not consider refueling emissions.

AES Response to NRC RAI:

a. Volume throughputs for vehicle and equipment fueling activities during construction are estimated for the maximum usage as follows:

- No more than 1325 liters (350 gallons) of gasoline will be consumed per week.
- No more than 37,854 liters (10,000 gallons) of diesel fuel will be consumed per week.

These amounts will fluctuate depending on the stages of activities.

Volume throughputs for vehicle and equipment fueling activities during facility operation are estimated as follows:

- 568 liters (150 gallons) per week of gasoline consumption.
- 568 liters (150 gallons) per week of diesel fuel consumption.

To estimate emissions from fueling activities, it was assumed that all fuels were distributed through the proposed fueling station.

b. The combined gasoline and diesel fueling station that will be operational on site will consist of one, 2000-gallon aboveground tank for gasoline storage and one, 2000-gallon

aboveground tank for diesel fuel storage. The tanks will be constructed of welded steel, insulated by 1/4 inch Styrofoam and 30 mil high density polyethylene (HDPE) membrane and encased in six inch reinforced concrete. The tank system includes a 5-gallon spill containment surrounding the fill pipe.

Best management practices for fueling activities will be implemented to reduce the potential for releases or other incidents at the fueling facility. These can include: requiring delivery contractors to undergo training prior to being allowed on-site, having reduced speeds for tanker trucks delivering fuel to the facility, posting warning signs at the fueling facility, use of liquid-level gauges to prevent overfills, paving the unloading areas and installing curbing to control small spills, requiring delivery contractors to carry spill kits, and other measures to reduce the potential for environmental impacts at the fueling facility.

The potential air quality impacts from on-site fueling activities would consist of VOC (petroleum distillates) emissions from the fuel storage and dispensing activities. These VOC emissions are estimated to be 688 pounds per year during construction and 657 pounds per year during operations, based on EPA AP-42 Fifth Edition, Volume 1, Chapter 7.1, November, 2006, and the EPA TANKS (Version 4.09) computer program. In accordance with IDAPA 58.01.01, Section 317 b.i.(3):

- operation, loading and unloading of volatile organic compound storage tanks, ten thousand gallons capacity or less, with lids or other appropriate closure, vapor pressure not greater than eighty (80) mm Hg at 21 degrees C.

- operation, loading and unloading of gasoline storage tanks, ten thousand gallons capacity or less, with lids or other appropriate closure,

are considered insignificant activities.

The potential emissions from the on-site fueling facility will not cause exceedances of air quality standards.

An evaluation of a gasoline tanker spill and fire was performed to assess any potential for impacting material-at-risk (MAR) (UF_6 or byproducts) that might result in a release exceeding the performance requirements of 10CFR70.61. The sequence postulated a failure of the fuel transfer hose and the inventory of the largest anticipated delivery vehicle at the offload area for the proposed Gasoline and Diesel Refueling Station. This fire event did not result in exposures that would result in a release of MAR. The revised Fire Risk Assessment is available for review by the NRC in AES's office.

An existing set of Integrated Safety Assessment (ISA) sequences previously considered the possibility of a fire involving a bulk fuel delivery vehicle occurring near areas with material-at-risk storage. An Item Relied on For Safety (IROFS) is in place to control the delivery route and staging of fuel delivery vehicles as well as ensuring spill containment measures are in-place at designated offload areas. These sequences and the IROFS will be revised and extended to include the addition of gasoline and diesel fuel deliveries to the Gasoline and Diesel Refueling Station.

Associated EREF License Application Revisions:

By September 25, 2009, AES will provide the impacts to the EREF License Application associated with the response to Environmental Report RAI 1. These impacts include, but are not limited to, revisions to the site plan to show the location of the Gasoline and Diesel Refueling Station, the addition of a description of the Gasoline and Diesel Refueling Station, a revision to lists of chemicals stored onsite, revisions to the affected ISA sequences and IROFS to include the gasoline and diesel fuel deliveries to the Gasoline and Diesel Refueling Station.

Commitments:

By September 25, 2009, AES will provide the impacts to the EREF License Application associated with the response to Environmental Report RAI 1. These impacts include, but are not limited to, revisions to the site plan to show the location of the Gasoline and Diesel Refueling Station, the addition of a description of the Gasoline and Diesel Refueling Station, a revision to lists of chemicals stored onsite, revisions to the affected ISA sequences and IROFS to include the gasoline and diesel fuel deliveries to the Gasoline and Diesel Refueling Station.

Attachments:

None

References:

EPA AP-42 Fifth Edition, Volume 1, Chapter 7.1, November, 2006

EPA TANKS Emissions Estimation Software (Version 4.09d) released October 5, 2006
http://www.epa.gov/ttn/chief/software/tanks/index.html

RAI 2

Provide air impact analyses that show compliance with applicable Idaho state standards.

a. Provide an assessment of the impact that the estimated annual amount of fluorides released to the environment will have on livestock feed crops and forage that may be grown on contiguous parcels. Provide a qualitative analysis or perform appropriate dispersion modeling, as necessary, to estimate the resulting maximum potential accumulation of fluoride on crops and forage vegetation for comparison against the published safe levels in effect in Idaho (see Idaho Administrative Procedures Act [IDAPA] 58.01.01 Part 577) and to determine conformance with fluoride emission limits and ambient air quality standards in effect in Idaho (see IDAPA 58.01.01 Part 585).

b. Releases of ethanol and methylene chloride are anticipated from the EREF during operations (Section 4.6.2.1, AES 2009a). Provide air analyses that illustrate the impacts of releases of ethanol and methylene chloride that result from normal operation. Compare the resulting estimated impacts to the relevant standards in Idaho rules IDAPA 58.01.01 Parts 585 and 586.

The State of Idaho published specific rules regarding the emissions of various chemical species for the protection of the environment. The environmental report should contain an analysis of the expected emissions and compare the result with the appropriate state guidelines for the species anticipated to be emitted during operation of the EREF.

AES Response to NRC RAI:

a. The following assessment reveals that emissions of fluorides from EREF will be in compliance with Idaho air quality regulations:

Potential for Fluoride Emissions to Impact Forage Vegetation (IDAPA 58.01.01 Part 577)

The Idaho ambient air quality standards for fluorides are found in IDAPA 58.01.01 Part 577.06 and are expressed in terms of the ***total fluoride content in vegetation used for feed and forage***. In accordance with IDAPA Part 577.06, the air quality standards for fluorides are those concentrations in air which result in total fluoride content in vegetation used for feed and forage of no more than 40 parts per million (ppm) dry basis (annual arithmetic mean), 60 ppm dry basis, (monthly concentration for two consecutive months), and 80 ppm dry basis (monthly concentration never to be exceeded).

To assess the potential for fluoride emissions from EREF to impact forage crops, a literature value for an accumulation coefficient for natural vegetation exposed to fluorides from industrial emissions was used to estimate a potential concentration of fluoride in vegetation at EREF. The estimated concentration of fluoride in vegetation was calculated from the literature-based accumulation coefficient and the estimated concentration of fluoride in air. The concentration of HF in air at various distances from the release point was calculated by multiplying the annual average emission rate by a site-specific air dispersion factor.

The average annual emission of fluoride was calculated as follows:

As stated in the ER Section 4.6.2.1, hydrogen fluoride (HF) releases are estimated to be less than 2.0 kg/yr (4.4 lb/yr), based on European operational experience. An annual average release rate for HF was calculated: at 2.0 kg/yr, or 2 $x10^6$ mg/yr, the average release rate (in units of mg/sec) is:

2 $x10^6$ mg/yr / [365 day/yr x 24 hr/day x 60 min/hr x 60 sec/min] = 0.0634 mg/sec

Site-specific air dispersion factors (χ/Q values) having units of sec/m^3 were calculated using meteorological data from the INL. As shown in Table 4-2 of the EREF ER, these χ/Q values were calculated for several potential receptor points including the site boundary, the nearest resident, the nearest recreation area, and the nearest business. Using the most conservative χ/Q value, (the value at the site boundary for the most critical sector), 4.259 $x10^{-6}$ sec/m^3, the estimated HF concentration in air at the site boundary (C_{SB}) is calculated as follows:

C_{SB} = 0.0634 mg/sec x 4.259 $x10^{-6}$ sec/m^3 = 2.701$x10^{-7}$ mg/ m^3

A maximum fluoride accumulation coefficient of 5.1 m^3/g dry wt day was cited in literature. Using the 5.1 m^3/g dry wt day value, an estimated concentration of fluoride in vegetation, (C_{veg}), from emissions at EREF for one year can be calculated as follows:

C_{veg} = 2.701$x10^{-7}$ mg/ m^3 x (5.1 m^3/g dry wt day) x 365 days x 1000 ug/mg = 0.5 ug/g (ppm) dry weight. This value is less than the annual average concentration standard of 40 ppm in IDAPA Part 577.06. Based on the very low anticipated HF emission rates, no exceedance of the bimonthly or maximum forage vegetation standards would be expected.

Comparison to Screening Emission Levels (EL) and Acceptable Ambient Concentrations (AAC) (IDAPA 58.01.01 Parts 585 and 586)

According to Section 4.6.2.1 of the EREF ER, hydrogen fluoride (HF) releases are estimated to be 2.0 kg (4.4 lbs) each year. As a very conservative measure for the purpose of this calculation, it was assumed that all 2.0 kg (4.4 lbs) were emitted in one month period.

To compare to the EL: 4.4 lbs/day ÷ 30 day/yr ÷ 24 hrs/day = 6 x 10^{-3} lbs/hr.

This conservative estimate is less than the screening emission limit of 0.167 lbs/hr for fluorides, and, as a result, complies with IDAPA 58.01.01 Sections 210 and 585.

To further assess potential fluoride emissions and to compare to the AAC:
(6 x 10^{-3} lbs/hr) x (453.59 g/lb) = 2.72 g/hr = 0.76 mg/sec

Table 4-2 of the EREF ER contains the χ/Q value at the EREF site boundary for the most critical sector (i.e., yields the most conservative value). This value is 4.259 x 10^{-6} sec/m^3.

(0.76 mg/sec) x (4.259 x 10^{-6} sec/m^3) = 3.23 x 10^{-6} mg/m^3

3.23 x 10^{-6} mg/m^3 is much lower than the AAC of 0.125 mg/m^3.

As a result, the emissions of fluorides meet the requirements of IDAPA 58.01.01 Sections 210 and 585.

b. The following assessment reveals that emissions of ethanol and methylene chloride from EREF operation will be in compliance with Idaho air quality regulations:

Per Section 4.6.2.1 of the EREF ER, approximately 173 kg (382 lbs) and 1,684 kg (3,713 lbs) of ethanol and methylene chloride, respectively, are estimated to be released each year. To demonstrate compliance with Idaho air quality regulations, the release rates for these two volatile organic compounds were first compared to the Screening Emission Level (EL) contained in IDAPA 58.01.01 Section 585 (for ethanol, a non-carcinogen) and Section 586 (for methylene chloride, a carcinogen). If the potential emission rate exceeded the EL, then the estimated ambient air concentration was calculated and compared to the Ambient Air Concentration (AAC) or Ambient Air Concentration for Carcinogen (AACC).

The estimated emission rate for ethanol was compared to the EL contained in IDAPA 58.01.01 Section 585. Since the annual release rate is less than the EL (as shown below), compliance is demonstrated. The estimated emission rate for methylene chloride was compared to the EL contained in IDAPA 58.01.01 Section 586. Since the annual release rate was not less than the EL (as shown below), the estimated ambient air concentration for methylene chloride was then calculated. The estimated ambient air concentration (as shown below) is less than the AACC demonstrating compliance.

For ethanol

As a very conservative measure assume that all emissions occur in one 24-hour period.

382 lbs/day ÷ 24 hrs/day = 15.917 lbs/hr

15.917 lbs/hr < 125 lbs/hr (EL)

As a result, the emissions of ethanol meet the requirements of IDAPA 58.01.01 Sections 210 and 585.

For methylene chloride

3713 lbs/yr ÷ 8760 hrs/yr = 0.424 lbs/hr (annual average)

0.424 lbs/hr > 1.6×10^{-3} lbs/hr (EL)

Because the emission rate is not less than the EL, a comparison to the AACC was performed. To compare to the AACC:

(0.424 lbs/hr) x (453.59 g/lb) = 192.322 g/hr (annual average)

192.322 g/hr ÷ 3600 sec/hr = 0.053 g/sec (annual average)

(0.053 g/sec) x (1×10^{6} µg/g) = 53422.778 µg/sec (annual average)

As discussed in the part "a." response, the χ/Q value at the EREF site boundary for the most critical sector (i.e., yields the most conservative value) is 4.259×10^{-6} sec/m^3.

(53422.778 µg/sec) x (4.259×10^{-6} sec/m^3) = 0.228 µg/m^3 (annual average)

0.228 µg/m^3 < 0.24 µg/m^3 (AACC [Acceptable Ambient Concentration for Carcinogens], annual average)

As a result, the emissions of methylene chloride meet the requirements of IDAPA 58.01.01 Sections 210 and 586.

Associated EREF License Application Revisions:

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

Commitments:

None

Attachments:

None

References:

Abstract of "Accumulation of Airborne Fluorides in Forest Trees and Vegetation" R. Hogskolevein, published in the European Journal of Forest Pathology, accessed on the website of the International Society of Fluoride Research at http://www.fluoride-journal.com/97-30-3/303-188b.htm. Date accessed: August 25, 2009

RAI 3

Provide air impact analyses that follow the latest guidance with the most up-to-date and most relevant available data.

a. Air dispersion analyses to assess human health impacts used recent meteorological data from the EBR station (now known as MFC) on the Idaho National Laboratory (INL) site (Section 4.6.2.3). This data is representative of the climate at the EREF site. However, older data from the Pocatello Municipal Airport (which is less representative than EBR data) was used in Section 4.6.1 (AES 2009a) to evaluate air emissions during construction. Provide revised impacts for construction and operation from the application of the AERMOD dispersion model, substituting the most recent 5 years of meteorological data available from INL's station EBR for the 1988-1992-era data.

b. Provide revised calculations for fugitive particulate emissions resulting from unpaved roads, using the Particulate Matter (PM) 10/PM30 and PM2.5/PM30 ratios in the U.S. Environmental Protection Agency's Modeling and Inventories AP-42: Fifth Edition, Section 13.2.2 - see Table 13.2.2-2 (1.5/4.9 and 0.15/4.9, respectively).

c. Provide an expanded discussion on how a 90% reduction in fugitive dust generation will result from proposed twice/day watering; demonstrate how this rate of watering will result in a sustained moisture ratio M of 4.5 necessary to ensure 90% reduction (see Figure 13.2.2-2 of U.S. Environmental Protection Agency's AP-42: Fifth Edition, Section 13.2.2). Revise fugitive dust reduction percentages in accordance with the expected moisture ratio, averaged over the typical construction day.

Update and revise Section 4.6 using the most up-to-date information such that an accurate assessment of the air impacts can be completed.

AES Response to NRC RAI:

AES will provide the response to Environmental Report (ER) RAI 3 (parts a, b, and c) by September 25, 2009.

Associated EREF License Application Revisions:

None

Commitments:

AES will provide the response to Environmental Report (ER) RAI 3 (parts a, b, and c) by September 25, 2009.

Attachments:

None

RAI 4

Provide additional information regarding the analysis performed to locate the proposed electrical transmission lines for EREF site power consumption.

a. Provide a copy of the Rocky Mountain Power conceptual study report (December 2008) that describes potential facility access to the electric grid (transmission line options) as identified during the NRC site visit in June.

Section 4.1.2 (AES 2009a) described land use considerations, but did not provide a basis for the locations of the proposed transmission lines. This information is needed to assess the construction and operation cumulative impacts of the proposed EREF.

AES Response to NRC RAI:

The latest report for delivery of 161 kV to the EREF (AREVA – New 161 kV Delivery to AREVA Engineering Service Report, dated February 26, 2009) is provided. This report only discusses the transmission line option selected by AES. This report contains proprietary commercial information to be withheld in accordance with 10 CFR 2.390. A non-proprietary version of the report is provided in Enclosure 3.2. The proprietary commercial information to be withheld in accordance with 10 CFR 2.390 is provided in Enclosure 4.2.

AES selected the transmission line option, because it included the following positive features:

- Uses existing right-of-way for a portion of the lines
- Large portion generally runs adjacent to highway providing good access for maintenance and emergency repairs
- Provided for best physical line separation to meet redundancy criteria

The transmission line options not selected included the following negative features:

- Provided less physical separation than selected option
- Difficult line access for maintenance and emergency repairs
- Traversed undeveloped land including lava flows

AES and Rocky Mountain Power are not aware of a December 2008 conceptual study report. A previous System Impact Study Report, AREVA – New 161 kV Delivery Point, dated September 10, 2008, which contains the transmission line option selected by AES, and two transmission line alternatives considered by AES, will be made available in AREVA offices upon request.

Rocky Mountain Power will obtain the necessary licenses to construct and operate the 161 kV transmission lines to the proposed EREF site under the provisions of 18 CFR 35. This activity will be conducted independently of the activity to acquire a Materials License under 10 CFR 70 to construct and operate the EREF.

Associated EREF License Application Revisions:

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

Attachments:

Enclosure 3.2 provides a non-proprietary version of the AREVA – New 161 kV Delivery to AREVA Engineering Service Report.

Enclosure 4.2 provides the proprietary commercial information to be withheld in accordance with 10 CFR 2.390 from the AREVA – New 161 kV Delivery to AREVA Engineering Service Report.

Commitments:

None

RAI 5

Provide information regarding mitigation of impacts to site MW004.

a. Provide a copy of the memorandum of agreement with the Idaho State Historic Preservation Officer (SHPO) concerning site MW004.

b. Provide a copy of the preservation plan addressing Site MW004.

Section 3.8.6 (AES 2009a) notes that a significant archaeological site, MW004, was identified during the initial historical and cultural environmental resource review. Construction activities may impact this site. In order to mitigate the adverse effects of the project on the archaeological site, AREVA Enrichment Services (AES) proposes to enter into a Memorandum of Agreement (MOA) with the SHPO (AES 2009b). The MOA may include a discussion on the mitigation actions planned for site MW004. In addition, AES plans on developing a preservation plan to guide consideration of site MW004 during operations (AES 2009b). These pieces of information are needed to demonstrate compliance with Section 106 of the National Historic Preservation Act.

AES Response to NRC RAI:

a. Referring to Section 7.4 of the AES Letter AES-O-NRC-09-00079-0 to the NRC, Response to Information Needs Identified by the U.S. Nuclear Regulatory Commission for the AREVA Enrichment Services Eagle Rock Enrichment Facility – Environmental Report, in consultation with the SHPO, one of the 11 archaeological sites identifed 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 still pending. Therefore, a Memorandum of Agreement (MOA) with the SHPO has not been initiated to date. Based upon communication received from the SHPO, AES anticipates that an official determination of eligibility will be made shortly after the SHPO's receipt of an addendum to the Cultural Resources Inventory Report.

   An amendment to the Cultural Resource Inventory was prepared to document the findings of several additional areas that were surveyed prior to geotechnical site characterization activities scheduled to start around September 21, 2009. The amendment to the Cultural Resources Inventory Report is provided in Enclosure 4.3, and was sent to the SHPO. This report contains proprietary information to be withheld in accordance with 10 CFR 2.390, because it indicates the location of possible historic sites. 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.

   Consistent with commitment 1 in Section 7.4 of the AES Letter AES-O-NRC-09-00079-0 to the NRC, to prevent impact to Site MW004 during the September 2009 site characterization activities its boundaries have been marked by AREVA's archaeologist and a 30 m (100 ft) buffer zone has been established.

   Consistent with commitment 2 in Section 7.4 of the AES Letter AES-O-NRC-09-00079-0 to the NRC, 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. Together, the MOA and the Data Recovery and Minimization Plan will define responsibilities and establish processes and procedures for historic and archaeological findings. The MOA and Data Recovery and Minimization Plan will be submitted to the SHPO for review and comment within one month of AES's receipt of written comments on the EREF Cultural Resources Inventory Report and the determination of eligibility for Site MW004.

The SHPO will approve the MOA which will contain proposed measures that might avoid, minimize, or mitigate any adverse effects of the EREF on historic and archaeological resources.

b. An official determination of the eligibility of Site MW004 for listing in the NRHP has not been made. If Site MW004 is determined eligible and pre-construction/construction activities will impact Site MW004, a Preservation (Treatment) Plan will be developed in consultation with the SHPO within one month of AES's receipt of written determination of eligibility. Consistent with commitment 3 in Section 7.4 of the AES Letter AES-O-NRC-09-00079-0 to the NRC, 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.

Associated EREF License Application Revisions:

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

Commitments:

Together, the MOA and the Data Recovery and Minimization Plan will define responsibilities and establish processes and procedures for historic and archaeological findings. The MOA and Data Recovery and Minimization Plan will be submitted to the SHPO for review and comment within one month of AES's receipt of written comments on the EREF Cultural Resources Inventory Report and the determination of eligibility for Site MW004.

If Site MW004 is determined eligible and pre-construction/construction activities will impact Site MW004, a Preservation (Treatment) Plan will be developed in consultation with the SHPO within one month of AES's receipt of written determination of eligibility.

Attachments:

Enclosure 4.3 – Amendment to A Class III Cultural Resource Inventory of the Proposed Eagle Rock Enrichment Facility, Bonneville, County, Idaho

RAI 6

Provide information regarding protection of cultural resources.

a. Provide a copy of the Unanticipated Discovery Plan for the Eagle Rock Enrichment Facility.

b. Provide a copy of the EREF Environmental Preservation Plan (defines responsibilities, processes, and procedures) for findings of historic and archaeological resources that occur during routine and unplanned operations activities (i.e. ground disturbing activities that involve grading, excavations, and trenching).

c. Provide a copy of the EREF Environmental Preservation Plan for findings of historic and archaeological resources specific to the area encompassing the location of transmission lines on the proposed site.

Based on historic and cultural resource survey undertaken for the proposed EREF (Section 3.8.6; AES 2009a) there is a potential for archaeological remains to be found within the proposed project area or within the transmission line right-of-ways. While the initial historic and cultural resource survey identified many archaeological sites, a potential exists for discovering additional unexpected findings during earth moving activities. Therefore, AES committed to develop an Unanticipated Discovery Plan and a Preservation Plan (AES 2009b). This information is needed to demonstrate compliance with Section 106 of the National Historic Preservation Act.

AES Response to NRC RAI:

a. Consistent with commitment 4 in Section 7.4 of the AES Letter AES-O-NRC-09-00079-0 to the NRC, Response to Information Needs Identified by the U.S. Nuclear Regulatory Commission for the AREVA Enrichment Services Eagle Rock Enrichment Facility – Environmental Report, the Unanticipated Discoveries Plan will be developed prior to additional site characterization work which is currently scheduled for September 21, 2009. A copy of the Unanticipated Discovery Plan will be provided to the NRC by September 21, 2009.

b. A plan for historic and archaeological resources found during ground disturbing activities (i.e., grading, excavations and trenching) will be developed once comments from the Idaho State Historic Preservation Officer (SHPO) on the Cultural Resources Inventory Report have been received. However, referring to Section 7.4 of the AES Letter AES-O-NRC-09-00079-0 to the NRC, AES has committed to developing a Memorandum of Agreement (MOA) with the Idaho SHPO pursuant to mitigation and protection activities for Site MW004. The MOA will also address identification and evaluation of future historic and archaeological sites that may be discovered on the EREF site. In conjunction with the MOA, AES further committed to developing a Data Recovery and Minimization Plan which will establish procedures for mitigating adverse effects to archaeological resources that cannot be avoided by the project. Together, the MOA and the Data Recovery and Minimization Plan will define responsibilities and establish processes and procedures for historic and archaeological findings. The MOA and Data Recovery and Minimization Plan will be submitted to the SHPO for review and comment within one month of AES's receipt of

written comments on the EREF Cultural Resources Inventory Report and the determination of eligibility for Site MW004.

c. Rocky Mountain Power will be responsible for the license activities associated with providing power to the site in accordance with the applicable regulations. This licensing activity will be conducted independent of AES's 10 CFR 70 application to obtain a Materials License for the EREF. The precise routing of the transmission lines on the proposed EREF site has not been determined. Therefore, a plan has not been developed to address historic and archaeological findings regarding the on-site impacts associated with the incoming transmission lines. However, once the precise routing of transmission lines is known, AES will perform a cultural resources survey along the on-site transmission line corridors and an addendum to the EREF Cultural Resources Inventory Report will be subsequently prepared. In addition, the EREF Preservation (Treatment) Plan (see response to ER RAI 5.b) and the Data Recovery and Minimization Plan (see response to ER RAI 5.a) will be revised as applicable. The MOA will address the future transmission line cultural resources survey along the on-site transmission corridors and other areas encompassing the location of the on-sire transmission lines, including identification and evaluation of future historic and archaeological sites that may be discovered.

Associated EREF License Application Revisions:

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

Commitments:

The Unanticipated Discoveries Plan will be developed prior to additional site characterization work which is currently scheduled for September 21, 2009. A copy of the Unanticipated Discovery Plan will be provided to the NRC by September 21, 2009

The MOA will also address identification and evaluation of future historic and archaeological sites that may be discovered on the EREF site.

Together, the MOA and the Data Recovery and Minimization Plan will define responsibilities and establish processes and procedures for historic and archaeological findings. The MOA and Data Recovery and Minimization Plan will be submitted to the SHPO for review and comment within one month of AES's receipt of written comments on the EREF Cultural Resources Inventory Report and the determination of eligibility for Site MW004.

Upon determination of the routing for on-site transmission lines, AES will perform a cultural resources survey along the on-site transmission line corridors. The Cultural Resources Inventory Report, the Preservation (Treatment) Plan, and the Data Recovery and Minimization Plan will be revised as applicable. The MOA will address the future transmission line cultural resources survey along the on-site transmission corridors and other areas encompassing the location of the on-site transmission lines, including identification and evaluation of future historic and archaeological sites that may be discovered.

Attachments:

None

RAI 7

Provide additional information regarding on-site workers and facility structures.

a. Provide an approximate population distribution of on-site workers during the period of time after enrichment operations have commenced and construction continues on the remainder of the facility.

b. Supply building location, heights and respective stack heights for all uranium emission release points.

Section 4.12.2 (AES 2009a) contains a description of radiological impacts to workers and the public. However AES did not provide an analysis of the radiological exposures of the construction workers anticipated during the overlap of the construction and operation phases of the proposed project (construction continues with the second enrichment unit – Separations Building Module 2 [SBM-2] while the first enrichment unit SBM-1 is operating). Provide information on the general location (center of gravity or average location) of these workers relative to radiological release points of the operating SBM-1.

Information on building heights and/or stack heights where emissions would occur is needed to perform confirmatory radiological and chemical air dispersion analysis, as considered in Section 4.12.2 (AES 2009a). Provide location and height of all emission release points (i.e. stack or ground release).

AES Response to NRC RAI:

a. The approximate population distribution, by craft, of on-site workers during the period of time after enrichment operations have commenced and construction continues on the remainder of the facility is summarized in Table 6 of Enclosure 3.5.

b. Building locations, along with stack locations relevant to this RAI, are shown in Figure 1 of Enclosure 3.5. Building and stack heights will be determined during detailed design. For the purposes of this analysis, gaseous releases were conservatively modeled as ground level sources. For entrainment modeling, the tallest nearby building height was assumed to be 15 meters, with an effective cross sectional area of 457.5 m^2.

On-site construction workers at EREF would potentially be exposed to low levels of radiation from facility sources during the periodic expansion of the Full Tails, Full Feed, and Empty Cylinder Storage Pads (i.e., these pads are modeled as a single pad in this evaluation) and during the build-out of the remaining Separation Building Modules (SBMs) and UF_6 Handling Areas. The sources of this exposure would be the direct/scatter dose from fixed radiation sources (UF_6 storage cylinders) and gaseous releases from the operation of the first SBM. In addition, on-site construction workers would potentially be subject to chemical exposures (HF) from routine operations of the first SBM.

The dose impacts to the construction workers on-site are evaluated for two areas of the site that involve activities at different times. These areas are as follows:

- The first evaluation deals with the dose impact (radiological and HF) to those workers who are involved with the continued build-out of the adjoining SBM and UF_6 Handling Areas to complete the licensed production capacity of EREF after the first SBM hall is completed and begins operations for the enrichment of uranium. Exposure contributions are derived from direct/scatter radiation from the Full Tails, Full Feed, and Empty Cylinder Storage Pad located to the north of the production facilities and the Full Product Cylinder Storage Pad next to the cylinder shipping and receiving area. The Full Tails, Full Feed, and Empty Cylinder Storage Pad is assumed to contain only those cylinders projected to be generated during the build-out of the production facilities in the first years of plant operation. In addition to direct/scatter dose, the release of gaseous effluents from the process systems adds additional exposure potential to construction workers. The pathways included are inhalation, air submersion, and external dose from ground plane deposition.

- The second evaluation looks at the dose impacts (radiological and HF) to those workers who are involved with the addition of segments of the Full Tails, Full Feed, and Empty Cylinder Storage Pad located north of the production facilities. Due to the large size of a full capacity storage pad to support the entire 30-year operating period of the plant, it is expected that the Full Tails, Full Feed, and Empty Cylinder Storage Pad would only be built out in segments as the need for more storage capacity occurs. The analysis assumes that the pad is built out in 20% capacity segments, with the southern half of the full pad built first before the northern half is started. The pad construction worker impact analysis assumes that the pad is 80% full when the last segment is to be added on. Cylinders are assumed to be located along the full length of the southern half of the pad while working on the last segment of the northern half of the pad, causing workers to receive direct/scatter dose from two sides. This bounds the direct/scatter dose impact for the construction of any segment of the pad prior to the last increment. Similar to the worker exposures on the build-out of the SBMs, the release of gaseous effluents from the process systems also adds exposure potential from inhalation, air submersion, and external dose from ground plane deposition to construction workers on the cylinder storage pad.

For conservatism, the gaseous release from the initial plant operations is assumed to be equal to that used for assessing the annual routine operations from the entire 6.6 M SWU facility. This assumption bounds the final condition of facility construction when full operating capacity is reached. The same assumption is applied to the annual release of HF from the full plant Gaseous Effluent Ventilation System (GEVS). The release points for all gaseous effluents is distributed between the SBM GEVS stacks on the UF_6 Handling Area roof for SBM operations (36.8% of the total), and the Technical Support Building (TSB) GEVS stack on its roof (63.2% of total).

The center point of construction worker activities has been assumed to focus around ten selected receptor locations as shown on Figure 1 of Enclosure 3.5. For construction work that involves the build-out of the UF_6 Handling Areas, two locations at the corners of the inner and outer UF_6 Handling Areas (receptor locations 1 and 2) are taken as representing the average receptor for work time activities in that portion of the plant. For the build-out of the SBMs, two additional center points at the southern corners of the SBMs are included (receptor locations 3 and 4), making a total of four receptor centers over which construction time is evaluated and averaged for impacts to workers assigned to the SBM construction. A total of six receptor center points for gaseous release impacts (receptor locations 5, 6, 7, 8, 9, and 10) are used in

assessing gaseous impacts out on the Full Tails, Full Feed, and Empty Cylinder Storage Pad. The six locations, as shown on Figure 1 of Enclosure 3.5, represent the southern and northern sides of that portion of the pad closest to the main production facilities.

The collective radiological dose impacts to construction workers for each area of the main plant facility areas is estimated by assessing the atmospheric dispersion concentrations and worker uptakes (inhalation) or external exposures (air submersion and ground plane deposition) of the released radioactivity at each receptor point multiplied by the estimated number of annual worker hours (highest worker year after initial start up) averaged over the receptors in the building area. For the gaseous impact contribution, direct dose from the cylinder storage pads (both Full Tails, Full Feed, and Empty Cylinder Storage and Full Product Cylinder Storage) is estimated by taking the nearest projected dose rate isopleth (Figure 2 of Enclosure 3.5) to a receptor point multiplied by the estimated number of annual worker hours in the area. For direct/scatter dose on the Full Tails, Full Feed, and Empty Cylinder Storage Pad, MCNP dose calculations estimate the dose rate over the pad area that represents about 20% of the pad capacity (1700 feet by 320 feet) times an equal area spread of total worker time estimated necessary for the build-out of a single 20% section of the pad.

Several different modeling assumptions were used to conservatively calculate collective doses to workers in the different construction areas during the build-out of the SBMs, the UF_6 handling area, and the Full Tails, Full Feed, and Empty Cylinder Storage Pad. These are summarized in the following bullets:

- Scenario A: Full Tails, Full Feed, and Empty Cylinder Storage Pad Expansion
  - Source of Exposure:
    - Direct/scatter dose from Full Tails, Full Feed, and Empty Cylinder Storage Pad that is 80% full (latter part of plant life cycle).
    - Airborne pathway doses from full plant SBM GEVS and TSB GEVS annual gas releases.
  - Work area: Full Tails, Full Feed, and Empty Cylinder Storage Pad build-out area; modeled as workers in last 20% of pad area in the far NE corner.
  - Dose calculation: Direct/scatter dose rates calculated for thirty-four 50-ft segments equally spaced across the last 20% portion of the Full Tails, Full Feed, and Empty Cylinder Storage pad. For gases, used SBM GEVS and TSB GEVS releases dispersed over Receptors 5, 6, 7, 8, 9 and 10 as representing conservative locations for estimating the last 20% portion of the pad. The far NE corner is actually farther from the plant gas release points than receptor points 5 through 10.
  - Time Frame: Worker exposure takes place near latter part of plant life, when last 20% of pad is being constructed.

- Scenario B: Completion of SBMs Following Initial Plant Start-up
  - Source of Exposure:
    - Direct/Scatter dose from Product and Full Tails, Full Feed, and Empty Cylinder Storage Pads that contains only cylinders produced from initial start-up through end of plant facility construction in 2018 (approximately 4,762 cylinders).
    - Airborne pathway doses from full plant SBM GEVS and TSB GEVS annual gas releases.
  - Work Area: SBM build-out area; modeled as workers in SBM areas (Receptors 1, 2, 3 and 4).

- Dose Calculation: Direct/scatter dose from all storage cylinders to Receptors 1 to 4 (Estimated from Figure 2 of Enclosure 3.5 Isopleths). For gases, used SBM GEVS and TSB GEVS annual releases dispersed over Receptors 1, 2, 3 and 4.
- Time Frame: Worker exposure takes place in the year following initial start-up when the maximum construction worker labor hours occur.

- Scenario C: Completion of UF_6 Handling Areas Following Initial Plant Start-up
  - Source of Exposure:
    - Direct/scatter dose from Product and Full Tails, Full Feed, and Empty Cylinder Storage Pads that contains only cylinders produced from initial start-up through end of plant facility construction in 2018 (approximately 4,762 cylinders).
    - Airborne pathway doses from full plant SBM GEVS and TSB GEVS annual releases.
  - Work Area: UF_6 handling area build-out area; modeled as workers in the remaining UF_6 handling areas (Receptors 1 and 2).
  - Dose Calculation: Direct/scatter dose from all storage cylinders to Receptors 1 and 2 (Estimated from Figure 2 of Enclosure 3.5 Isopleths). For gases, used SBM GEVS and TSB GEVS annual gas releases dispersed over Receptors 1 and 2.
  - Time Frame: Worker exposure takes place in the year following initial start-up when the maximum construction worker labor hours occur.

Direct and scatter dose rates due to Full Product, Full Tails, Full Feed, and Empty Cylinder Storage Pads

Direct/scatter dose rates were projected for workers in the SBM and UF_6 handling area construction areas due to direct and scatter radiation from the Full Product, Full Tails, Full Feed, and Empty Cylinder Storage Pads. Work was assumed to take place on the last two SBMs at the end of major construction activities, i.e., at the end of the heavy construction in 2018, with the facility having operated at partial capacity for several years. To re-create the dose contours done for the 6.6 M SWU analyses, the MCNP model was modified to reduce the number of cylinders stored on the tails pad to be consistent with the Cylinder Management Plan (CMP) at the end of the major construction period. The assumption was 2293 full tails cylinders at year 7 of the CMP. The number of full product cylinders was assumed to be 644 cylinders. Full feed and all empty cylinders total 1825. For the SBM area build-out, the average dose for the 4 area receptors, Receptors 1 through 4, was used. For the UF_6 handling area build-out, the average dose for the closest receptors, Receptors 1 and 2 was used. The results of the direct/scatter dose rate determinations are shown in Table 1 of Enclosure 3.5.

For direct/scatter doses to construction workers in the area of the Full Tails, Full Feed, and Empty Cylinder Storage Pad expansion, the dose rates versus distance from the east end of the tails pad and dose rate versus distance from the south side of the tails pad were superimposed at various distances to simulate dose rate for the last 20% segment of the north pad where construction activities are assumed to occur. The 20% cylinder pad segment was broken down into 170 equal area sub-segments. The cylinder direct/scatter dose rate to each of the 170 segments was estimated and multiplied by the estimated worker time for construction activities in the area to estimate the accumulative dose impact during the build-out.

Dose rates from SBM and UF6 Handling Areas Gaseous Releases

Radiological dose was also projected for on-site construction workers due to radioactive releases from the SBM GEVS and TSB GEVS. Submersion and external ground surface dose conversion factors were taken from Federal Guidance Report 12. Inhalation dose conversion factors were taken from Federal Guidance Report 11, using the most restrictive lung clearance class for the specific radionuclide/target organ pairs. An inhalation rate of 8000 m^3/year was assumed based on Regulatory Guide 1.109 (Rev. 1). For each of these pathways, the doses were summed for the two sources (SBM GEVS and TSB GEVS). A total gaseous uranic radioactivity release rate of 528 µCi/year was used as a conservative estimate for initial plant operation of the first SBM, since this bounding release quantity represents the assumed annual releases from the full 6.6 M SWU plant (see ER Section 4.12.2). The release rate distribution between the SBM GEVS and the TSB GEVS is summarized in Table 2 of Enclosure 3.5.

X/Q and D/Q atmospheric dispersion values were determined based on a ground level release. On Figure 1 of Enclosure 3.5, Point A represents the release location for the first SBM GEVS system. Point B represents the release location for the TSB GEVS. Receptor locations 1 and 2 represent the center area for construction activities with the additional UF_6 Handling areas and the northern half of the SBM Halls associated with the build-out of the plant after initial start of plant operations. Receptor locations 3 and 4 represent the southern half of the SBM build-out. For the expansion of the Full Tails, Full Feed, and Empty Cylinder Storage Pad, receptor locations 5, 6, 7, 8, 9 and 10 represent the center portion (closest approach) of the pad area for use in estimating the gaseous impact to construction workers anywhere on the pad. The receptor locations, their distances and directions from the two release points, and the atmospheric dispersion values are shown in Tables 3 and 4 of Enclosure 3.5. Building and stack heights will be determined during detailed design. For the purposes of this analysis, however, gaseous releases were conservatively modeled as ground level releases. For entrainment modeling, the tallest nearby building height was assumed to be 15 meters, with an effective cross sectional area of 457.5 m^2.

For the 10 receptors shown in Figure 1 of Enclosure 3.5 and discussed above, maximum individual doses were calculated for each exposure pathway resulting from the SBM GEVS and TSB GEVS gas releases. These values were added and the sums are shown in Table 5 of Enclosure 3.5.

Doses

To determine collective dose, the dose rates determined for the work areas and release points discussed above were multiplied by the respective projected labor hours by craft and by location. These craft hours are provided in Table 6 of Enclosure 3.5. Collective dose for the total work force was then determined by adding the collective doses for all areas on-site (storage pads, SBM area, UF_6 handling area). The total number of construction workers was based on the highest craft population that would occur within the five years that the cylinder storage pad would be built. The resulting collective doses for the SBM and UF_6 handling areas are shown in Table 7 of Enclosure 3.5. For the Full Tails, Full Feed, and Empty Cylinder Storage Pad expansion area, the accumulated direct/scatter doses to workers from all pathways is shown in Table 8 of Enclosure 3.5. The component of that projected total collective dose that was due to GEVS releases is based on the maximum of the six area receptors, receptors 5 through 10. The average individual worker doses were summed for each exposure pathway (inhalation, submersion, direct ground surface, and direct/scatter dose), and are

shown in Table 9 of Enclosure 3.5 for the SBM and UF_6 handling area, and Table 10 of Enclosure 3.5 for the Full Tails, Full Feed, and Empty Cylinder Storage Pad.

HF Exposure

Chemical HF exposure to on-site construction workers from the gaseous releases associated with routine operations of the first SBM was also calculated. Using the X/Q values shown in Tables 3 and 4 of Enclosure 3.5 for each receptor location, along with the release fractions from the TSB GEVS and SBM GEVS as used for radiological releases above and as shown in Table 2 of Enclosure 3.5, the HF concentrations were calculated based on an annual release rate of 63.42 µg/second and are shown in Table 11 of Enclosure 3.5.

Results/Conclusions

The dose to on-site construction workers during the periodic expansion of the Full Tails, Full Feed, and Empty Cylinder Storage Pad and the build-out of the remaining SBMs and UF_6 Handling Areas after the first cascade in SBM 1 begins operation is dominated by the direct/scatter dose from the Full Tails, Full Feed, and Empty Cylinder Storage Pad.

It should be noted that the individual construction worker dose rates on the Full Tails, Full Feed, and Empty Cylinder Storage Pad (up to approximately 1.8 mrem/hour for a segment average dose rate) would exceed the 10 CFR 20.1301 dose limit of 100 mrem/year to members of the public. Work in these areas will most likely be subject to Radiation Protection controls such as badging of workers, shielding, and/or the application of time and distance protection measures.

For the build-out of the additional SBMs and the UF_6 Handling Areas, the annual collective effective dose is estimated to be 13.6 person-rem as shown in Table 7 of Enclosure 3.5. The maximum projected collected effective dose from the build-out of the Full Tails, Full Feed, and Empty Cylinder Storage Pad is approximately 24.0 person-rem as shown in Table 8 of Enclosure 3.5. The tables also show that over 99 percent of this dose is due to direct and scatter dose from the Full Tails, Full Feed, and Empty Cylinder Storage Pad.

The maximum HF construction area average airborne concentration is 5.23 E-03 ug/m^3 at receptor location 2. The most limiting airborne concentration limit for HF is 14 ug/m^3 in California. The HF airborne concentration to construction workers for the build-out of the remaining SBM/UF_6 Handling Areas represents a fraction of .00037 of the California limit.

Associated EREF License Application Revisions:

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

Commitments:

None

Attachments:

Enclosure 3.5: Figures and Tables for Response to ER RAI 7

RAI 8

Provide additional information regarding site traffic during the period when construction and operations overlap.

a. Provide a quantitative breakdown of each of the four vehicle categories (employees, operational deliveries/waste, construction workers, and construction deliveries/waste) that will access the site during the period when construction and operations overlap.

The Environmental Report (AES 2009 a) and Supplement (AES 2009 b) notes increases in traffic volume during the period when construction and operation overlap. The text states "... this [1,210 trips] is the maximum number of additional vehicle trips anticipated even when project construction and operations activities overlap." Provide a quantitative breakdown of each of the four vehicle categories for each phase of the proposed project lifecycle. Include a time-varying (e.g., monthly) projection of vehicle categories for the overlap period, or a "snapshot" breakdown when total site traffic is expected to reach a maximum. This clarification is necessary to accurately assess the overall traffic impact on regional roads (particularly U.S. Route 20).

AES Response to NRC RAI:

The enclosed table, Traffic Breakdown during Construction and Operations Overlap, provides a quantitative breakdown of each of the four vehicle categories (operational employees, operational deliveries/waste shipments, construction workers, and construction deliveries/waste shipments) during the period when construction and operations overlap. As shown in the table, the anticipated number of daily vehicle trips during the construction and operations overlap period will not exceed 1,210 maximum number of vehicle trips (employee and delivery) during construction as stated in ER Section 4.2.4.

The enclosed table contains proprietary commercial information to be withheld in accordance with 10 CFR 2.390. Information pertaining to the number of construction workers and shipments to/from the EREF during construction is considered proprietary commercial information. A non-proprietary version of the table is provided in Enclosure 3.3. The proprietary commercial information to be withheld in accordance with 10 CFR 2.390 is provided in Enclosure 4.4.

Associated EREF License Application Revisions:

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

Commitments:

None

Attachments:

Enclosure 3.3 – Non-proprietary version of the Table, Traffic Breakdown during Construction and Operations Overlap

Enclosure 4.4 – Proprietary version of the Table, Traffic Breakdown during Construction and Operations Overlap to be withheld in accordance with 10 CFR 2.390.

RAI 9

Clarify/provide additional information on construction-related wastes and proposed disposal location(s).

a. Provide project generation (by weight) of non-hazardous construction-related wastes.

b. Provide preferred and alternative disposal locations for construction-related waste, along with their available capacities.

Throughout the environmental report (AES 2009a), landfill waste acceptance data is provided in terms of weight, especially for Peterson Hill. For consistency with the operational waste projection discussions (section 3.12.2 and associated tables), provide projections of nonhazardous construction wastes by weight (section 3.12.2.2 currently describes the waste by volume). Also discuss the available disposal capacities (by weight) of the proposed landfills where this waste may be shipped.

AES Response to NRC RAI:

a. ER Section 3.12.2.2, Construction Wastes, gives the estimated volume of waste as 6,116 m^3 (8,000 yd^3) of non-compacted waste that will be transported off-site to a landfill. This waste consists of packing materials, paper, and scrap lumber. Assuming a compaction ratio of 5-to-1 and that the waste consists of 75% paper products and 25% wood products, the total estimated mass of construction waste is 1,189 MT (1,311 tons) per year.

b. The preferred location for disposal of non-hazardous construction-related waste is the Bonneville County's construction and demolition landfill (currently, the Hatch Pit). When the Hatch Pit approaches its maximum capacity as determined by Bonneville County, Bonneville County will permit and open a new landfill for construction and demolition wastes. The Public Works Director of Bonneville Country assured AES verbally that Bonneville County will permit another site prior to closing the Hatch Pit. The Bonneville County's Peterson Landfill will not be used for construction-related waste.

   In addition, alternative locations for disposal of construction-related waste exist in Bingham and Jefferson Counties. These counties are within a reasonable haul distance of the EREF. AES contacted these counties and both acknowledged that they accept construction and demolition waste from outside their respective borders.

   The capacity of the preferred location for disposal of non-hazardous construction-related waste (Bonneville County's construction and demolition landfill) is not limited by weight, but by volume. However, Bonneville County does not specifically define the volume capacity, but establishes it by observation.

   Given the availability of three locations that may be utilized for the disposal of construction-related waste, and the assurance provided by Bonneville County that an additional landfill will be permitted and opened when the Hatch Pit approaches its maximum capacity, there is adequate landfill capacity within range of the EREF.

Associated EREF License Application Revisions:

ER Sections 2.1.2.8, 3.12.2.2, and 4.13 will be revised to state:

"The preferred location for non-hazardous construction-related waste is the Bonneville County's construction and demolition landfill (currently, the Hatch Pit). When the Hatch Pit approaches its maximum capacity as determined by Bonneville County, a new landfill for construction and demolition wastes will either be opened by Bonneville County or another location found, as alternative locations for disposal of non-hazardous construction-related waste exist in Bingham and Jefferson Counties. These counties are within a reasonable haul distance of the EREF. AES contacted these counties and both acknowledged that they accept construction and demolition waste from outside their respective borders."

Commitments:

The markups to the ER Sections 2.1.2.8, 3.12.2.2, and 4.13 will be incorporated into Revision 2 of the EREF License Application.

Attachments:

Enclosure 3.1: Markups of ER Sections 2.1.2.8, 3.12.2.2, and 4.13

RAI 10

Provide additional information on facility plan for discharge of treated sanitary liquid waste.

a. Provide the technical rationale for discharging treated sanitary liquid waste into the cylinder storage pad stormwater retention basins instead of discharge to surface or groundwater.

Section 3.12.1.3.4 describes effluent discharge from the domestic sanitary sewage treatment plant. The effluent will be evaporated by discharge into the lined cylinder storage pad stormwater retention basin(s). Should cylinder storage pad runoff be contaminated, the discharge of uncontaminated aqueous waste to these basins would increase the volume of potentially contaminated wastewater. Also requested is the rationale for precluding discharge of treated sanitary liquid waste to surface or groundwater (e.g., via the stormwater detention basin). This clarification is necessary to explain the rationale for using this facility procedure rather than accepted practices for the minimization of radioactive wastes, as discussed in Sections 1.3.2 and 4.13.5 (AES 2009a).

AES Response to NRC RAI:

The EREF ER Section 3.12.1.3.4 states that the effluent discharge from the domestic sanitary sewage treatment plant will be diverted to the retention basin rather than directly to the soil or to the unlined detention basin. This approach allows the treated water to evaporate whereas diverting treated water to the detention basin or discharging this water directly to the soil will result in the water seeping into the soil. Although the quality of the domestic sanitary sewage treated water allows for the direct discharge to the soil, it was deemed prudent to discharge the water to the retention basin where the water will ultimately evaporate, avoiding seepage of the water into the soil. A water balance of this basin that considers precipitation and treated water inflows and evaporation outflows assures that the basin is capable of supporting the additional domestic sanitary sewage treated water inflows.

At EREF, residual solids will accumulate in the lined basin after evaporation of the combined cylinder storage pad stormwater runoff water and water from the treated domestic sanitary sewage treatment plant. The residual domestic sanitary sewage treatment plant solids consist mainly of dissolved and suspended solids typically contained in treated municipal waste water streams that are acceptable for irrigation. The residual cylinder storage pad stormwater runoff solids consist of primarily minor quantities of sand and soil residuals.

In the unlikely event that potentially contaminated water is discharged to the retention basin from the cylinder storage pads, this water will mix with the treated water from the domestic sanitary sewage treatment plant resulting in a temporary increase in the volume of contaminated water inside the basin. However, the amount of radioactive material inside the basin, from this unlikely event, remains the same.

The scenario discussed above - the discharge of radioactive water into the retention basin - is unlikely since precautions will be taken to prevent the existence of radioactive material in the cylinder storage pads that can potentially be discharged into the retention basin. These precautions include surveying cylinders containing depleted uranium hexafluoride for external

contamination and removal of external contamination from the cylinders prior to placing the cylinders on the cylinder storage pads. Once placed in storage on the cylinder storage pads, the cylinders will be monitored for external contamination. Thus, rainfall runoff to the retention basin from the cylinder storage pads is expected to be free of radioactive contaminants. Additionally, the residual basin water and sediments will be sampled to determine the chemical and radioactive accumulation.

Additionally, as stated in ER Section 4.4: "Although a highly unlikely occurrence, the stored cylinders represent a potential source of low-level radioactivity that could enter stormwater runoff. The engineering of cylinder storage systems (high-grade sealed cylinders described in ER Section 2.1.2, Proposed Action) with the collection of stormwater to the lined basins and environmental monitoring of the Cylinder Storage Pads Stormwater Retention Basins (described in ER Section 6.2, Physicochemical Monitoring), combine to make the potential for contamination release through this system extremely low. An assessment was made by AES that assumed a conservative contamination level on cylinder surfaces and 100% washoff to the Cylinder Storage Pads Stormwater Retention Basins from a single storm event. Results show that the levels of radioactivity discharged to the basin will be below the regulatory unrestricted release criteria."

Accounting for the measures discussed above, the approach taken to divert the domestic sanitary sewage treatment plant discharge to the lined retention basin minimizes any impact on the site water sources.

Associated EREF License Application Revisions:

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

Attachments:

None

Commitments:

None

RAI 11

Provide additional information on production of DUF_6 tails.

a. Provide clarification of the projected annual production of DUF_6 tails, including tonnage, filled cylinders, and outgoing DUF_6 waste shipments.

In Section 4.2.7.1.3 (AES 2009a) and Table 4.2-2, the projection of annual full DUF_6 tails cylinders (1,222) doubled with the doubling of facility capacity. However, the projections of DUF_6 tonnage and outgoing DUF_6 cylinder shipments (approximately 857) in Section 4.13.3.6 (Costs Associated with Depleted UF_6 Conversion and Disposal) did not double. Provide a clarification or the rationale for the differences noted. In addition to environmental impacts, this may affect the cost estimate for conversion/disposal. This clarification is necessary to assess the impact of DUF_6 disposal and the associated transportation impacts.

AES Response to NRC RAI:

As presented in ER Section 4.2.7.1.3, the facility has an operational capacity of approximately 1,222 tails cylinders containing depleted uranium per year (at full production). However, the facility is not at full production for the 30 year period of the license. There is a ramp-up period of approximately 11 years, including two years of construction during which there is no production, to achieve full production and a ramp-down period of approximately 8 years for decommissioning as presented in the key dates and milestone schedule (refer to ER Section 1.0). The facility is only at full production for approximately 14 years. Taking into account a ramp-up and ramp-down period, the projections of DUF_6 tonnage and outgoing DUF_6 cylinder shipments, and the cost estimate for DUF_6 conversion/disposal presented in ER Section 4.13.3.6 are correct.

Associated EREF License Application Revisions:

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

Attachments:

None

Commitments:

None

RAI 12

Provide additional information on soil disturbances during the construction period.

a. Provide a description of any treatment or modifications required to make on-site excavated soils suitable for use as on-site fill.

b. Provide the volume of any additional soil to be brought from an off-site source to augment on-site soil used as fill, or clarify usage of on-site excavated soils.

c. Provide the volume of clay to be brought in from an off-site source to be used as liner material for the two retention basins.

d. Provide the depths of facility foundations/footings and utility trenches (and any other structures requiring below-ground surface excavation or drilling).

Disturbances to soil at the EREF site include grading during site preparation and activities associated with building construction and infrastructure installation. Section 4.3 (AES 2009a) indicates that cut and fill of significant areas will be required, therefore provide a clarification of the extent of such operations.

AES Response to NRC RAI:

a. Subsurface site investigations, laboratory analysis and reports will provide comprehensive characterization of the on-site soils. The treatments or modifications, if any, that may be required to make on-site soils suitable for use as on site fill will depend on the properties of the excavated soils and may include:

   - Blending of soils from different locations or blending of on-site excavated soil with off-site soil
   - Screening to obtain desirable gradations
   - Use of additives.

b. AES anticipates that additional off-site soil will be utilized to augment fill requirements under roads and structures. Suitability of on-site soil for this use will be determined by the results of the subsurface investigations. For this reason, the maximum amount of soil imported from off-site can not be determined. However, it is anticipated as a minimum that approximately 230,000 to 306,000 cubic meters (300,829 to 400,233 cubic yards) of fill under roads and structures may be imported. It is anticipated that excavated on-site soils will be used for fill outside the footprint of roads and structures. This will be verified by the results of the subsurface investigations.

c. Assuming any on-site clay deposits are unsuitable or impractical to use and clay was used exclusively as the liner, the approximate amount of clay that would be required to be brought in from an off site source is 66,000 cubic meters (86,325 cubic yards) for the liner of the two Cylinder Storage Pads Stormwater Retention Basins. However, the amount of clay

will actually be significantly less, because the Cylinder Storage Pads Stormwater Retention Basins will be lined with an impervious synthetic fabric (ER Sections 3.4.1.1 and 4.4.2).

d. The depth of foundations/footings for structures ranges from a minimum of 0.76 m (2.5 ft.) to 6.1 m (20 ft.). The depth of utility trenches range from 0.9 m (3 ft.) to 3.7 m (12 ft.).

Associated EREF License Application Revisions:

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

Attachments:

None

Commitments:

None

RAI 13

Provide clarification on the extent of land disturbance anticipated at the EREF site.

a. Confirm the area to be landscaped and irrigated once construction completes.

AES Response to NRC RAI:

AES estimates that there may be approximately 3.0 hectares (7.5 acres) of landscaped areas once construction is complete. The extent of the irrigated landscaped acreage will not exceed 2 hectares (5 acres) to comply with the IDWR irrigation limitation specified in the IDWR Water Rights Transfer documents. The total EREF project water right of 526.8 AF (acre-foot) includes Industrial, potable and irrigation water use. The amount of water specifically allocated for irrigation-use water is 20.0 AF (acre-foot)/irrigation season (April 1 through October 31). The EREF project water rights transfer correspondence is provided in Attachment 10.2-2 of the AES Letter AES-O-NRC-09-00079-0 to the NRC, Response to Information Needs Identified by the U.S. Nuclear Regulatory Commission for the AREVA Enrichment Services Eagle Rock Enrichment Facility - Environmental Report.

For the purpose of establishing a bounding value for irrigation water usage, the bounding value of 20 AF/214 Days (6,517,020 gallons/Irrigation Season) selected for irrigated water usage is within the water rights appropriation for irrigation-use water. Refer to the response to ER RAI 16.e which provides the estimate of water use related to irrigation of landscaped areas.

Additionally, as stated in the response to ER RAI 16.e, the EREF will manage irrigation water usage by using, where practical, drought tolerant native plants in the reclamation of disturbed areas and xerophilic plants in landscaped areas. Where water is determined to be necessary for irrigation, EREF will be prudent in establishing the irrigation method (drip, sprinkler, flood, etc) so as to keep the use of water as low as necessary to meet the landscaping goals for the project.

Associated EREF License Application Revisions:

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

Attachments:

None

Commitments:

None

RAI 14

Provide additional information regarding the storm water detention basin(s).

a. Supply information in regards to the National Pollutant Discharge Elimination System Construction General Permit (i.e. size and location of storm water detention basin).

b. Clarify whether the detention basin(s) created during construction will be used during operations.

c. Confirm whether wastewater (industrial or domestic) generated during construction would require discharge control (i.e. retention).

Section 3.4.11 provides a general description of the applicable Federal and State regulations for water resources on the proposed site. In this section, AES described the storm water retention/detention basins for the operations phase in detail. More information is needed for the construction phase to verify that AES is in compliance with the applicable Federal and State regulations with respect to storm water control.

AES Response to NRC RAI:

a. The size and location of the detention basin(s) to be used during construction will be developed during detailed design/construction planning.

   Per ER 3.4.9, Contaminant Sources: 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. Appropriate routine erosion control measures and best management practices (BMPs) will be implemented as is normally required by such permits.

   Per ER 4.4 Water Resources Impacts: National Pollutant Discharge Elimination System (NPDES) General Permit for Construction Stormwater: The construction of the proposed EREF will involve the disturbance of 240 ha (592 acres). Because this disturbance area is more than 0.4 ha (1 acre), a NPDES Construction General Permit from the EPA Region 10 and an oversight review by the Idaho Department of Environmental Quality (IDEQ) are required. AES will develop a Storm Water Pollution Prevention Plan (SWPPP) and file a Notice of Intent (NOI) with the Environmental Protection Agency (EPA), Washington, D.C., at least 60 days prior to the commencement of construction activities. (IDEQ, 2008a)

   Construction of the EREF will pose a short-term risk to water resources due to transport in stormwater runoff of constituents, such as sediment, oil and grease, fuels, and chemical constituents derived from wash-off of concrete, fill materials, and construction materials. The off-site transport of these types of potential contaminants will be controlled by employing best management practices (BMPs) during construction, including control and mitigation of hazardous materials and fuels. The BMPs will be designed to reduce the probability of hazardous material spills and stormwater runoff from contacting potential contaminant sources related to construction activities.

Construction BMPs to be used at the EREF are described in ER Sections 4.1.1, 4.3, and 5.2.1.

b. AES has not determined if a detention basin used during construction will be utilized during operations. If a detention basin created during construction, as a Best Management Practice for soil erosion and sediment control in area(s) proposed for permanent storm water runoff management, is to be utilized during operations, it will be modified to meet permanent design requirements.

c. AES does not plan on using any retention basin(s) related to construction activities.

   During construction, sanitary needs will be handled by temporary facilities until such time that the Domestic Sanitary Sewage Treatment Plant is available for site use. Sanitary waste generated during this time that temporary facilities are used will be temporarily stored on-site and shipped off-site for processing.

   Other water use related to construction activities (i.e., vehicle washdown, concrete washdown, dust suppression watering, stormwater runoff) will be controlled in accordance with the Best Management Practices (BMPs). As stated in ER Section 4.4, "Construction of the EREF will pose a short-term risk to water resources due to transport in stormwater runoff of constituents, such as sediment, oil and grease, fuels, and chemical constituents derived from wash-off of concrete, fill materials, and construction materials. The off-site transport of these types of potential contaminants will be controlled by employing best management practices (BMPs) during construction, including control and mitigation of hazardous materials and fuels. The BMPs will be designed to reduce the probability of hazardous material spills and stormwater runoff from contacting potential contaminant sources related to construction activities. ER Sections 4.2.5 and 4.4.7.1 specify BMPs related to mitigation measures that will be in place to minimize potential impacts on water resources during construction and operation. In addition to Revision 1 of the EREF License Application, refer to AES Letter AES-O-NRC-09-00079-0 to the NRC, Response to Information Needs Identified by the U.S. Nuclear Regulatory Commission for the AREVA Enrichment Services Eagle Rock Enrichment Facility – Environmental Report, for markups related to ER Sections 4.2.5 and 4.4.7.1. In the AES Letter, refer to Response 1.3 and Attachment 1.3, and Response 3.2 and Attachment 3.2, for the related changes.

Associated EREF License Application Revisions:

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

Attachments:

None

Commitments:

None

RAI 15

Provide the means of handling sanitary needs during construction.

a. Clarify the type of system used (i.e. portable).

In section 3.4.12.1, AREVA refers the discussion on the retention and detention basins that treat effluent from the Domestic Sanitary Sewage Treatment Plant to section 3.4.1.1. Waste handling during the construction period is not addressed. This information is needed to clarify the impacts of the disposal of sanitary waste.

AES Response to NRC RAI:

During the construction phase, sanitary needs will be handled by temporary facilities. Sanitary waste generated during this time will be temporarily stored on-site and shipped off-site for processing.

Associated EREF License Application Revisions:

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

Attachments:

None

Commitments:

None

RAI 16

Clarify water demand usage information given for each phase of the project lifecycle.

a. Identify the year in which water usage for construction and operations become additive.

b. Clarify the point during the 7 -year heavy construction period in which the process (makeup water) and fire protection water demand values under operations are added to the construction values. Provide a graphic that depicts the change in water demand usage between construction and operation.

c. Water demand use continues during construction years 8 through 11 as described in Section 3.4.6.1. Provide an estimate of average annual usage for construction activities during years 8 through 11.

d. Clarify and revise the discussion on the primary point of diversion for groundwater at the proposed site. According to the Idaho Water Review Board, the use of the current lava and spud wells are for irrigation and do not meet the specifications for potable water use. The primary use of water at the proposed site (not including fire tank refills) is for potable supply. Identify the need for a new well or other action planned and the means to accomplish the action (i.e. permit process).

e. Provide estimates of water use related to irrigation of landscaped areas.

f. Provide estimates of water usage during decontamination and decommissioning. Compare usage during this phase with anticipated water usage during the construction and operation phases.

As described in the Environmental Report (AES, April 2009a) and the Supplement (AES 2009b), an overlap exists with the construction and operations phases of the proposed project. AES should clarify the source of the potable water and provide estimates for each phase of the proposed project. This information will be used to determine water resource impacts, including decontamination and decommissioning.

AES Response to NRC RAI:

For the responses to part a, b, and c below, refer to the graph and markups provided in Enclosures 3.1, 3.4, and 4.1.

- The graph depicts the change in water demand usage between construction and operation for the period 2011-2022.
- The markups provide changes to ER Section 3.4.7 including the addition of two tables: Construction Water Use (2011-2022) and Operations Water Use (2011-2022).

A non-proprietary version of the markups is provided in Enclosure 3.1. The proprietary commercial information to be withheld in accordance with 10 CFR 2.390 is provided in Enclosure 4.1. The graph depicting the change in water demand usage between construction and operation for the period 2011-2022 is provided in Enclosure 3.4. Information pertaining to the number of construction workers is considered proprietary commercial information.

a. Refer to the attached markups for ER Tables 3.4-15 and 3.4-16. Water usage for construction and operation becomes additive in the second year (year 2012) following the start of construction in February 2011, due to the staffing of personnel to support Operations.

b. Refer to the attached markups for ER Tables 3.4-15 and 3.4-16. The point during the 7-year heavy construction period in which the process (makeup and deionized) water and fire protection water demand values are added to the construction water demand values is year 2013, just before the first cascade is placed into service in February 2014.

   Process water must be available before placing the first cascade into service. Since the process water source (storage) is the upper part of the Fire Water Tanks, the Fire Water Tanks will be filled in 2013. The Fire Water Tank fill is a one-time fill scenario where two tanks, each capable of storing 180,000 gallons of water, are filled. This one-time fill (water demand value) of the Fire Water Tanks is included in the Operations process water demand value for year 2013 (i.e., of the 1,593,026 liters (420,833 gallons) of Operations water projected to be used in the attached spreadsheet 1,362,748 liters (360,000 gallons) are for filling of the Fire Water Tanks).

   A graph depicting the change in water demand usage between construction and operation for the period beginning with the start of construction (February 2011) and ending with full facility production (March 2022) is provided in Enclosure 3.4.

c. The attached markup for ER Table 3.4-15 provides the estimate of annual water usage for construction activities during the 11-year construction period for the EREF, including years 8 through 11 of construction. The attached markup for ER Table 3.4-16 provides the estimate of annual water usage for operations during the 11-year construction period for the EREF.

   Table 3.4-15, Construction Water Use (2011-2022), and Table 3.4-16, Operations Water Use (2011-222) will be added to the ER. Refer to the markups provided in Enclosures 3.1 and 4.1. Enclosure 3.1 is a non-proprietary version. Enclosure 4.1 provides the proprietary commercial information to be withheld in accordance with 10 CFR 2.390. Table 3.4-15 modifies the new Table 3.4-15 shown in AES letter to NRC, AES-O-NRC-09-00079-0, Response to Information Needs Identified by the U.S. Nuclear Regulatory Commission for the AREVA Enrichment Services Eagle Rock Enrichment Facility - Environmental Report, dated July 7, 2009. This update to Table 3.4-15 adds construction water use for the entire 11 year construction period. Table 3.4-16 provides the operations water use for the years when construction and operation of cascades overlap.

d. To satisfy the site requirements for potable water, one new well will be drilled for potable water use. The drilling and establishment of this well for potable water use will require compliance to the appropriate Idaho Codes and Standards. The permitting requirements and applicable codes and standards are discussed in ER Section 1.3.2, State Agencies, under the headings for the Idaho Department of Water Resources, and Idaho Water Quality Division.

e. The EREF will manage landscape and restoration water usage by using, where practical, drought tolerant native plants in the reclamation of certain disturbed areas and xerophilic plants in landscaped areas. Where water is determined to be necessary for irrigation, EREF

will be prudent in establishing the irrigation method (drip, sprinkler, flood, etc) so as to keep the use of water as low as necessary to meet the landscaping goals for the project.

For the purpose of establishing a bounding value for landscape and restoration water usage, it is assumed that usage will start in the year 2013 and continue to increase until the completion of construction in 2022. The irrigation usage rate will not exceed 20 AF/growing season and not be applied outside the period defined by the IDWR as the growing season; April 1 through October 31.

This bounding value of 20 AF/214 days (6,517,020 gallons/growing season) for irrigated water usage is within the water rights appropriation for seasonal irrigation use.

f. Refer to the response to ER RAI 17.a

Associated EREF License Application Revisions:

The EREF License Application will be revised as shown on the attached markups presented in Enclosures 3.1 and 4.1.

Commitments:

The EREF License Application will be revised to include the changes identified in Enclosures 3.1 and 4.1 in Revision 2 of the EREF License Application.

Attachments:

Enclosure 3.1 contains a non-proprietary version of the markups in response to this RAI.

Enclosure 4.1 provides the proprietary commercial information to be withheld in accordance with 10 CFR 2.390 for the markups in response to this RAI.

Enclosure 3.4 provides a graph depicting the change in water demand usage between construction and operation for the period beginning with the start of construction (February 2011) and ending with full facility production (March 2022).

RAI 17

Provide additional information regarding water usage and effluent processing during the Decommissioning Phase.

a. Provide estimates of water usage during the decommissioning phase and state whether usage would be higher or lower than average or peak usage during normal operation.

b. Describe the process used for handling decontamination rinsates (e.g., through the Liquid Effluent Treatment System Evaporator or a new facility built specifically for decommissioning).

Information is not available to assess the impacts of decontamination and decommissioning on water resources. Section 4.4 (AES 2009a) does not provide any discussion on water usage or processing during the decontamination and decommissioning phase. Section 10.1.6.8 of the Safety Analysis Report (AES 2009c) states that all wastes produced during decommissioning would be handled as they are during normal operation, but aqueous volume levels (usage and effluent) were not provided.

AES Response to NRC RAI:

a. The volume of water required during decommissioning is bounded by the values presented in ER Table 3.4-2, Anticipated Normal Plant Water Consumption, and ER Table 3.4-3, Anticipated Peak Plant Water Consumption. This is conservative, because approximately 215 people will be on-site during decommissioning compared with the 550 people on-site during normal operations in years 2017 through 2022 (new ER Table 3.4-16 provided in Enclosure 3.1). Also, decommissioning operational water use is expected to be less than 400,000 L (105,670 gal) per year compared with the 2,072,513 L (547,500 gal) used for process water during normal operations in 2022 (new ER Table 3.4-16 provided in Enclosure 3.1).

b. During decommissioning, AES plans to utilize the Liquid Effluent Collection and Treatment System to process aqueous and non-aqueous liquid wastes. This system is described in ISA Summary Section 3.5.12. However, as part of the decommissioning process, the Liquid Effluent Collection and Treatment System will be required to be removed from service and appropriately decommissioned. At that time, temporary skid-mounted systems will be utilized to process any remaining aqueous and non-aqueous liquid wastes.

Associated EREF License Application Revisions:

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

Commitments:

None

Attachments:

None

Enclosure	Subject or Title
3.1	Non-Proprietary Markup Pages of the EREF Environmental Report
3.2	Non-Proprietary Version of the AREVA – New 161 kV Delivery to AREVA Engineering Service Report
3.3	Non-Proprietary Version of the Table, Traffic Breakdown during Construction and Operations Overlap
3.4	Graph Depicting the Change in Water Demand Usage between Construction and Operation for the Period Beginning with the Start of Construction (February 2011) and Ending with Full Facility Production (March 2022)
3.5	Figures and Tables for Response to RAI 7

Markups of Environmental Report

Section 2.1.2.8
Section 3.0 Table of Contents
Section 3.4.7
Table 3.4-15
Table 3.4-16
Section 3.12.2.2
and Section 4.13

Insert A

Average and peak potable water requirements for operation of the EREF are expected to be approximately 68.2 m^3/day (18,000 gpd) and 47 L/sec (739 gpm), respectively. These usage rates are well within the capacities of the wells and are under the appropriation.

Solid waste that would be generated at the proposed EREF, which falls into non-hazardous, radioactive, hazardous, or mixed waste categories, would be collected and transferred to authorized treatment or disposal facilities off site as follows. All solid radioactive waste generated would be Class A low-level waste as defined in 10 CFR 61 (CFR, 2008ee). Approximately 146,500 kg/yr (323,000 lbs/yr) of low-level waste would be generated. During operation, the proposed EREF would generate about 5,062 kg/yr (11,160 lbs/yr) of hazardous waste and about 100 kg/yr (220 lbs/yr) of mixed wastes. As a result, the EREF would be a small quantity generator (SQG) of hazardous waste, which would be disposed by licensed contractors. AES does not plan to treat hazardous waste or store quantities longer than 180 days. Non-hazardous and industrial waste, expected to be approximately 70,307 kg/yr (155,000 lbs/yr) annually, would be collected and disposed of by a licensed solid waste disposal contractor. For example, the non-hazardous wastes could be disposed of in the Bonneville County Peterson Hill Landfill. This landfill accepted 81,647 MT (90,000 tons) of waste in 2007. The estimated annual non-hazardous waste would represent less than 0.01% of the total annual waste accepted at the landfill. This landfill will maintain this yearly 81,647 MT (90,000 tons) waste capacity for the next 80 years.

No communities or habitats defined as rare or unique, or that support threatened and endangered species, have been identified as occurring on the EREF site. Thus, proposed activities are not expected to impact communities or habitats defined as rare or unique, or that support threatened and endangered species, within the 1,700-ha (4,200-ac) proposed site.

Noise generated by the operation of the proposed EREF would be primarily limited to the area immediately surrounding the proposed EREF footprint and U.S. Highway 20. Noise from traffic on U.S. Highway 20 associated with deliveries and worker vehicles during the operation of the proposed EREF would be heard at residences along U.S. Highway 20. There is considerable existing traffic already present on U.S. Highway 20. Therefore, maximum noise levels would not increase, although there would be a longer duration of noise associated with peak commute traffic.

A pedestrian cultural resource survey of the area where the proposed EREF is to be located was conducted from April through July, 2008. 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. The 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 SHPO to recover significant information. Therefore, the impact on archaeological and cultural resources would be small.

The size and industrial nature of this proposed plant would be new to the immediate area. However, similarly sized industrial facilities are located west of the proposed site. The proposed facility would be about 2.4 km (1.5 mi) or greater from public viewing areas such as U.S. Highway 20, the Wilderness Study Area and the Wasden Complex, making details of the proposed facility difficult to observe. Therefore, the impact on views would be small.

1a

Insert A for ER Sections 2.1.2.8, 3.12.2.2, and 4.13

The preferred location for non-hazardous construction-related waste is the Bonneville County's construction and demolition landfill (currently, the Hatch Pit). When the Hatch Pit approaches its maximum capacity as determined by Bonneville County, a new landfill for construction and demolition wastes will either be opened by Bonneville County or another location found, as alternative locations for disposal of non-hazardous construction-related waste exist in Bingham and Jefferson Counties. These counties are within a reasonable haul distance of the EREF. AES contacted these counties and both acknowledged that they accept construction and demolition waste from outside their respective borders.

LIST OF TABLES

1a

Anticipated water use to construct the facility is shown in Table 3.4-15, Construction Water Use (2011-2022). The construction period includes the years when both construction and operation of cascades overlap. Anticipated water use to operate the facility during this period of construction and operations overlap is shown in Table 3.4-16, Operations Water Use (2011-2022).

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 operation and maintenance of the proposed site.

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

construction,

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.

Irrigation water usage will start in the year 2013 and continue to increase until the completion of construction in 2022. The irrigation water usage will not exceed 24,669,600 liters (6,517,020 gallons) per growing season and will not be applied outside the period defined by the Idaho Department of Water Resources (IDWR) as the growing season; April 1 through October 31. Irrigation water usage is within the IDWR irrigation water use limitation specified in the IDWR Water Rights for the EREF site.

1a

storage and ultimate disposal of depleted uranium tails cylinders is provided in Section, 4.13.3, Waste Disposal Plan.

3.12.2.2 Construction Wastes

Efforts are made to minimize the environmental impact of construction. Erosion, sedimentation, dust, smoke, noise, unsightly landscape, and waste disposal are controlled to practical levels and permissible limits, where such limits are specified by regulatory authorities. In the absence of such regulations, the EREF will ensure that construction proceeds in an efficient and expeditious manner, remaining mindful of the need to minimize environmental impacts.

Wastes generated during site preparation and construction will be varied, depending on the activities in progress. The bulk of the wastes will consist of non-hazardous materials such as packing materials, paper, and scrap lumber. These types of wastes will be transported off site to an approved landfill. It is estimated there will be an average of 6,116 m^3 (8,000 yd^3) (non-compacted) per year of this type of waste. A recycling program will be implemented during construction to recover recyclable materials such as metals, paper, etc. Most scrap structural steel, piping, sheet metal, etc., could be recycled or directly placed in an offsite landfill.

Hazardous wastes that may be generated during construction have been identified and annual quantities estimated as shown below. Any such wastes that are generated will be handled by approved methods and shipped off site to approved disposal sites.

Paint, solvents, thinners, organics - 11,360 L (3,000 gal)

Petroleum products, oils, lubricants - 11,360 L (3,000 gal)

Sulfuric acid (battery) - 379 L (100 gal)

Adhesives, resins, sealers, caulking - 910 kg (2,000 lbs)

Lead (batteries) - 91 kg (200 lbs)

Insert A

Pesticides - 379 L (100 gal)

Management and disposal of all wastes from the EREF site is performed by a staff professionally trained to properly identify, store and ship wastes; audit vendors; direct and conduct spill cleanup; interface with state agencies; maintain inventories and provide annual reports.

A Spill Prevention, Control and Countermeasure (SPCC) Plan is implemented during construction to minimize both the possibility of spills of hazardous substances, and to minimize the environmental impact of actual spills. The SPCC Plan ensures prompt and appropriate remediation of spills. Spills during construction are more likely to occur around vehicle maintenance and fueling operations, storage tanks, painting operations and warehouses. The SPCC plan identifies sources, locations and quantities of potential spills and provides appropriate response measures. The plan will identify individuals and their responsibilities for implementation of the plan and provide for prompt notifications of state and local authorities, when required.

3.12.3 Effluent and Solid Waste Quantities

Quantities of radioactive and non-radioactive wastes and effluent are described in this section. The information includes quantities and average uranium concentrations. Portions of the waste considered hazardous or mixed are identified.

1a

Insert A for ER Sections 2.1.2.8, 3.12.2.2, and 4.13

The preferred location for non-hazardous construction-related waste is the Bonneville County's construction and demolition landfill (currently, the Hatch Pit). When the Hatch Pit approaches its maximum capacity as determined by Bonneville County, a new landfill for construction and demolition wastes will either be opened by Bonneville County or another location found, as alternative locations for disposal of non-hazardous construction-related waste exist in Bingham and Jefferson Counties. These counties are within a reasonable haul distance of the EREF. AES contacted these counties and both acknowledged that they accept construction and demolition waste from outside their respective borders.

Table 3.4-15 Construction Period Water Use (2011-2022)
Page 1 of 2

Construction							
Year	Calendar Year	People (1)	Potable Water Liters (Gallons)	Concrete (2) Liters (Gallons)	Dust (3) Liters (Gallons)	Soil Compaction (4) Liters (Gallons)	Total Construction Liters (Gallons)
1	2011	[*]	19,555,438 (5,166,000)	1,216,370 (321,331)	52,465,810 (13,860,000)	16,981,736 (4,486,100)	90,219,351 (23,833,431)
2	2012	[*]	28,140,751 (7,434,000)	3,649,110 (963,993)	52,465,810 (13,860,000)	12,129,784 (3,204,350)	96,385,453 (25,462,343)
3	2013	[*]	19,078,475 (5,040,000)	10,947,978 (2,891,978)	52,465,810 (13,860,000)	9,703,903 (2,563,500)	92,195,513 (24,355,478)
4	2014	[*]	13,831,895 (3,654,000)	72,989,219 (1,927,985)	52,465,810 (13,860,000)	4,851,952 (1,281,750)	78,447,871 (20,723,735)
5	2015	[*]	13,831,895 (3,654,000)	6,081,655 (1,606,655)	52,465,810 (13,860,000)	4,581,952 (1,281,750)	77,231,504 (20,402,405)
6	2016	[*]	8,346,833 (2,205,000)	4,561,387 (1,204,991)	52,465,810 (13,860,000)	0 (0)	65,374,027 (17,269,991)
7	2017	[*]	6,677,466 (1,764,000)	2,432,740 (642,662)	52,465,810 (13,860,000)	0 (0)	61,576,014 (16,266,662)
8	2018	[*]	6,677,466 (1,764,000)	1,216,370 (321,331)	26,232,904 (6,930,000)	0 (0)	34,126,740 (9,015,331)
9	2019	[*]	6,677,466 (1,764,000)	304,093 (80,333)	6,558,226 (1,732,500)	0 (0)	13,539,785 (3,576,833)
10	2020	[*]	5,962,024 (1,575,000)	76,023 (20,083)	1,639,556 (433,125)	0 (0)	7,677,603 (2,028,208)
11	2021	[*]	5,008,100 (1,323,000)	19,006 (5,021)	409,889 (108,281)	0 (0)	5,436,995 (1,436,302)
12	2022	[*]	3,815,695 (1,008,000)	4,751 (1,255)	102,472 (27,070)	0 (0)	3,922,919 (1,036,326)

Notes:

(1) Estimate of [*] usage per day per person for 252 days per year for construction related activities (5 days a week).

(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.

* Proprietary Commercial Information withheld in accordance with 10 CFR 2.390.

Table 3.4-15 Construction Water Use (2011-2022)

Assumptions:

(1) Project Milestones:

- Start site construction = February 2011
- 1st cascade on line = February 2014
- Anticipated completion of Heavy Construction Activity = 2017
- Last 3.3 M SWU cascade on line = March 2018
- Full 6.6 M SWU production = March 2022

All SBM construction (i.e., SBMs 1, 2, 3, and 4) - construction that generates dust and requires any significant concrete production and curing - is assumed to be completed about 2018 and reduces significantly until 2022.

(2) From Assumption 1 above, Concrete Mixing and Curing values assume progressive decline following completion of heavy construction in 2017. Year 2018 assumes 1/2 of water usage in 2017 and subsequent years assumes 1/4 of water usage in 2018 for all subsequent years until 2022.

(3) From Assumption 1 above, Dust Control yearly water values assume progressive decline following completion of heavy construction in 2017. Year 2018 assumes 1/2 of water usage for dust control in 2017 and subsequent years assumes 1/4 of water usage in 2018 for all subsequent years until 2022.

Table 3.4-16 Operations Water Use (2011-2022)
Page 1 of 2

Operations					
Year	Calendar Year	People [1]	Potable Water Liters (Gallons)	Process Water [2] Liters (Gallons)	Total Operations [3] Liters (Gallons)
1	2011	0	0 (0)	0 (0)	0 (0)
2	2012	50	2,072,513 (547,500)	0 (0)	2,072,513 (547,500)
3	2013	100	4,145,026 (1,095,000)	1,593,027 (420,833)	5,738,053 (1,515,833)
4	2014	420	17,409,109 (4,599,000)	460,558 (121,667)	17,869,667 (4,720,667)
5	2015	420	17,409,109 (4,599,000)	690,838 (182,500)	18,099,946 (4,781,500)
6	2016	480	19,896,124 (5,256,000)	921,117 (243,333)	20,817,241 (5,499,333)
7	2017	550	22,797,642 (6,022,500)	1,151,396 (304,167)	23,949,039 (6,326,667)
8	2018	550	22,797,642 (6,022,500)	1,381,675 (365,000)	24,179,318 (6,387,500)
9	2019	550	22,797,642 (6,022,500)	1,554,385 (410,625)	24,352,027 (6,433,125)
10	2020	550	22,797,642 (6,022,500)	1,727,094 (456,250)	24,524,737 (6,478,750)
11	2021	550	22,797,642 (6,022,500)	1,899,804 (501,875)	24,697,446 (6,524,375)
12	2022	550	22,797,642 (6,022,500)	2,072,513 (547,500)	24,870,155 (6,570,000)

Notes:

[1] Estimate of 114 L (30 gal) per day per person for 365 days per year.
[2] Process water includes Demineralized Water, Fire Water, and Liquid Effluent Water.
[3] Total Operations Water Use is industrial water use and does not include irrigation water use.

Table 3.4-16 Operations Water Use (2011-2022)
Page 2 of 2

Assumptions:

(1) Project Milestones:

- Start site construction = February 2011
- 1st cascade on line = February 2014
- Anticipated completion of Heavy Construction Activity = 2017
- Last 3.3 M SWU cascade on line = March 2018
- Full 6.6 M SWU production = March 2022

All SBM construction (i.e., SBMs 1, 2, 3, and 4) - construction that generates dust and requires any significant concrete production and curing - is assumed to be completed about 2018 and reduces significantly until 2022.

(2) Process Water usage begins just before the placement of the 1st cascade on line and increases to "full" usage for 6.6 M SWU

(3) At year 2013, the two fire Water Tanks are filled to provide site Fire Protection and Process Water supply. Each tank has an 180,000 fire water capacity - total of 360,000 gallons to fill the tanks. This is a one time fill and is expected to occur in the year preceding the start of the 1st cascade.

(4) The number of people assumed in Operations is generally conservative. For example, the operations staff is assumed to be at full operating complement upon start of the first cascade for 3.3 M SWUs and upon start of the first cascade for 6.6 M SWUs.

(5) At year 2018, the Process Water usage reaches the maximum expected for the 3.3 M SWU configuration - that is, 365,000 gallons per year. Since, for the 3.3 M SWU scenario, Process Water Usage starts in year 3 (2013) and ends in year 8 (2018), there are 6 years from the start of Process Water usage to the point where Process Water usage reaches the expected 3.3 M SWU value. As such, the incremental yearly addition of Process Water usage is 1/6 of the final 3.3 M SWU value per year. This same approach was used to estimate the water usage for the 6.6 M SWU scenario.

Insert A

4.13 WASTE MANAGEMENT IMPACTS

Solid waste generated at the Eagle Rock Enrichment Facility (EREF) will be disposed of at licensed facilities designed to accept the various waste types. Approximately 70,307 kg/yr (155,000 lbs/yr) of industrial waste including miscellaneous trash, filters, resins, and paper will be generated annually by the EREF. It will be collected and disposed of by a licensed solid waste disposal contractor. It could be disposed of at the Bonneville County Peterson Landfill that accepted 81,647 MT (90,000 tons) of waste in 2007 and will maintain this yearly waste capacity for the next 80 years. The impact of the additional waste from the EREF is very small in that it represents less than one-tenth of one percent of the Peterson Hill annual landfill capacity. Radioactive waste will be collected in labeled containers in each Restricted Area and transferred to the Solid Waste Collection Room for inspection. Suitable waste will be volume-reduced and all radioactive waste disposed of at a licensed LLW disposal facility. Hazardous and some mixed wastes will be collected at the point of generation, transferred to the Solid Waste Collection Room, inspected, and classified. Any mixed waste that may be processed to meet land disposal requirements may be treated in its original collection container and shipped as LLW for disposal. There will be no on-site disposal of solid waste at the EREF. Waste Management Impacts for on-site disposal, therefore, need not be evaluated. On site storage of depleted UF_6 (DUF_6) Cylinders will minimally impact the environment. A pathway assessment for the temporary storage of DUF_6 on the Full Tails Cylinder Storage Pads is provided in Section 4.13.3.2, DUF_6 Cylinder Storage.

EREF will generate approximately 5,062 kg (11,160 lbs) of Resource Conservation and Recovery Act (RCRA) hazardous wastes per year and 100 kg (220 lbs) per year of mixed waste. Under Idaho regulations, (IDA, 2008) EREF will be considered a small quantity generator (SQG) if it accumulates less than 1,000 kg (2,200 lbs) but more than 100 kg (220 lbs) of hazardous waste per month. As an SQG, EREF will be required to file an annual report to the state and to pay an annual fee. Since the EREF plans to ship all hazardous wastes off-site within the allowed timeframe, 180 days, no further permitting as a Treatment, Storage and Disposal facility will be necessary and the impacts for such systems need not be evaluated.

4.13.1 Waste Descriptions

Descriptions of the sources, types and quantities of solid, hazardous, radioactive and mixed wastes generated by EREF during construction and operation are provided in Section 3.12, Waste Management.

4.13.2 Waste Management System Description

Descriptions of the EREF waste management systems are provided in Section 3.12.

4.13.3 Waste Disposal Plans

4.13.3.1 Radioactive and Mixed Waste Disposal Plans

Solid radioactive wastes are produced in a number of plant activities and require a variety of methods for treatment and disposal. These wastes, as well as the generation and handling systems, are described in detail in Section 3.12, Waste Management.

All radioactive and mixed wastes will be disposed of at off-site licensed facilities. Table 4.13-1, Possible Radioactive Waste Processing/Disposal Facilities, summarizes the facilities that may be used to process or dispose of EREF radioactive or mixed waste.

1a

Insert A for ER Sections 2.1.2.8, 3.12.2.2, and 4.13

The preferred location for non-hazardous construction-related waste is the Bonneville County's construction and demolition landfill (currently, the Hatch Pit). When the Hatch Pit approaches its maximum capacity as determined by Bonneville County, a new landfill for construction and demolition wastes will either be opened by Bonneville County or another location found, as alternative locations for disposal of non-hazardous construction-related waste exist in Bingham and Jefferson Counties. These counties are within a reasonable haul distance of the EREF. AES contacted these counties and both acknowledged that they accept construction and demolition waste from outside their respective borders.

Engineering Service Report

Completed for AREVA

New 161kV delivery to AREVA

Bonneville County, Idaho

February 26, 2009

1.0 Description

AREVA NC, Inc. has requested a dual redundant supply utilizing separate feeders for service to a Uranium Enrichment Facility to be located on the north side of Hwy. 20, approximately 17 miles west of Idaho Falls in Bonneville County Idaho. Latitude N43.5831, Longitude W112.4312 (Approximately within T3N R34E Section 26). The customer is requesting construction power in 2010 from existing 25 kV facilities, and permanent power available by late 2011 with the maximum expected load projected over the next ten years as follows: Plant startup beginning in 2013 with a ramp up period to 32 MVA, a potential additional 30 MVA load from 2019 to 2021 (Total of 62 MW). Once running, the plant runs continuously and is never shut down.

AREVA will construct, own, and operate a 161 kV substation immediately adjacent to the point of service. The point of service constructed, owned, and operated by Rocky Mountain Power located at the AREVA site and hereafter named Twin Buttes Substation. The point of service will be loop fed from a 161 kV line extension.

2.0 Scope of the Study

This study evaluates Transmission Provider's sub-transmission system and main grid transmission system to identify any interconnection and system modifications needed to supply a total of 32 and 62 mega watts at the customer's facility.

3.0 Study Assumptions

This study will list timeframes in which facilities must be in service to meet customer's stated schedule. However, permitting, long-lead material delivery and construction delays could delay this construction schedule by up to three years.

"Adequate service" is defined as voltage levels defined in PaciCorp's existing Operability and Reliability Guidelines, filed with the Idaho Public Service Commission. Specifically, transmission voltage levels under steady-state conditions shall be maintained within Range A limits (0.95 pu – 1.06 pu for all 161-kV systems, 0.9 pu – 1.04 pu for radial subtransmission systems and 0.95 pu – 1.04 pu for looped subtransmission systems).

All active higher-priority transmission service requests and system improvements necessary to serve them were considered in this study. ***If any of the active higher-queued requests are withdrawn or changed, PacifiCorp reserves the right to restudy this request, and the results and conclusions could significantly change.***

N-1 transmission conditions were studied as applicable.

This study assumes AREVA will:

- Take 161-kV delivery from Transmission Provider
- Construct their 161-kV facilities adjacent to the Transmission Provider's metering facility
- Begin taking service in fourth quarter 2012, due to construction and equipment lead times that will allow 2012 delivery at the earliest

This study assumes:

- Substations and facilities previously identified and proposed to serve higher-queued loads are built as originally proposed in their respective studies, including originally-proposed load ramps:
- In some cases permitting, design and long-lead item ordering must start several years in advance in order to meet the proposed June 1 in-service date.

4.0 Transmission Additions

AREVA selected alternative 1 from the system impact study dated September 10, 2008. Rocky Mountain Power has refined the details of the alternative further and has refined the estimated costs further.

Alternative Summary

The selected alternative configuration is to construct a 161 kV line originating at the existing Bonneville substation, extending approximately 10 miles west to the proposed AREVA substation. For the second source, a new 161 kV line between the AREVA substation and Antelope substation approximately 27 miles west along Hwy 20 is required.

This project involves approximately 27 miles of new single circuit 161 kV line between Antelope and AREVA following along Hwy 20 and approximately 10 mile rebuild of existing 69 kV line between AREVA and Bonneville. The new 10 mile section will be constructed double circuit 161 kV with one side energized at 69 kV, (Currently feeds from Bonneville to Kettle substation) the other side energized at 161 kV and with distribution under build.

Antelope substation will require the installation of one 161 kV circuit breaker and associated switches, relaying, SCADA, etc.

Bonneville substation will require the installation of three 161 kV circuit breakers in a ring bus configuration and associated switches relaying, SCADA, etc.

The 161 kV point of service at AREVA will be a new switching substation constructed utilizing four 161 kV circuit breakers in a ring bus configuration with associated

switches, relaying, SCADA, revenue metering, etc. This switching substation will be separate from AREVA's customer owned and operated substation.

Miscellaneous communication and relay work will be required at Goshen and Westside substations.

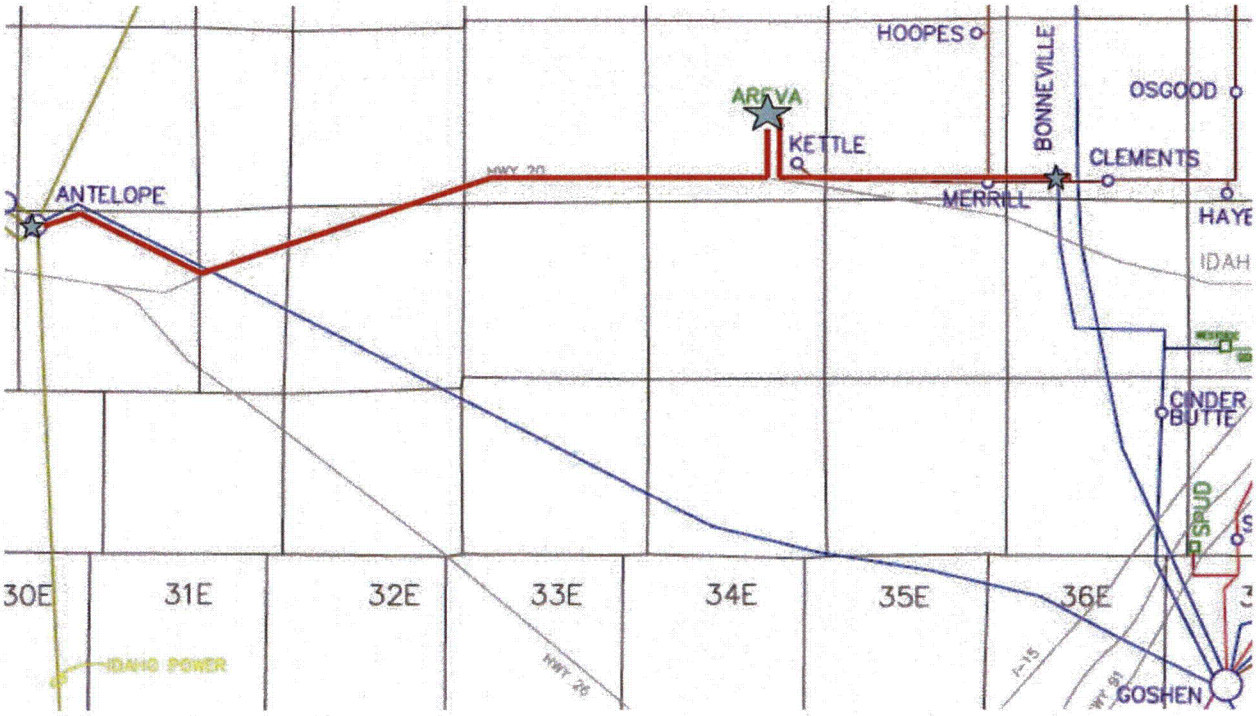


Figure 1 is a one-line diagram showing the proposed 161 kV transmission system from Bonneville to Antelope and the delivery point of the new AREVA substation.

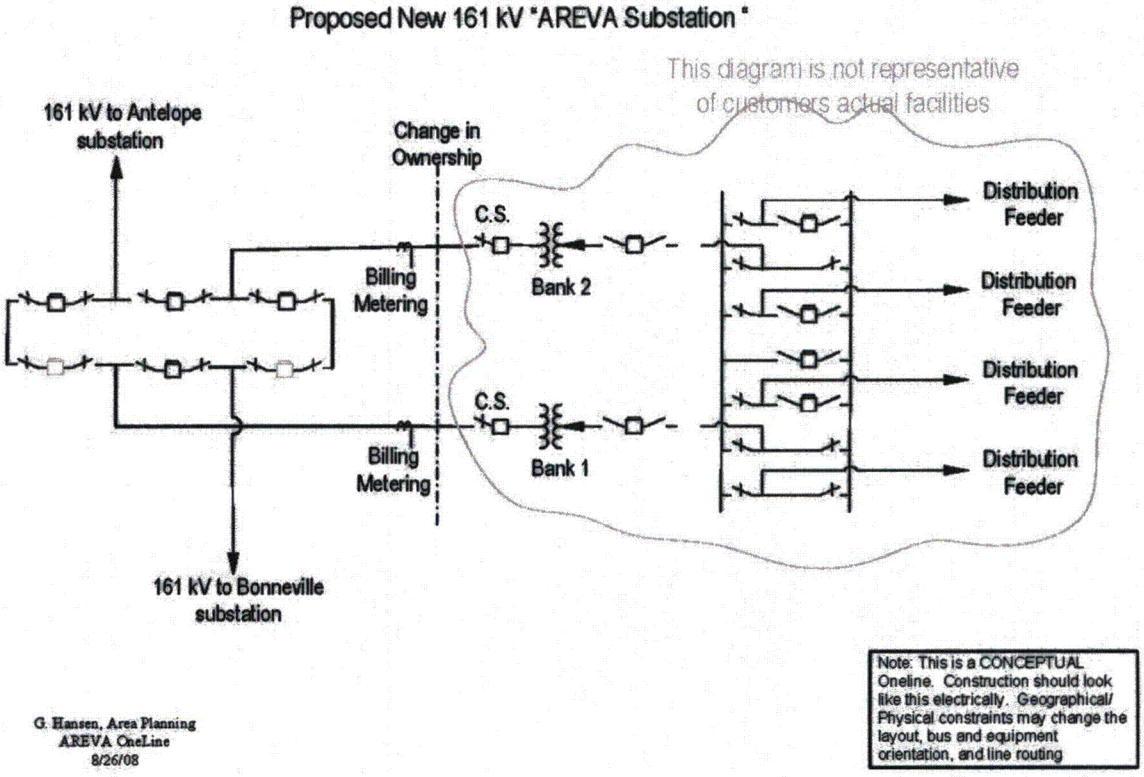


Figure 2: One-line diagram showing the proposed transmission system from Bonneville to Antelope and the new interconnect to AREVA substation.

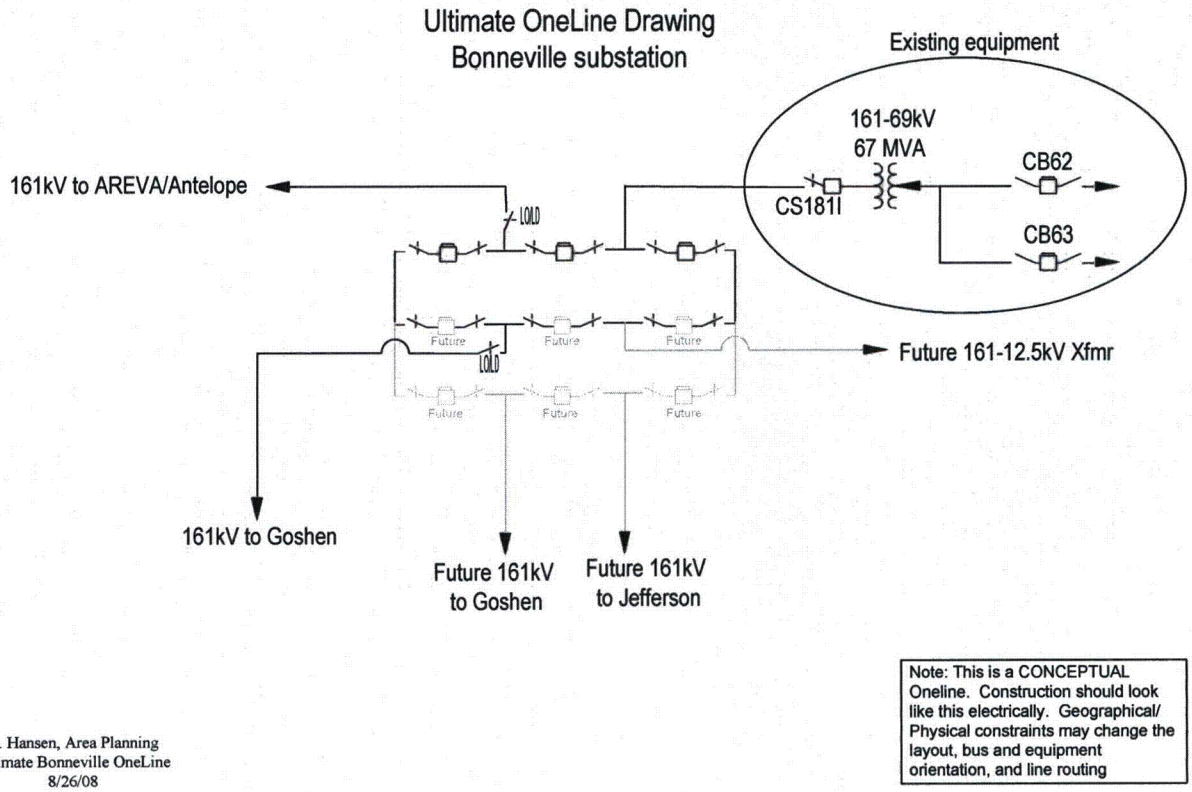


Figure 3: One-line diagram showing the ultimate layout of Bonneville substation.

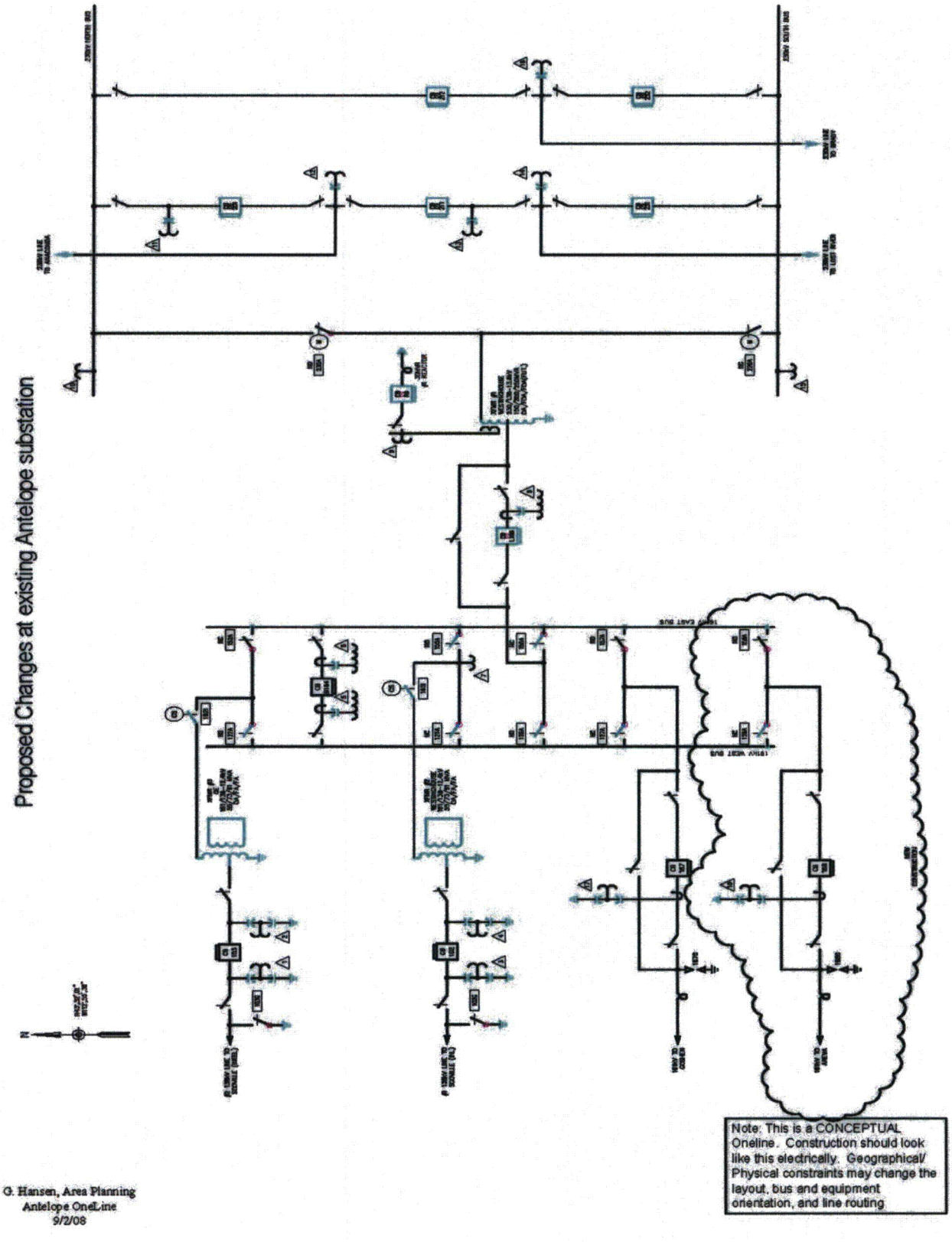


Figure 4: One-line diagram showing the breaker addition at Antelope substation.

5.0 Cost estimate (preliminary scope estimate):

- [Proprietary Commercial Information withheld in accordance with 10 CFR 2.390.]
- Includes estimate of right of way and permitting costs not included in previous estimate (some uncertainty still exists in these costs to be refined in the next phase)
- Does not include any costs for AREVA (Customer owned) substation and electrical facilities.
- Includes cost of Twin Buttes substation (RMP) adjacent to AREVA's substation and assumes AREVA provides land and unencumbered 24 hour/day access to Rocky Mountain Power to Twin Buttes substation.

6.0 Conclusions

Rocky Mountain Power can provide the requested load if the indicated improvements are implemented.

7.0 Participation by Affected Systems

N/A

8.0 Additional Customer Requirements

Transmission Customer must maintain a power factor at the metering point of 95 percent or better at all times. The 95% minimum power factor requirement will be addressed in the MESA.

AREVA shall be responsible for ensuring that any induced voltage fluctuations to the transmission system caused by their facility are within acceptable tolerances (IEEE 519, etc.). The voltage fluctuation tolerance standards are contained in the PacifiCorp Engineering Handbook in section, "1C.5.1 Voltage Fluctuation and Light Flicker" which can be found on the company website at:

http://www.rockymountainpower.net/Navigation/Navigation1891.html

Should induced voltage fluctuations result from the proposed AREVA load, it will be up to AREVA to compensate for any damages incurred as well as mitigate the problem at their sole expense.

It is strongly recommended that the Transmission Customer install voltage regulating equipment in their substation.

The Transmission Customer owned substation must be constructed to standards acceptable to PacifiCorp and in accordance with minimum substation standards.

Enclosure 3.3
Non-Proprietary Version of the Table, Traffic Breakdown during Construction and Operations Overlap

Traffic Breakdown during Construction and Operations Overlap
(Page 1 of 2)

Month, Year	Number of Operational Employees [1]	Trips/Day for Operational Employees [2]	Trips/Day Operational Deliveries/ Waste Shipments [3]	Number of Construction Workers [4]	Trips/Day for Construction Workers [5]	Trips/Day Construction Deliveries/ Waste Shipments [6]	Combined Daily Trips [7]
February 2014 (start of first cascade)	280	400	29	[*]	[*]	[*]	[*]
September 2016 (One SBM operational)	350	500	37	[*]	[*]	[*]	[*]
March 2018 (Two SBMs operational)	420	600	44	[*]	[*]	[*]	[*]
September 2020 (Three SBMs operational)	485	693	58	[*]	[*]	[*]	[*]
February/March 2022 (Construction completed/Four SBMs operational)	550	780	71	[*]	[*]	[*]	[*]

*** Proprietary Commercial Information withheld from disclosure in accordance with 10 CFR 2.390**

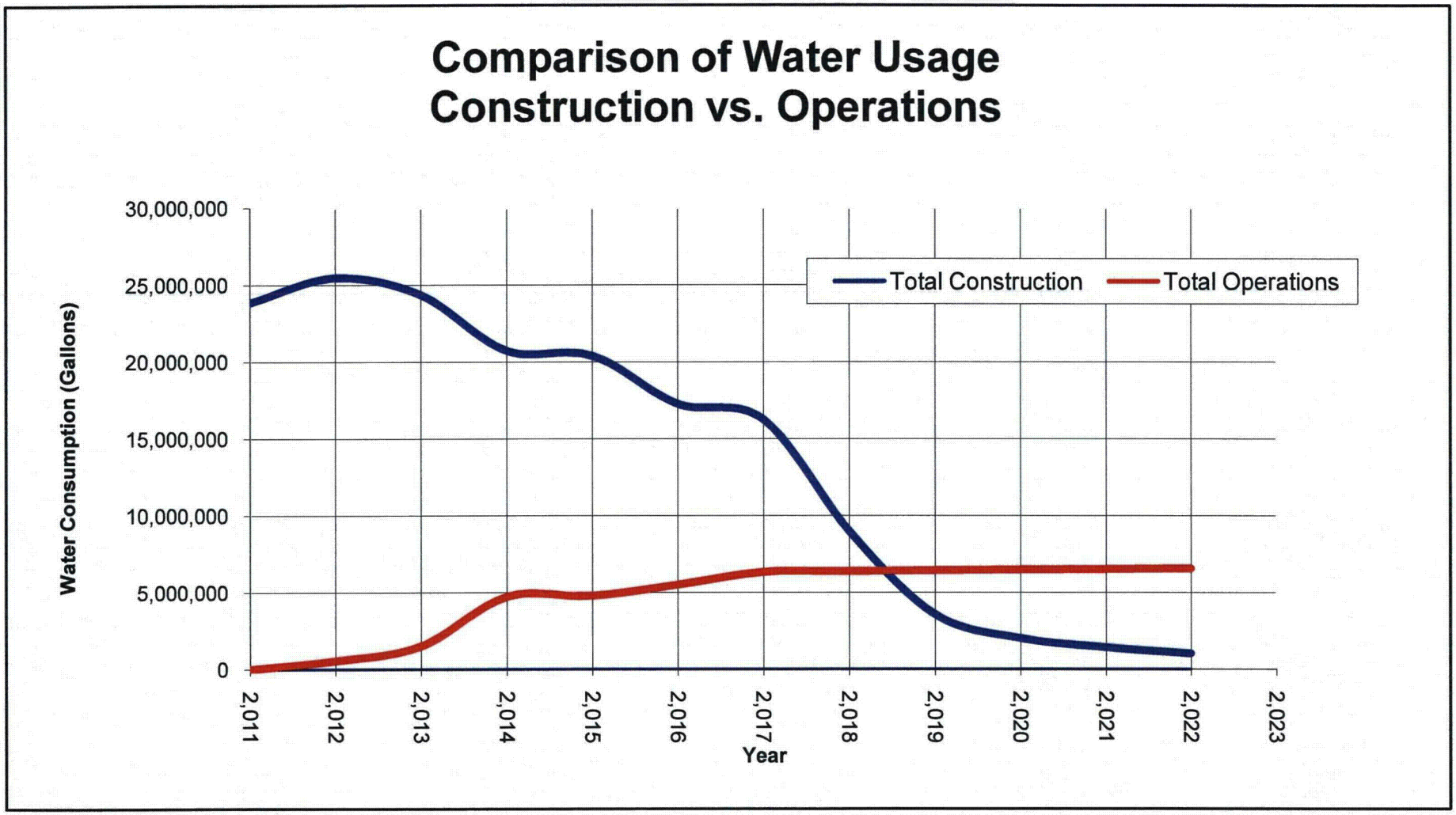
Traffic Breakdown during Construction and Operations Overlap
(Page 2 of 2)

Key:
SBM – Separations Building Module

Notes:
1. For the number of operational employees in March 2018 refer to ER Section 4.2.4, Rev. 0.
   For the number of operational employees in February/March 2022, refer to ER Section 4.2.4, Rev. 1.
   The estimated number of operational employees in February 2014 is assumed to be two thirds of the operational staff in March 2018. The estimated number of operational employees in September 2016 is the average of the February 2014 and March 2018 operational employee numbers. The estimated number of operational employees in September 2020 is the average of the March 2018 and February/March 2022 operational numbers.
2. For the number of trips per day for operational employees in March 2018 refer to ER Section 4.2.4, Rev. 0.
   For the number of trips per day for operational employees in February/March 2022 refer to ER Section 4.2.4, Rev. 1.
   Referring to ER Section 4.2.4, the trips per day for operational employees for February 2014, September 2016, and September 2020 are derived as follows: {(number of employees) ÷ 4.2 employees/position} x 3 shifts/position x 2 trips/shift/day
3. For the number of operational deliveries and waste shipments in March 2018 and February/March 2022, refer to ER Section 4.2.4 of Rev. 0 and Rev. 1, respectively.
   The number of operational deliveries and waste shipments in February 2014 is assumed to be two thirds of the operational shipments in March 2018. The estimated number of operational deliveries and waste shipments in September 2016 is the average of the February 2014 and March 2018 operational shipments. The estimated number of operational shipments in September 2020 is the average of the March 2018 and February/March 2022 operational shipments.
4. Refer to ER Table 4.10-2. For February 2014, the estimated number of construction workers is the average of the numbers of annual construction workers in 2013 (i.e., **[*]**) and 2014 (i.e., **[*]**).
5. Number of construction workers x 2 trips/construction worker/day.
6. Referring to ER Tables 4.2-3 and 4.2-4 (as marked for revision in Enclosure 3, of the AES Letter AES-O-NRC-09-00079-0 to the NRC, Response to Information Needs Identified by the U.S. Nuclear Regulatory Commission for the AREVA Enrichment Services Eagle Rock Enrichment Facility – Environmental Report), the trips per day for construction deliveries and waste shipments are derived as follows: {{(number of supply shipments and number of waste shipments for a given year) ÷ 250 days/year} x 2 trips/day} plus {([*] trucks per day for centrifuges/parts) x 2 trips}.
   For February 2014, refer to 'Year 4' shipment information in ER Tables 4.2-3 and 4.2-4; for September 2016, refer to 'Year 6', and for March 2018, conservatively refer to 'Year 7'. For September 2020, it is assumed that the trips per day for construction related shipments are equivalent to that for March, 2018. For February/March 2022, it is assumed that the trips per day for construction related shipments are half that for September 2020.
7. Combined Daily Trips is equal to the sum of the trips per day for operational employees, operational deliveries/waste shipments, construction workers and construction deliveries/waste shipments.

*** Proprietary Commercial Information withheld from disclosure in accordance with 10 CFR 2.390**

Enclosure 3.4
Graph Depicting the Change in water Demand Usage between Construction and Operation for the Period Beginning with the Start of Construction (February 2011) and Ending with Full Facility Production (March 2022)


Comparison of Water Usage
Construction vs. Operations
Water Consumption (Gallons)
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
Total Construction
Total Operations
2,011
2,012
2,013
2,014
2,015
2,016
2,017
2,018
2,019
2,020
2,021
2,022
2,023
Year

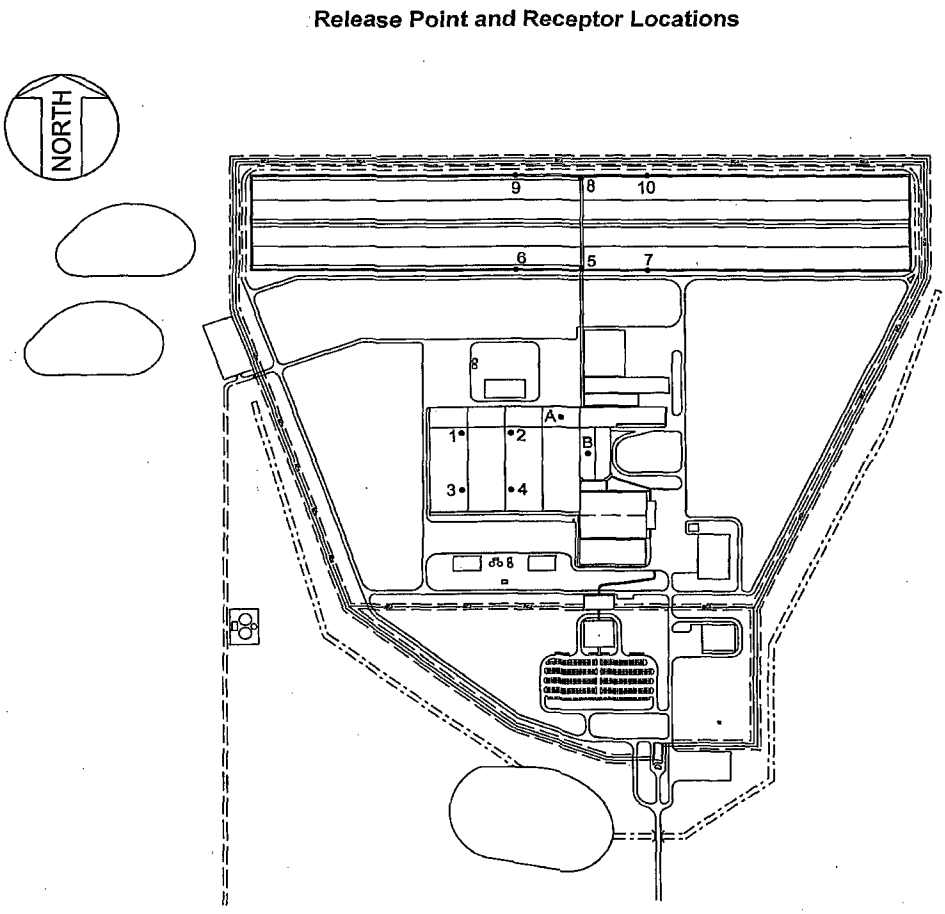


Figure 1: EREF SBM GEVS ("A") and TSB GEVS ("B") Release Points and Receptor Locations 1-10

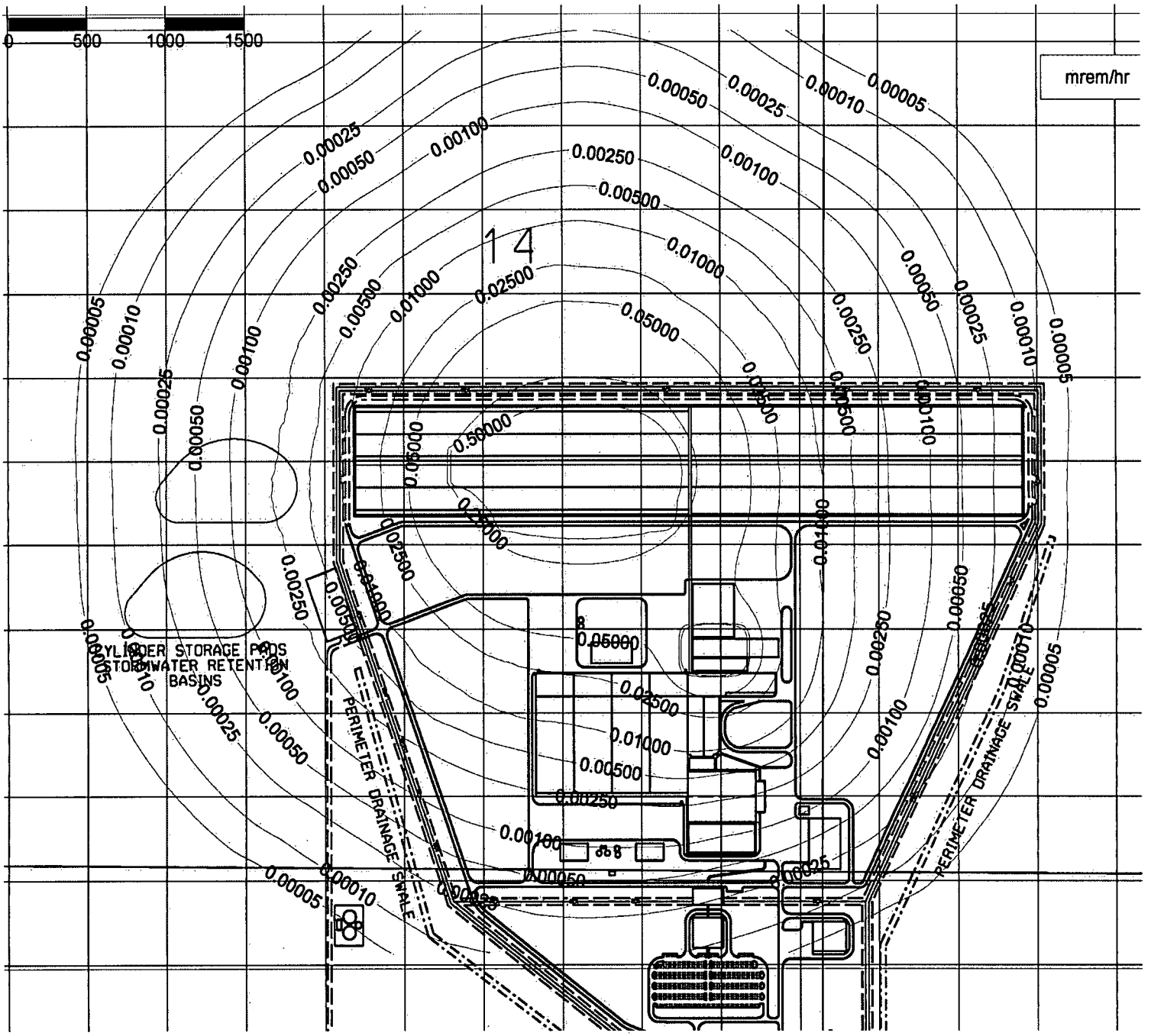


Figure 2: Dose Contours from Full Tails, Full Feed, and Empty Cylinder and Product Pads (mrem/hour) at the End of Plant Construction

Table 1: Storage Cylinder Direct / Scatter Dose Rate to Construction Areas

Receptor Location	Lung	Thyroid	Bone Surface	Effective
	mSv/hr (mrem/hr)	mSv/hr (mrem/hr)	mSv/hr (mrem/hr)	mSv/hr (mrem/hr)
1	2.5E-04 (2.5E-02)	2.5E-04 (2.5E-02)	2.5E-04 (2.5E-02)	2.5E-04 (2.5E-02)
2	2.5E-04 (2.5E-02)	2.5E-04 (2.5E-02)	2.5E-04 (2.5E-02)	2.5E-04 (2.5E-02)
3	5.0E-05 (5.0E-03)	5.0E-05 (5.0E-03)	5.0E-05 (5.0E-03)	5.0E-05 (5.0E-03)
4	5.0E-05 (5.0E-03)	5.0E-05 (5.0E-03)	5.0E-05 (5.0E-03)	5.0E-05 (5.0E-03)

Table 2: Radioactive Release Distribution from TSB GEVS and SBM GEVS

Bounding Release			
Radionuclide	TSB GEVS	SBM GEVS	Activity Totals
	MBq/yr (μCi/yr)	MBq/yr (μCi/yr)	MBq/yr (μCi/yr)
U-234	6.020 (162.7)	3.50 (94.6)	9.520 (257.3)
U-235	0.28 (7.5)	0.16 (4.4)	0.440 (11.9)
U-236	0.037 (1.0)	0.026 (0.7)	0.063 (1.7)
U-238	6.020 (162.7)	3.50 (94.6)	9.520 (257.3)
Totals	12.36 (333.9)	7.184 (194.2)	19.54 (528.1)
Rel. Pt. %	63.23%	36.77%	100.00%

Table 3: Receptor locations and their X/Q and D/Q values relative to Release Point A (UF_6 Handling Area 1 roof)

Release Point A, UF_6 Handling Area 1 Roof (SBM GEVS)				
Receptor Location	Direction, Distance (meters)	Description	X/Q depleted (sec/m^3)	D/Q ($1/m^2$)
1	WSW, 202	North end of SBM4	5.09E-05	1.02E-07
2	WSW, 101	North end of SBM2	1.74E-04	2.57E-07
3	SW, 241	South end of SBM4	3.73E-05	1.11E-07
4	SW, 173	South end of SBM2	6.62E-05	1.77E-07
5	N, 310	South center Cylinder Pad	2.58E-05	8.17E-08
6	NNW, 317	SW center Cylinder Pad	1.99E-05	5.68E-08
7	NNE, 349	SE center Cylinder Pad	2.04E-05	9.93E-08
8	N, 504	North center Cylinder Pad	1.18E-05	3.93E-08
9	N, 515	NW center Cylinder Pad	1.14E-05	3.80E-08
10	NNE, 533	NE center Cylinder Pad	1.04E-05	5.24E-08

Table 4: Receptor locations and their X/Q and D/Q values relative to Release Point B (TSB roof)

Release Point B, TSB Roof (TSB GEVS)				
Receptor Location	Direction, Distance (meters)	Description	X/Q depleted (sec/m^3)	D/Q ($1/m^2$)
1	W, 252	North end of SBM4	2.25E-05	3.88E-08
2	WNW, 151	North end of SBM2	2.90E-05	3.98E-08
3	WSW, 252	South end of SBM4	3.50E-05	7.46E-08
4	WSW, 158	South end of SBM2	7.84E-05	1.42E-07
5	N, 389	South center Cylinder Pad	1.79E-05	5.83E-08
6	NNW, 414	SW center Cylinder Pad	1.31E-05	3.81E-08
7	NNE, 410	SE center Cylinder Pad	1.60E-05	7.81E-08
8	N, 587	North center Cylinder Pad	9.66E-06	3.10E-08
9	NNW, 605	NW center Cylinder Pad	7.45E-06	2.12E-08
10	NNE, 601	NE center Cylinder Pad	8.84E-06	4.34E-08

Table 5: Total Dose Rate for All Receptors from SBM GEVS and TSB GEVS Releases

Location #	Lung	Thyroid	Bone Surface	Effective
	mSv/hr (mrem/hr)	mSv/hr (mrem/hr)	mSv/hr (mrem/hr)	mSv/hr (mrem/hr)
1	5.25E-06 (5.25E-04)	4.54E-10 (4.54E-08)	1.92E-07 (1.92E-05)	6.31E-07 (6.31E-05)
2	1.31E-05 (1.31E-03)	1.13E-09 (1.13E-07)	4.82E-07 (4.82E-05)	1.58E-06 (1.58E-04)
3	5.71E-06 (5.71E-04)	4.99E-10 (4.99E-08)	2.10E-07 (2.10E-05)	6.87E-07 (6.87E-05)
4	1.18E-05 (1.18E-03)	1.02E-09 (1.02E-07)	4.32E-07 (4.32E-05)	1.42E-06 (1.42E-04)
5	3.31E-06 (3.31E-04)	2.93E-10 (2.93E-08)	1.21E-07 (1.21E-05)	3.98E-07 (3.98E-05)
6	2.49E-06 (2.49E-04)	2.19E-10 (2.19E-08)	9.12E-08 (9.12E-06)	2.99E-07 (2.99E-05)
7	2.81E-06 (2.81E-04)	2.56E-10 (2.56E-08)	1.03E-07 (1.03E-05)	3.38E-07 (3.38E-05)
8	1.66E-06 (1.66E-04)	1.47E-10 (1.47E-08)	6.11E-08 (6.11E-06)	2.00E-07 (2.00E-05)
9	1.42E-06 (1.42E-04)	1.25E-10 (1.25E-08)	5.21E-08 (5.21E-06)	1.71E-07 (1.71E-05)
10	1.50E-06 (1.50E-04)	1.37E-10 (1.37E-08)	5.50E-08 (5.50E-06)	1.80E-07 (1.80E-05)

Table 6: Craft Hours by Location and Category

Labor Craft	Plant Area	Craft Hours Per Year [2]	Persons	Man-Hours per Person Per Year
Civil/Structural	UF_6 Handling	109,174.16	54.15	2016
	SBM	269,296.25	133.58	2016
	20% Cylinder Pad [1]	24,729.60	12.27	2016
	Total civil/structural	403,200.01	200.00	2016
Mechanical	UF_6 Handling	65,504.49	32.49	2016
	SBM	161,577.75	80.15	2016
	20% Cylinder Pad [1]	14,837.76	7.36	2016
	Total Mechanical	241,920.00	120.00	2016
Electrical	UF_6 Handling	43,669.66	21.66	2016
	SBM	107,718.49	53.43	2016
	20% Cylinder Pad [1]	9,891.84	4.91	2016
	Total Electrical	161,279.99	80.00	2016
Totals	UF_6 Handling	218,348.30	108.31	2016
	SBM	538,592.49	267.16	2016
	20% Cylinder Pad [1]	49,459.20	24.53	***
	Total All	806,399.99		

*** Total number of people if build-out spread over the year. Use 122.67 people for actual build-out in the 20% increments which give the number of hours per person on pad as 403.2 man-hours in a year.

[1] Full Tails, Full Feed, and Empty Cylinders Storage Pad

[2] Based upon the year with the maximum number of craft workers during the construction and operations overlap period

Table 7: Cumulative Dose Impact – SBM + UF_6 Handling Areas

Pathway	Lung	Thyroid	Bone Surface	Effective	% of Total Eff. Dose
	Person-Sv (Person-Rem)	Person-Sv (Person-Rem)	Person-Sv (Person-Rem)	Person-Sv (Person-Rem)	
Direct / Scatter Dose from Cylinders on Pad	1.35E-01 (1.35E+01)	1.35E-01 (1.35E+01)	1.35E-01 (1.35E+01)	1.35E-01 (1.35E+01)	99.40%
Inhalation from Plant Gaseous Releases	6.84E-03 (6.84E-01)	5.73E-07 (5.73E-05)	2.51E-04 (2.51E-02)	8.22E-04 (8.22E-02)	0.60%
Air Submersion from Plant Gaseous Releases	1.48E-11 (1.48E-09)	1.57E-11 (1.57E-09)	4.10E-11 (4.10E-09)	1.61E-11 (1.61E-09)	0.00%
Ground Deposition from Gaseous Releases	1.74E-08 (1.74E-06)	1.84E-08 (1.84E-06)	4.37E-08 (4.37E-06)	2.15E-08 (2.15E-06)	0.00%
Totals	1.42E-01 (1.42E+01)	1.35E-01 (1.35E+01)	1.35E-01 (1.35E+01)	1.36E-01 (1.36E+01)	100%

Table 8: Cumulative Dose Impacts – Cylinder Storage Pad 20% Build-Out

Pathway	Lung	Thyroid	Bone Surface	Effective	% of Total Eff. Dose
	Person-Sv (Person-Rem)	Person-Sv (Person-Rem)	Person-Sv (Person-Rem)	Person-Sv (Person-Rem)	
Direct / Scatter Dose from Cylinders on Pad	2.40E-01 (2.40E+01)	2.40E-01 (2.40E+01)	2.40E-01 (2.40E+01)	2.40E-01 (2.40E+01)	99.99%
Inhalation from Plant Gaseous Releases	1.64E-04 (1.64E-02)	1.37E-08 (1.37E-06)	6.00E-06 (6.00E-04)	1.97E-05 (1.97E-03)	0.01%
Air Submersion from Plant Gaseous Releases	3.54E-13 (3.54E-11)	3.74E-13 (3.74E-11)	9.80E-13 (9.80E-11)	3.84E-13 (3.84E-11)	0.00%
Ground Deposition from Plant Gaseous Releases	9.56E-10 (9.56E-08)	1.01E-09 (1.01E-07)	2.41E-09 (2.41E-07)	1.18E-09 (1.18E-07)	0.00%
Totals	2.40E-01 (2.40E+01)	2.40E-01 (2.40E+01)	2.40E-01 (2.40E+01)	2.40E-01 (2.40E+01)	100%

Table 9: Annual Individual Dose Impact for Build-out SBM Facilities

Location #	Lung	Thyroid	Bone Surface	Effective
	mSv/yr (mrem/yr)	mSv/yr (mrem/yr)	mSv/yr (mrem/yr)	mSv/yr (mrem/yr)
1	0.515 (51.5)	0.504 (50.4)	0.504 (50.4)	0.505 (50.5)
2	0.530 (53.0)	0.504 (50.4)	0.505 (50.5)	0.507 (50.7)
3	0.112 (11.2)	0.101 (10.1)	0.101 (10.1)	0.102 (10.2)
4	0.125 (12.5)	0.101 (10.1)	0.102 (10.2)	0.104 (10.4)

Table 10: Annual Individual Dose Impact for Build-out of Full Tails, Full Feed, and Empty Cylinder Storage Pad

Pathway	Lung mSv (mrem)	Thyroid mSv (mrem)	Bone Surface mSv (mrem)	Effective mSv (mrem)
Direct / Scatter Dose from Cylinders on Pad	1.96E+00 (1.96E+02)	1.96E+00 (1.96E+02)	1.96E+00 (1.96E+02)	1.96E+00 (1.96E+02)
Inhalation from Plant Gaseous Releases	8.87E-04 (8.87E-02)	7.42E-08 (7.42E-06)	3.25E-05 (3.25E-03)	1.07E-04 (1.07E-02)
Air Submersion from Plant Gaseous Releases	1.92E-12 (1.92E-10)	2.03E-12 (2.03E-10)	5.30E-12 (5.30E-10)	2.08E-12 (2.08E-10)
Ground Deposition from Plant Gaseous Releases	4.63E-09 (4.63E-07)	4.90E-09 (4.90E-07)	1.17E-08 (1.17E-06)	5.74E-09 (5.74E-07)
Total	1.96E+00 (1.96E+02)	1.96E+00 (1.96E+02)	1.96E+00 (1.96E+02)	1.96E+00 (1.96E+02)

Table 11: Average Air HF Concentration to Construction Workers

Receptor Location	From TSB GEVS (ugm/m^3)	From SBM GEVS (ugm/m^3)	Total (ugm/m^3)
1	9.02E-04	1.19E-03	2.09E-03
2	1.16E-03	4.07E-03	5.23E-03
3	1.40E-03	8.71E-04	2.27E-03
4	3.14E-03	1.54E-03	4.69E-03
5	7.17E-04	6.00E-04	1.32E-03
6	5.25E-04	4.65E-04	9.90E-04
7	6.42E-04	4.76E-04	1.12E-03
8	3.87E-04	2.75E-04	6.63E-04
9	2.99E-04	2.67E-04	5.65E-04
10	3.54E-04	2.43E-04	5.97E-04