AREVA

September 30, 2014
10 CFR 70.5

AES-O-NRC-14-02916

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
License SNM-2015

Subject: AES License Basis Documents, Revision 5

This letter submits both hard copies and electronic copies of Revision 5 of the AREVA Enrichment Services (AES) License Basis Documents (LBDs) for the Eagle Rock Enrichment Facility (EREF). No changes have been made to the current Revision 6 of the Quality Assurance Plan Description (QAPD).

Revision 5 of the LBDs incorporates changes which have been previously identified in AES correspondence (see References 1-8). These changes include physical changes to the facility, changes related to Foreign Ownership, Control, or Influence (FOCI) updates, and changes associated with two recently approved License Amendment Requests (LAR #13-01 and #13-02). Enclosure 1 provides a summary description of the changes incorporated into the revisions. Enclosure 2 provides a listing of the updated LBD pages. All changes are marked with a side bar and revision number on each page.

Enclosure 3 provides an affidavit supporting our request to withhold proprietary and ECI in accordance with 10 CFR 2.390(b).

Enclosures 4 and 5 provide the hard copies of the revised pages. Enclosure 5 contains SUNSI information and AES requests this information be withheld from public disclosure in accordance with 10 CFR 2.390.

Enclosures 6 - 8 provide compact discs containing the EREF License Basis Documents Revision 5 and the Quality Assurance Program Description (QAPD) Revision 6 in accordance with 10 CFR 70.21, Filing, and 10 CFR 70.5, Communications.

1) Disc 1 provides the portions of the EREF License Basis Documents Revision 5 that do not contain any proprietary, security-related sensitive unclassified non-safeguards information (SUNSI), or export control information (ECI), and also provide the QAPD Revision 6.

NMSS01
NMSS

AREVA ENRICHMENT SERVICES LLC

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2) Disc 2 provides the portions of the EREF License Basis Documents Revision 5 that contain either proprietary or SUNSI information that AES is requesting be withheld from public disclosure in accordance with 10 CFR 2.390. In accordance with 10 CFR 2.390(b) an affidavit supporting our request to withhold this proprietary and SUNSI information is enclosed.
3) Disc 3 provides the portions of the EREF License Basis Documents Revision 5 that contain information deemed ECI under 10 CFR 810. AES requests that this ECI information be withheld from public disclosure in accordance with 10 CFR 2.390, paragraphs (a)(1) and (a)(3).

AES has reviewed the changes in accordance with Section 19 of the Quality Assurance Program Description; 10 CFR 40.35(f), 10 CFR 51.22, 10 CFR 70.32, 10 CFR 70.72, or 10 CFR 95.19; and License Conditions 13 and 24 and determined that the changes, exclusive of the changes NRC approved in References 6 and 8, can be made without prior NRC review and approval. There is no decrease in the effectiveness of safety commitments in the License Basis Documents.

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

Respectfully,

James A. Kay
Licensing Manager

References:

1. AES-O-NRC-12-02413, Notification of Changes, dated October 26, 2012
2. AES-O-NRC-13-02542, Annual Summary of Changes to the EREF Integrated Safety Analysis Summary, dated January 31, 2013
3. AES-O-NRC-13-02908, Foreign Ownership, Control, or Influence (FOCI) Information – Update to Standard Practice Procedure Plan (SPPP) Appendix 1, Certificate Pertaining to Foreign Interests; and Appendix 2, Owners, Officers, Directors, and Executive Personnel (OODEP), dated January 31, 2014
4. AES-O-NRC-13-02569, License Amendment Request (LAR) 13-01, Elimination of a Sole IROFS - IROFS52, dated March 26, 2013
5. AES-O-NRC-13-02687, License Amendment Request (LAR) 13-02, Request to Modify Materials License SNM-2015, License Condition #10, dated June 24, 2013
6. NRC Letter to AES, Approval of License Amendment Request 13-02, Request to Modify Materials License SNM-2015, License Condition #10, dated September 27, 2013
7. AES-O-NRC-13-02912, Foreign Ownership, Control, or Influence (FOCI) Information – Update to Standard Practice Procedure Plan (SPPP) Appendix 1, Certificate Pertaining to Foreign Interests, dated March 17, 2014

8. NRC Letter to AES, Approval of License Amendment Request 13-01, Request to Eliminate Sole IROFS52, dated April 17, 2014

Enclosures:

1) Summary Description of Changes
2) List of Updated Licensing Basis Document Pages
3) Affidavit of James A. Kay
4) Hard copies of Revision 5 to the License Basis Documents (non-SUNSI)
5) Hard copies of Revision 5 to the License Basis Documents (SUNSI)
6) Disc 1 – Portions of the EREF License Basis Documents Revision 5 that do not contain any proprietary, security-related sensitive unclassified non-safeguards information (SUNSI), or export control information (ECI), and also provides the QAPD Revision 6.
7) Disc 2 – Proprietary and SUNSI portions of the Safety Analysis Report; Emergency Plan; Fundamental Nuclear Material Control Plan; Physical Security Plan; Standard Practice and Procedure Plan; Redacted version of the Integrated Safety Analysis Summary
8) Disc 3 – ECI portions of the Integrated Safety Analysis Summary

cc: James Smith, U.S. NRC Senior Project Manager
Deborah Seymour, Branch Chief, Region II, USNRC

Enclosure 1
Summary Description of Changes

The following provides a summary description of the changes reflected in Revision 5 of the LBD. No changes were made to Revision 6 of the QAPD.

Physical Changes (see References 1 and 2)

- The PIV Diesel Generator Rooms/Buildings have been eliminated.
- The stand-alone Visitor Center has been eliminated.
- The Short Term and Long Term Warehouses have been combined into one building.
- The Electrical Switchyard has been relocated from its initial location (adjacent to the Twin Buttes Substation) to its current location northwest of the Electrical Services Building.
- The Northern Cylinder Storage Pads have been rearranged.
- The fire hydrants along the outer loop road on the east and west sides of the site and on the north side of the Northern Cylinder Storage Pads have been eliminated.

FOCI Updates (see References 3 and 7)

The changes reflect the AREVA Group internal reorganization as it affects AES, and clarifies the introductory remarks and updates the information in Appendix 1.

Operational Programs Moved from Environmental Report (ER) (LAR #13-02) (see References 5 and 6)

The relevant information from ER Sections 6.1.1 and 6.1.2 related to the topics below has been inserted into Section 9.2 of the Safety Analysis Report (SAR):

- Radiological effluent monitoring program
- Radiological environmental monitoring program
- Features for waste minimization

Elimination of a Sole IROFS (LAR #13-01) (see References 4 and 8)

IROFS52 has been eliminated and the associated seismic requirements have been changed from the Design Basis Earthquake – Piping (DBE-P) to the non-safety related Investment Protection Earthquake (IPE) for the centrifuges, centrifuge piping, cascade headers, and associated supports in the Cascade Hall as well as the UF_6 piping, UF_6 components, and associated supports in the Process Services Corridor.

Enclosure 2 – List of Updated Licensing Basis Documents Pages

Integrated Safety Analysis Summary
ISAS Figure 3.1-1 (SUNSI)
ISAS Figure 3.2-2 (SUNSI)
ISAS Figure 3.2-3A (SUNSI)
ISAS Figure 3.2-3B (SUNSI)
ISAS Figure 3.2-5 (SUNSI)
ISAS Figure 3.2-10A (SUNSI)
ISAS Figure 3.2-12 (SUNSI)
ISAS Section 3.3.1.1 0.1, page 3.3-22 (SUNSI)
ISAS Section 3.3.1.13, page 3.3-25 (SUNSI)
ISAS Figure 3.3-1 (SUNSI)
ISAS Figure 3.3-10 (SUNSI)
ISAS Figure 3.3-11 (SUNSI)
ISAS Section 3.5.4.2.3, page 3.5-25 (SUNSI)

Safety Analysis Report
SAR Section 1.1.2, pages 1.1-5 and 1.1-7
SAR Figure 1.1-3 (SUNSI)
SAR Figure 1.1-4 (SUNSI)
SAR Section 3.3.3, page 3.3-8
SAR Figure 4.7-2 (SUNSI)
SAR Section 7.3.1, pages 7.3-1 and 7.3-2
SAR Section 7.5.1.1.1, page 7.5-2
SAR Section 7.5.1.4, pages 7.5-4 and 7.5-5
SAR Figure 7.5-1, Sheet 1 of 2 (SUNSI)
SAR Figure 7.5-2 (SUNSI)

Emergency Plan
EP Section 1.2.1.2, page 1.2-1 (SUNSI)
EP Figure 1.2-1 (SUNSI)
EP Figure 1.3-1 (SUNSI)
EP Figure 1.3-4 (SUNSI)
EP Section 5.4.1.1, page 5.4-1 (SUNSI)

Fundamental Nuclear Materials Control Plan
FNMCP Figure 5.1-1 (SUNSI)
FNMCP Figure 5.1-2 (SUNSI)
FNMCP Figure 5.1-3 (SUNSI)
FNMCP Figure D-3 (SUNSI)
FNMCP Figure D-4 (SUNSI)

Physical Security Plan
PSP Section 1.0, page 1-1 (SUNSI)
PSP Figure 1.0-1 (SUNSI)
PSP Figure 1.1-1 (SUNSI)
PSP Section 3.4, page 3-2 (SUNSI)

Standard Practice Procedures Plan
SPPP Figure 3.2-1 (SUNSI)
SPPP Figure 3.2-2 (SUNSI)
SPPP, Appendix 1, pages 1-1 to 1-5 (SUNSI)
SPPP, Appendix 2 (SUNSI)

LAR #13-01 - Eliminate IROFS52

ISAS Section 3.2.6.3, pages 3.2-24 - 3.2-25 (SUNSI)
ISAS Section 3.3, page 3.3-1 (SUNSI)
ISAS Section 3.5.1, page 3.5-1 (SUNSI)
ISAS Section 3.7, page 3.7-1 (SUNSI)
ISAS Table 3.7-3, page 2 of 11 (SUNSI)
ISAS Table 3.7-3, page 3 of 11(SUNSI)
ISAS Table 3.7-3, page 11 of 11 (SUNSI)
ISAS Table 3.7-4, pages 6 of 37 and 7 of 37 (SUNSI)
ISAS Table 3.8-1, page 12 of 36 (SUNSI)
ISAS Table 3.8-2, page 3 of 5 (SUNSI)
ISAS Appendix E, pages E-2, E-3, E-6, E-8, E-9, E-12, E-13 and E-14 (SUNSI)
ISAS Appendix E, Table 2-14 (SUNSI)
ISAS Appendix E, Table 2-15 (new) (SUNSI)
SAR Section 3.3.2, page 3.3-5
SAR Section 6.3.2.3 page 6.3-4
EP Section 2.1.1.1, pages 2.1-1 through 2.1-2 (SUNSI)

LAR #13-02 – Eliminate Updating of ER

SAR Section 9.0 TOC, pages 9-ii and 9-iii
SAR Section 9.2.2, pages 9.2-2 – 9.2-7
SAR Section 9.3, page 9.3-1
SAR Tables 9.2-1 through 9.2-4
SAR Figure 9.2-1(SUNSI)
SAR Figure 9.2-2

FOCI Updates

SAR, Section 1.2.1, pages 1.2-1 and 1.2-2
FNMCP, Section 1.1, page 1.1-1 (SUNSI)

Enclosure 3
Affidavit of James A. Kay

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 information contained in Enclosure 7 and ECI information contained in Enclosure 8. 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 and ECI information sought to be protected should be withheld from public disclosure.
   1. The information is sought to be withheld from public disclosure because it has been held in confidence by AES. This information is proprietary to AES, and AES seeks to protect it as such. The information proprietary to AES is found in documents listed in paragraph (d) above. AES has separated the proprietary information from non-proprietary information in these documents. Therefore, AES seeks to protect the separated information from public disclosure.
   2. 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 provide a competitive advantage to AES.
   3. 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.
   4. The information sought to be withheld is not available in public sources, to the best of AES's knowledge and belief.
   5. 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.

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 30, 2014

J. A. Kay

Mr. James A. Kay
Licensing Manager
400 Donald Lynch Boulevard
Marlborough, MA 01752

Barbara Ann Lema

Notary Public

BARBARA ANN LEMA
Notary Public
COMMONWEALTH OF MASSACHUSETTS
My Commission Expires
August 11, 2017

Enclosure 4

Hard copies of Revision 5 to the License Basis Documents (non-SUNSI)

- Environmental Laboratory Area - provides rooms and space for various laboratory areas that receive, prepare, and store various samples

Centrifuge Assembly Building (CAB)

This building is used to assemble centrifuges before they are moved into the Separations Building and installed in the cascades. The overall layout of the Centrifuge Assembly Building (CAB) is presented in Figures 1.1-11 and 1.1-12. The major functional areas of the CAB are:

- Centrifuge Component Storage Areas
- Centrifuge Assembly Areas
- Assembled Centrifuge Storage Areas
- Building Office Area
- Centrifuge Test and Post Mortem Facilities.

Source material and SNM are used and produced in this area.

Administration Building

The Administration Building is on the east end of the site. The Security and Secure Administration Building is connected to the west side of the Administration Building. The Administration Building is shown in Figure 1.1-4. It contains general office areas and a Visitor Center. Vehicular traffic passes through a security checkpoint before being allowed to park. Parking is located outside of the Controlled Access Area (CAA) security fence. Personnel enter the Administration Building and general office areas via the main lobby.

Security and Secure Administration Building

The Security and Secure Administration Building is on the east end of the site. The Administration Building is connected to the east side of the Security and Secure Administration Building. The Security and Secure Administration Building contains secure office areas. The Entry Exit Control Point (EECP) for the facility is located at the boundary between the Administration Building and the Security and Secure Administration Building. All personnel access to inside areas of the plant occurs at this location.

Personnel requiring access to facility areas or the CAA must pass through the EECP. The EECP is designed to facilitate and control the passage of authorized facility personnel and visitors.

Guard House

The main facility Guard House is located at the entrance to the plant. It functions as a security checkpoint for all incoming and outgoing traffic. Employees, visitors and trucks that have access approval will be screened at the main Guard House. Smaller Vehicle Inspection Guard Houses are also located at each of the three vehicle access points into the Controlled Access Area of the facility.

Cylinder Receipt and Shipping Building

The overall layout of the Cylinder Receipt and Shipping Building (CRSB) is presented in Figure 1.1-13. The CRSB is located near the Cylinder Storage Pads. This building contains equipment to receive, inspect, weigh and temporarily store cylinders of feed UF_6 sent to the plant; temporarily store, inspect, weigh, and ship cylinders of enriched UF_6 to facility customers; receive, inspect, weigh, and temporarily store empty product and depleted uranium tails cylinders prior to being filled in the Separations Building; and inspect, weigh, and transfer filled

Source material and SNM are used on the Full Product Cylinder Storage Pad while only source material is used on the Northern Cylinder Storage Pads.

Electrical Services Building (ESB)

The ESB is located immediately north of the SBMs. It houses four standby diesel generators (DGs), which provide the site with standby power. The ESB is shown on Figure 1.1-16.

The building also contains day tanks, switchgear, control panels, and building heating, ventilation, and air conditioning (HVAC) equipment. The rooms housing the standby DGs are constructed independent of each other with adequate provisions made for maintenance, as well as equipment removal and equipment replacement via roll-up and access doors.

Gasoline and Diesel Fueling Station (GDFS)

A Gasoline and Diesel Fueling Station is located to the south of the SBM 3/4 MSB. The GDFS supports vehicle fueling from an adjacent fuel pump island and on-site vehicle repair and maintenance conducted inside the building.

Mechanical Services Buildings (MSBs)

The two MSBs are located south of the SBMs. They house air compressors, the demineralized water system, the centrifuge cooling water system pumps, heat exchangers, and expansion tanks. The MSB is presented in Figure 1.1-15.

Electrical Services Building for the CAB

An Electrical Services Building that supports the CAB (ESB-CAB) is located to the east of the CAB. The ESB-CAB houses four transformers and switchgear, which provide the CAB and the adjacent long term warehouse with power. The ESB-CAB also contains control and lighting panels. The ESB-CAB is presented in Figure 1.1-17.

1.1.3 Process Descriptions

This section provides a description of the various processes analyzed as part of the Integrated Safety Analysis. A brief overview of the entire enrichment process is provided followed by an overview of each major process system.

1.1.3.1 Process Overview

The enrichment process at the EREF is basically the same process described in the SAR for the National Enrichment Facility (LES, 2005). The Nuclear Regulatory Commission (NRC) staff documented its review of the National Enrichment Center license application and concluded that LES's application provided an adequate basis for safety and safeguards of facility operations and that operation of the National Enrichment Facility would not pose an undue risk to worker and public health and safety (NRC, 2005). The design of the EREF incorporates the latest safety improvements and design enhancements from the enrichment facilities currently operating and under construction in Europe.

The primary function of the facility is to enrich natural uranium hexafluoride (UF_6) by separating a feed stream containing the naturally occurring proportions of uranium isotopes into a product stream enriched in ^{235}U and a tails stream depleted in the ^{235}U isotope. The feed material for the enrichment process is uranium hexafluoride (UF_6) with a natural composition of isotopes ^{234}U, ^{235}U, and ^{238}U. The enrichment process is a mechanical separation of isotopes using a fast rotating cylinder (centrifuge) based on a difference in centrifugal forces due to differences in

1.2 INSTITUTIONAL INFORMATION

This section provides the applicant's corporate identity and location, applicant's ownership organization and financial information. Also, the type, quantity, and form of licensed material to be used at the facility, and the type(s) of license(s) being applied for are discussed.

1.2.1 Corporate Identity

1.2.1.1 Applicant

The Applicant's name, address, and principal office are as follows:

AREVA Enrichment Services, LLC
400 Donald Lynch Boulevard
Marlboro, MA 01752

1.2.1.2 Organization and Management of Applicant

AREVA Enrichment Services LLC ("AES") is a Delaware limited liability company. It has been formed solely to provide uranium enrichment services for commercial nuclear power plants. AES is a wholly owned subsidiary of AREVA Inc., the survivor of a merger on January 1, 2014 of AREVA NC Inc. (AES' former direct parent), AREVA NP USA Inc., Transnuclear, Inc., and COGEMA Resources Inc. (formerly affiliates of AES), with and into AREVA NP Inc. (incorporated in Delaware, April 24, 1989), which, effective January 1, 2014, was renamed AREVA Inc. AREVA Inc. is a wholly owned subsidiary of AREVA NP SAS, which is part of AREVA SA..

The AREVA SA is a corporation formed under the laws of France ("AREVA"), is governed by the Executive Board, and its principal owners are as follows.

• Commissariat à l'Energie Atomique (French Atomic Energy Commission)	61.52%
• French State	21.68%
• BPI – Groupe	3.32%
• Electricité d 'France	2.24%
• Public	4.11%
• Framepargne	0.23%
• Kuwait Investment Authority	4.82%
• Group Total	0.95%
• AREVA	0.20%
• Employees	0.94%
TOTAL	100%

AES is a Delaware LLC and is governed by the AES Management Committee. The names and addresses of the AES Management Committee are as follows.

- Mr. Marc Chevrel, Chairman of the Management Committee
  Tour AREVA, 1 place Jean Millier, 92084 Paris La Defense, France

Mr. Chevrel is a citizen of France

- Ms. Aline des Cloizeaux, Member of the Management Committee
  Tour AREVA, 1 place Jean Millier, 92084 Paris La Defense, France

  Ms. des Cloizeaux is a citizen of France

- Mr. Guillaume Dureau, Member of the Management Committee
  Tour AREVA, 1 place Jean Millier, 92084 Paris La Defense, France

  Mr. Dureau is a citizen of France

- Mr. Michael Rencheck, Member of the Management Committee
  Tour AREVA, 1 place Jean Millier, 92084 Paris La Defense, France

  Mr. Rencheck is a citizen of the United States of America

- Mr. Paul Myers, Member of the Management Committee
  7207 IBM Drive, Charlotte, NC 28262, USA

  Mr. Myers is a citizen of the United States of America

- Mr. Michael McMurphy, Member of the Management Committee
  1155 F Street NW Suite 800, Washington, DC 20004, USA

  Mr. McMurphy is a citizen of the United States of America

- Ms. Katherine Williams, Member of the Management Committee
  7207 IBM Drive, Charlotte, NC 28262, USA

  Ms. Williams is a citizen of the United States of America

- Mr. Sam Shakir, Member of the Management Committee
  Tour AREVA, 1 place Jean Millier, 92084 Paris La Defense, France

  Mr. Shakir is a citizen of the United States of America and a citizen of Canada

The President and Chief Executive Officer (CEO) of AES is Mr. Paul Myers, a citizen of the United States of America. Any safety decision related to the operation of the facility will be made by the President of AES.

AES's principal location for business is Marlboro, MA. The facility will be located in Bonneville County near Idaho Falls, Idaho. No other companies will be present or operating on the EREF site other than services specifically contracted by AES.

AES is responsible for the design, quality assurance, construction, operation, and decommissioning of the enrichment facility. The President and CEO of AES report to the AES Management Committee.

Foreign Ownership, Control, and Influence (FOCI) of AES is addressed in the AES Standard Practice Procedures Plan, Appendix 1 - FOCI Package. The NRC, in its letter to Louisiana Energy Services, dated March 24, 2003, has stated "...that while the mere presence of foreign ownership would not preclude grant of the application, any foreign relationship must be examined to determine whether it is inimical to the common defense and security [of the United States]" (NRC, 2003b). The FOCI Package mentioned above provides sufficient information for this examination to be conducted.

The ASCE standard outlines a methodology to demonstrate compliance to a target performance goal of 1.0E-05 annual probability by designing to a seismic hazard of 1.0E-04 annual probability. The difference between the design level and the performance target is accounted for in the detailed design process by confirmatory calculations.

Based on these approaches, the DBE for the EREF buildings assumed to withstand seismic events in the ISA has been selected as the 10,000-year (1.0E-04 mean annual probability) earthquake. For the EREF, following the ASCE approach provides a risk reduction ratio of design to target performance of 10 (1.0E-04/1.0E-05). This DBE for the buildings will be used in the detailed design process to demonstrate compliance with the overall ISA performance requirements. This will be accomplished by confirmatory seismic performance calculations for the QA Level 1 and QA Level 2 seismic Items Relied on for Safety (IROFS) during detailed design. The ASCE standard addresses design and evaluation of structures, systems, and components (SSCs). The equivalents of SSCs for the EREF are considered to be the IROFS and the items that may affect the function of IROFS. The objective of the EREF seismic design approach is to demonstrate that use of this DBE for the buildings achieves a likelihood of unacceptable performance of less than approximately 1.0E-05 per year, by introducing sufficient design safety margins, i.e., conservatism, during the design process to allow for demonstration of compliance to the target performance goal. The ASCE standard implements this objective with the end result of demonstrating compliance to the target performance goal.

The ASCE approach is based on achieving the target performance goal annual frequencies by incorporating sufficient conservatism in the seismic demand and structural capacity evaluations to achieve both of the following:

- Less than about a 1% probability of unacceptable performance for the DBE ground motion
- Less than a 10% probability of unacceptable performance for a ground motion equal to 150% of the DBE ground motion

The ASCE method is based on achieving both of the above probability goals, which represent two points on the underlying fragility curve. Meeting these two probability goals allows the target performance probabilities to be achieved with less possibility of non-conservatism. The resulting nominal factors of safety against conditional probability of failure are 1.0 and 1.5, respectively, for the above two goals.

The actual seismic design detailed approach for EREF will be based on the ASCE method. The safety margins will be representative of those discussed above and described in more detail in the ASCE standard.

The difference between the mean annual probabilities for design (1.0E-04) and performance (1.0E-05) is achieved through conservatism in the design (factors of safety), elasticity in the structures, and conservatism in the evaluation of the design.

- As a result of the additional site subsurface investigation to be conducted to support the final design of the EREF, if a potential for soil liquefaction is determined to exists, an assessment of soil liquefaction potential will be performed using the applicable guidance of Regulatory Guide 1.198, Procedures and Criteria for Assessing Seismic Soil Liquefaction at Nuclear Power Plant Sites (NRC, 2003a).

- The Gasoline and Diesel Fueling Station is designed to meet the construction type, occupancy, and exiting requirements of the IBC (ICC, 2006).
- The Gasoline and Diesel Fueling Station is designed to resist the normal load conditions as defined by the IBC (ICC, 2006) using structural steel framing.
- The two Mechanical Services Buildings are designed to meet the construction type, occupancy and exiting requirements of the IBC (ICC, 2006).
- Each Mechanical Services Building structure is designed to resist the normal load conditions as defined by the IBC (ICC, 2006), using structural steel framing.
- The Administration Building is designed to meet the construction type, occupancy and exiting requirements of the IBC (ICC, 2006).
- The Administration Building superstructure is designed to resist normal load conditions as defined by the IBC (ICC, 2006), using structural steel framing.
- The Security and Secure Administration Building is designed to meet the construction type, occupancy and exiting requirements of the IBC (ICC, 2006).
- The Security and Secure Administration Building structure is designed to resist normal load conditions as defined by the IBC (ICC, 2006), using structural steel framing.
- The Guard House is designed to meet the occupancy and exiting requirements set by the IBC (ICC, 2006).
- The Guard House structure is designed to resist normal load conditions as defined by the International Building Code (ICC, 2006), using structural steel framing.

3.3.4 Structural Design Criteria

- As part of the Integrated Safety Analysis for external events, the following structures (buildings and areas) were determined to be required to withstand the design basis natural phenomena hazards and external hazards defined in the ISA Summary:
  - Separations Building Modules (UF_6 handling area, process service corridors, and cascade halls including the link corridors, electrical support rooms and second floor mechanical rooms)
  - BSPB
  - Cylinder Receipt and Shipping Building
  - TSB
- The above structures shall be designed to withstand the effects of external events (i.e., seismic, winds, snow, and local intense precipitation).
- The determination of normal wind pressure loadings and the design for wind loads for all structures and structural components exposed to wind are based on the requirements of the IBC (ICC, 2006), Section 1609 which further refers to the wind design requirements of ASCE 7-05, Chapter 6.0 (ASCE, 2005a).
- The structures and components listed above exposed to wind are designed to withstand the Extreme Environmental wind as defined in the ISA Summary Section.

level. At 6% enrichment, the maximum allowable U concentration value for a 24 hour average concentration is 5.47 mg/m3.

6.3.2.2 Chemical Release Scenarios

The EREF ISA Summary presents the evaluation level chemical release scenarios based on the criteria applied in the ISA. Information on the criteria for the development of these scenarios is also provided in the EREF ISA Summary.

6.3.2.3 Source Term

The methodologies used to determine source term are those prescribed in NUREG/CR-6410 (NRC, 1998) and supporting documents.

6.3.2.3.1 Dispersion Methodology

In estimating the dispersion of chemical releases from the facility, conservative dispersion methodologies were utilized. Site boundary atmospheric dispersion factors were generated using a computer code based on Regulatory Guide 1.145 (NRC, 1982) methodology. The code was executed using five years (2003-2007) of meteorological data collected at Argonne National Lab-West (EBR) which is now identified as MFC (Materials and Fuels Complex), a mesonet station on the Idaho National Laboratory (INL) property that is located 18 kilometers (11 miles) west of the EREF site. This station was judged to be representative of the EREF site because both are located in the Eastern Snake River Plain and have similar climates and topography.

The specific modeling methods utilized follow consistent and conservative methods for source term determination, release fraction, dispersion factors, and meteorological conditions as prescribed in NRC Regulatory Guide 1.145 (NRC, 1982).

For releases inside of buildings, conservative leak path fractions were assumed as recommended by NUREG/CR-6410 (NRC, 1998) and ventilation on and off cases were evaluated for consideration of volumetric dilution and mixing efficiency prior to release to atmosphere.

6.3.2.3.2 RASCAL 4.1 Dispersion Methodology

The NRC recognized dispersion methodology is the RASCAL 4.1 model, which was developed by the NRC.

The specific modeling methods utilized follow consistent and conservative methods for source term determination, release fraction, dispersion factors and meteorological conditions as prescribed by the NRC. The EREF may use the RASCAL 4.1 with validation and verification documentation.

6.3.2.4 Chemical Hazard Evaluation

This section is focused on presenting potential deleterious effects that might occur as a result of chemical release from the facility. As required by 10 CFR 70 (CFR, 2008a), the likelihood of these accidental releases fall into either unlikely or highly unlikely categories.

7.3 FACILITY DESIGN

The design of the facility incorporates the following:

- Liimits on areas and equipment subject to contamination
- Design of facilities, equipment, and utilities to facilitate decontamination.

7.3.1 Building Construction

The facility consists of several different process-related buildings and functional areas:

Separations Building Modules (SBMs) which include the following areas:

  - Cascade Halls
  - Process Service Corridor
  - Link Corridor
  - Electrical and Mechanical Equipment Rooms
- UF_6 Handling Area
- Cylinder Receipt and Shipping Building (CRSB)
- Blending, Sampling, and Preparation Building (BSPB)
- Centrifuge Assembly Building (CAB)
- Northern Cylinder Storage Pads and Full Product Cylinder Storage Pad
- Technical Support Building (TSB)
- Operation Support Building (OSB)

There are also numerous utility support and non-process structures and areas including:

- Electrical Services Building (ESB)
- Electrical Services Building for the Centrifuge Assembly Building
- Mechanical Services Buildings (MSBs)
- Guard House
- Administration Building, including a Visitor Center
- Security and Secure Administration Building
- Long and Short-Term Warehouse
- Electrical Switchyard
- Domestic Sanitary Sewage Treatment Plant
- Fire, Process, and Domestic Water Tanks and Pump Buildings
- Fuel Oil Storage Tanks
- Liquid Nitrogen (N_2) Package
- Gasoline and Diesel Fueling Station

The SBMs, UF_6 Handling Area, BSPB, TSB, and OSB are protected steel frame buildings with insulated metal panel exterior walls. Structural elements of these buildings are protected structural steel columns and trusses with built-up composite roofing on metal deck. Select interior walls are concrete or masonry as required by code or to support equipment loads. These process buildings all share at least one wall. Accordingly, to meet building code allowable area requirements, these are classified as Type IB in accordance with the IBC (ICC, 2006). This is equivalent to Type II, 222 construction per NFPA 220 (NFPA, 2006c).

The CRSB is separated from the other process buildings and will also be a protected steel frame building with insulated metal panel exterior walls and protected columns and trusses with built-up composite roofing on metal deck meeting Type IB construction requirements.

The CAB will be an unprotected steel frame building with insulated metal panel exterior walls and with built-up composite roofing on metal deck. This construction is classified as non-combustible Type IIB in accordance with the International Building Code (IBC) (ICC, 2006). This is equivalent to Type II, 000 construction per NFPA 220 (NFPA, 2006c). The CAB shares a portion of one wall with the SBMs. The separating construction at this interface will be fire-rated as required to separate the CAB from the adjoining process structures.

The remaining utility and non-process related structures including the Security Buildings, Administration Building, Short and Long Term Warehouse, Electrical and Mechanical Services Buildings, a Sanitary Sewage Treatment Plant, Gasoline and Diesel Fueling Station are all independent from the main plant process buildings. These structures will be unprotected steel frame buildings with insulated metal panel exterior meeting Type IIB construction.

All of the cylinder storage pads are open lay-down areas each consisting of a concrete pad with a dedicated collection and drainage system. Concrete saddles are used for fixed location storage of cylinders. Other stillages or stops may be used for interim storage or to secure cylinders temporarily during movement. The western one third of the Full Product Cylinder Storage Pad is covered by a roof to protect workers from weather while handling cylinders. There are no structures over any of the Northern Cylinder Storage Pads.

7.3.2 Fire Area Determination and Fire Barriers

The facility is subdivided into fire areas by barriers with fire resistance as required by the IBC (ICC, 2006), as required for specific hazards (e.g., National Electrical Code, NFPA 70 (NFPA, 2008c) requirements for transformer vaults), or as determined necessary by the FHA to ensure licensed material safety consistent with the ISA. The design and construction of fire barrier walls is in accordance with NFPA 221 (NFPA, 2006d). These fire areas are provided to limit the spread of fire, protect personnel and limit the consequential damage to the facility. Fire barriers for the main process structures are shown in Figures 7.3-1 through 7.3-8 . The fire resistance rating of fire barrier assemblies is determined through testing in accordance with NFPA 251 (NFPA, 2006e). Openings in fire barriers are protected consistent with the designated fire resistance rating of the barrier. Penetration seals provided for electrical and mechanical openings are listed to meet the guidance of ASTM E-814-02 (ASTM, 2002) or UL 1479 (UL, 2003). Penetration openings for ventilation systems are protected by fire dampers having a rating matched to that of the barrier per code. Door openings in fire rated barriers are protected with fire rated doors, frames and hardware in accordance with NFPA 80 (NFPA, 2007g).

7.3.3 Electrical Installation

All electrical systems at the facility are installed in accordance with NFPA 70 (NFPA, 2008c). Switchgear, motor control centers, panel boards, variable frequency drives, uninterruptible met with the hydraulically shortest flow path assumed to be out of service. Sectional control valves are arranged to provide adequate sectional control of the fire main loop to minimize protection impairments. All fire protection water system control valves are monitored under a periodic inspection program and their proper positioning is supervised in accordance with NFPA 801 (NFPA, 2008e). Exterior fire hydrants, equipped with separate shut-off valves on the branch connection, are provided at intervals to ensure complete coverage of all facility structures, including the Full Product Cylinder Storage Pad and south side of the Northern Cylinder Storage Pads.

The fire pumps are separated from each other by fire-rated barrier construction. One fire pump is electric-motor driven and one is diesel engine-driven to avoid common mode failure (e.g., bad fuel). The electric fire pump is powered from a normal (non-diesel backed) power supply. A dedicated diesel fuel tank is provided in or adjacent to the fire pump building for the diesel-engine driven pump and is sized to provide a minimum eight hour supply of fuel in accordance with NFPA 20 (NFPA, 2007d). The diesel fuel tank will have suitable spill containment.

Each pump is equipped with a dedicated listed controller. The pumps are arranged for automatic start functions upon a drop in the system water pressure as detected by pressure switches contained within the pump controllers. Use of start delay timers prevents simultaneous start of both pumps. Both pumps are maintained in the automatic start condition at all times, except during periods of maintenance and testing. Each fire pump controller interfaces with the site-wide fire alarm system, which is monitored and annunciated in the Control Room, for all alarm and trouble conditions required by NFPA 20 (NFPA, 2007d). Remote manual fire pump start switches are provided in the Control Room. Once activated, the fire pumps can only be shut-off at the pump controller location. Pumps, suction and discharge piping and valves are provided and arranged in accordance with NFPA 20 (NFPA, 2007d). The Fire Pump Building is provided with automatic sprinkler protection.

A jockey pump is provided in the Fire Pump Building to maintain pressure in the fire protection system during normal operation.

7.5.1.1.2 System Interfaces

The Fire Water Supply System interfaces with the site well water supply that supplies fill and make up water to the fire water supply storage tanks.

7.5.1.1.3 Safety Considerations

Failure of the Fire Water Supply System will not endanger public health and safety. The system is designed to assure water supply to automatic fire protection systems, standpipe systems and to fire hydrants located around the facility. This is accomplished by providing redundant water storage tanks and redundant fire pumps which are not subject to a common failure, electrical or mechanical.

Automatic fire suppression systems located in buildings and/or over areas containing licensed material-at-risk, which if released could exceed 10 CFR 70.61 performance requirements, have been designated as IROFS where such protection is practicable. The safety aspects of fire protection IROFS are controlled as follows:

Pre-action fire sprinkler systems are designed for protected areas by hazard class (NFPA) and include:

- Area-wide smoke and/or fire detectors and fire alarm control panels,

7.5.1.3 Portable Extinguishers

Portable fire extinguishers are installed throughout all buildings in accordance with NFPA 10 (NFPA, 2007a). Multi-purpose extinguishers are provided in general areas for Class A, B, or C fires.

The portable fire extinguishers are spaced within the travel distance limitation and provide the area coverage specified in NFPA 10 (NFPA, 2007a). Specialized extinguishers are located in areas requiring protection of particular hazards. Supplemental fire extinguishers will be provided in water exclusion areas. In areas where water discharge is prohibited due to moderator control constraints, the preferred fire extinguisher agent is carbon dioxide due to its suitability for use on electrical equipment and lack of hydrogenous moderator.

7.5.1.4 Automatic Suppression Systems

Fire sprinkler systems are engineered to protect specific hazards in accordance with parameters established by the FHA. NFPA 801 (NFPA, 2008e) requires that fire sprinkler systems be provided for the nuclear related process areas of the facility except where determined unnecessary or inappropriate by the FHA. For the EREF, there are areas where sprinklers may be omitted or only provide partial coverage due to the need to mitigate the risk of criticality. In these cases, other controls to mitigate the impact of fire will be provided as required. The EREF FHA contains a methodology for comparative evaluation of fire risk and criticality risk. This methodology will be applied during detailed design to determine where sprinkler coverage should be limited or omitted and what other controls (i.e., alternate suppression, limitations on combustibles, etc.) should be applied. Automatic fire suppression systems located in buildings and/or over areas containing licensed material-at-risk, which if released could exceed 10 CFR 70.61 performance requirements, have been designated as IROFS where such protection is practicable.

The areas proposed for sprinkler system coverage are shown in Figure 7.5-2, Sprinkler System Coverage including notation of structures/areas where moderator control concerns may limit sprinkler application or coverage.

Automatic pre-action sprinkler systems designed and tested in accordance with NFPA 13 (NFPA, 2007b) are provided in following buildings, subject to moderator control restrictions:

- Process Service Corridor in the Separations Building Module
- UF_6 Handling Area
- Technical Support Building
- Blending, Sampling and Preparation Building

Automatic wet pipe sprinkler systems, designed and tested in accordance with NFPA 13 (NFPA, 2007b) are provided in the following buildings:

- Administration Building
- Security and Secure Administration Building
- Long and Short Term Warehouse
- Fire Pump Building
- Centrifuge Assembly Building

- Operation Support Building

Water flow detection is provided to alarm and annunciate all sprinkler system actuations. Sprinkler system control valves are monitored under a periodic inspection program and their proper positioning is supervised in accordance with NFPA 801 (NFPA, 2008e) to ensure the systems remain operable.

7.5.1.5 Fire Detection Systems

Facility structures are provided with automatic fire detection installed in accordance with NFPA 72 (NFPA, 2007f) as required by the FHA or in accordance with the IBC (ICC, 2006). Automatic smoke, heat, or fire detectors are installed as appropriate to the hazard in all process structures as required by the FHA or in accordance with IBC (ICC, 2006) for early detection of fire conditions and/or to actuate pre-action sprinkler valves to charge sprinkler piping in the protected areas. Automatic fire suppression systems located in buildings and/or over areas containing licensed material-at-risk, which if released could exceed 10 CFR 70.61 performance requirements, have been designated as IROFS where such protection is practicable.

All structures protected by wet-pipe sprinkler systems will have sprinkler water flow and other system conditions monitored and alarmed in accordance with NFPA 72 (NFPA, 2007f).

7.5.1.6 Manual Alarm Systems

All facility structures are provided with manual fire alarm pull stations installed in accordance with NFPA 72, (NFPA, 2007f), NFPA 101 [Life Safety Code] (NFPA, 2006b); and as required by the FHA.

7.5.1.7 Fire Alarm System

Each building of the facility is monitored by a local fire alarm control panel (LFACP) installed in accordance with NFPA 72 (NFPA, 2007f). Each panel has a dual power supply, consisting of normal building power and backup power by either 24-hour battery or the facility UPS. The method of backup power will be determined in final design. Activation of a fire detector, manual pull station or water flow device results in an audible and visual alarm at the building control panel and the main fire alarm control panel.

The main fire alarm control panel (MFACP), located in the Control Room, is a listed, microprocessor-based addressable console connected via data highway to each individual LFACP. The MFACP has dual power supplies, consisting of normal building power and backup power by either 24-hour battery or the facility UPS. The method of backup power will be determined in final design. The MFACP monitors all functions associated with the individual building alarm panels and the fire pump controllers. All fire alarms, suppression system actuation alarms, supervisory alarms, and trouble alarms are audibly and visually annunciated by the MFACP and automatically recorded via printout. Failure of the MFACP will not result in failure of any building's LFACP and its associated local control functions (e.g., releasing or local alarming).

All fire pump alarm and trouble conditions are monitored by the MFACP through the fire pump controllers and annunciated in accordance with NFPA 20 (NFPA, 2007d).

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environmental conditions caused by facility operation. The preoperational program will be initiated at least two years prior to facility operation.

The operational program will monitor to ensure facility emissions are maintained ALARA. Sampling focuses on locations within the site perimeter, but may also include distant locations as control sites. Sampling locations have been determined based on NRC guidance found in the document, "Off-site Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors" (NRC, 1991), meteorological information, and current land use. The sampling locations may be subject to change as determined from the results of periodic review of land use.

ER Chapter 6 describes the environmental measurement and monitoring programs as they apply to preoperation (baseline), operation, and decommissioning conditions for both the proposed action and each alternative.

9.2.2.1 Effluent Monitoring

ER Section 6.1, Radiological Monitoring, presents information relating to the facility radiological monitoring program. This section describes the location and characteristics of radiation sources and radioactive effluent. It also describes the various elements of the monitoring program, including:

- Number and location of sample collection points
- Measuring devices used
- Pathway sampled or measured
- Collection frequency and duration
- Method and frequency of analysis, including lower limits of detection.

As a matter of compliance with regulatory requirements, all potentially radioactive effluent from the facility is discharged only through monitored pathways. See ER Section 4.12.2.1.1, Routine Gaseous Effluent, for a discussion of pathway assessment. The effluent sampling program for the EREF is designed to determine the quantities and concentrations of radionuclides discharged to the environment. The uranium isotopes ^{238}U, ^{236}U, ^{235}U, and ^{234}U are expected to be the prominent radionuclides in the gaseous effluent. The annual uranium source term for routine gaseous effluent releases from the 6.6 million SWU EREF plant has been conservatively assumed to be 19.5 MBq (528 μCi) per year, which is proportional to the 4.4 MBq (120 μCi) per year source term applied to the 1.5 million SWU plant described in NUREG-1484 (NRC, 1994).

This is a very conservative annual release estimate used for bounding analyses. Additional details regarding source term are provided in ER Section 4.12, Public and Occupational Health Impacts. Representative samples are collected from each release point of the facility. Because uranium in gaseous effluent may exist in a variety of compounds (e.g., depleted hexavalent uranium, triuranium octoxide, and uranyl fluoride), effluent data will be maintained, reviewed, and assessed by the facility's Radiation Protection/Chemistry Manager to assure that gaseous effluent discharges comply with regulatory release criteria for uranium. Table 9.2-1, Effluent Monitoring Program, presents an overview of the effluent sampling program.

Gaseous effluent from the EREF, which has the potential for airborne radioactivity, will be discharged through the four Separations Building Gaseous Effluent Ventilation Systems (GEVS), the Technical Support Building (TSB) GEVS, the Centrifuge Test and Post Mortem Facilities GEVS, the Centrifuge Test and Post Mortem Facilities Exhaust Filtration System, the

Ventilated Room Heating, Ventilating, and Air Conditioning (HVAC) System, and the TSB Contaminated Area HVAC System.

Liquid effluent discharges will include domestic sanitary wastes from the Domestic Sanitary Sewage Treatment Plant (SSTP) and stormwater runoff. Domestic SSTP effluent is discharged to the Domestic SSTP Basin. General site stormwater runoff is routed to the Site Stormwater Detention Basins and stormwater runoff from the Cylinder Storage Pads (i.e., Full Product Cylinder Storage Pad and Northern Cylinder Storage Pads) is collected in the Cylinder Storage Pads Stormwater Retention Basins. There will be no liquid effluent discharges from plant operations.

9.2.2.1.1 Expected Concentrations

Pursuant to 10 CFR 20 (CFR, 2008a), surveys necessary to demonstrate compliance with these regulations and to demonstrate that the amount of radioactive material present in effluent from the facility has been kept as low as reasonably achievable (ALARA), are required. In addition, the NRC has issued Regulatory Guide 4.15 "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment" (NRC, 1979) and Regulatory Guide 4.16 "Monitoring and Reporting Radioactivity in Releases of Radioactive Materials in Liquid and Gaseous Effluent from Nuclear Fuel Processing and Fabrication Plants and Uranium Hexafluoride Production Plants" (NRC, 1985) that reiterate that concentrations of hazardous materials in effluent must be controlled and that licensees must adhere to the ALARA principal such that there is no undue risk to the public health and safety at or beyond the site boundary.

As noted in ER Section 6.1.1, Effluent Monitoring Program, discharge of gaseous effluent has the highest possibility of the potential pathways, of introducing facility-related uranium into the environment. However, the radioactive materials in gaseous effluents from the EREF are expected to be very low concentrations of uranium because of process and effluent controls. Under routine operating conditions, radioactive material in effluents discharged from the facility will comply with regulatory release criteria.

9.2.2.1.2 Calculation of Total Effective Dose Equivalent

Based on recorded plant effluent data, dose projections to members of the public will be performed monthly to ensure that the annual dose to members of the public does not exceed the ALARA constraint of 0.1 mSv/yr (10 mrem/yr) from air emissions and radioactive materials. Compliance is demonstrated through effluent and environmental sampling data. Compliance with 10 CFR 20.1301 (CFR, 2008a) will be demonstrated using a calculation of the total effective dose equivalent (TEDE) to the individual who is likely to receive the highest dose in accordance with 10 CFR 20.1302(b)(1) (CFR, 2008a). Pursuant to 10 CFR 70 (CFR, 2008e), semiannual reports will be submitted, specifying the quantities of the principal radionuclides released to unrestricted areas and other information needed to estimate the annual radiation dose to the public from effluent discharges. If the monthly dose impact assessment indicates a trend in effluent releases that, if not corrected, could cause the ALARA constraint to be exceeded, appropriate corrective action will be initiated to reduce the discharges to assure that subsequent releases will be in compliance with the annual dose constraint. In addition, an evaluation of the need for increased sampling will be performed. Corrective actions may include, for example, change out of Separation Building or Technical Support Building Gaseous Effluent Vent System filters.

9.2.2.1.3 Effluent Discharge Locations and Sampling

Figure 9.2-1, Effluent Release Points and Meteorological Tower, indicates the locations of air and liquid effluent release points from the facility complex to the environment. Effluents will be sampled as indicated in Table 9.2-1, Effluent Monitoring Program. This table presents an overview of the effluent sampling program. For gaseous effluents, liquid condensate samples from the evaporator exhaust vent and continuous air sampler filters are analyzed for gross alpha and gross beta each week. The filters, or liquid condensate samples, are composited quarterly and an isotopic analysis is performed if a specified gross alpha or gross beta action level is exceeded (as specified in Table 9.2-1). Table 9.2-2, Required Lower Limit of Detection for Effluent Sample Analysis, summarizes detection requirements for gaseous effluent sample analyses. Sampling of liquid effluent discharges to the detention and retention basins are described below in Section 9.2.2.2, Environmental Monitoring.

The guidance in "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors (NRC, 1991) and Regulatory Guide 4.16, "Monitoring and Reporting Radioactivity in Releases of Radioactive Materials in Liquid and Gaseous Effluent from Nuclear Fuel Processing and Fabrication Plants and Uranium Hexafluoride Production Plants" (NRC, 1985) was followed for determining sample locations, analyses, frequencies, durations, and lower limits of detection.

Lastly, Section 6.1 of the ER justifies the choice of sample locations, analyses, frequencies, durations, and lower limits of detection.

9.2.2.2 Environmental Monitoring

ER Section 6.0, Environmental Measurements and Monitoring Programs, also includes information relating to the facility environmental monitoring program. The information presented is the same as that included in the effluent monitoring program, i.e., number and location of sample collection points, etc.

The Radiological Environmental Monitoring Program (REMP) at the EREF is a major part of the effluent compliance program. It provides a supplementary check of containment and effluent controls, establishes a process for collecting data for assessing radiological impacts on the environs and estimating the potential impacts on the public, and supports the demonstration of compliance with applicable radiation protection standards and guidelines. The REMP includes the collection of data during pre-operational years in order to establish baseline radiological information that will be used in determining and evaluating impacts from operations at the plant on the local environment. The REMP will be initiated at least two years prior to plant operations in order to develop a sufficient database. The early initiation of the REMP provides assurance that a sufficient environmental baseline has been established for the plant before the arrival of the first uranium hexafluoride shipment.

Environmental media identified for radiological sampling consist of ambient air, groundwater, soil/sediment, and vegetation. Figure 9.2-2, Modified Site Features with Proposed Sampling Stations and Monitoring Locations, indicates the REMP sampling locations. The types and frequency of radiological environmental sampling and analyses are summarized in Table 9.2-3, Radiological Environmental Monitoring Program. Although the site Domestic Sanitary Sewage Treatment Plant will receive only domestic sanitary wastes, samples will be collected semiannually from the sanitary sewage treatment system and will be analyzed for isotopic uranium.

Because the offsite dose equivalent rate from stored uranium cylinders is expected to be very low and difficult to distinguish from the variance in normal background radiation beyond the site boundary, demonstration of compliance will rely on a system that combines direct dose equivalent measurements and computer modeling to extrapolate the measurements. Environmental thermoluminescent dosimeters (TLDs) placed at the Owner Controlled Area fence line or other location(s) close to the stored uranium cylinders, along with a minimum of two off-site TLD control sampling locations to provide information on regional changes in background radiation levels, will provide quarterly direct dose equivalent information. Where TLD results indicate radiation levels at the fence line in excess of background, the direct dose equivalent at offsite locations will be estimated through extrapolation of the quarterly TLD data using the Monte Carlo N-Particle (MCNP) computer program (ORNL, 2005) or a similar computer program.

A control sample location will be established beyond 8 km (5 mi) in an upwind sector (the sector with a non-prevalent wind direction) that is not in the vicinity of any other facility with a significant radiological source term.

A minimum detectable concentration (MDC) of at least 1.8×10^{-9} Bq/ml (5.0×10^{-14} μCi/ml) is a program requirement (NRC, 2002) for all analyses performed on gaseous effluent samples. That MDC value represents 5% of the limit for any applicable uranium isotope (Class W). Liquid condensate samples from the evaporator discharge are analyzed to an MDC equivalent to 5% or less of the appropriate 10 CFR 20 Appendix B, Table 2, Col. 1 (Air) value (CFR, 2008a). The MDCs for gross alpha (assumed to be uranium) in various environmental media are shown in Table 9.2-4, Required MDC for Environmental Sample Analysis.

9.2.2.3 Waste Minimization

The EREF will also have in place a Decontamination Workshop designed to remove radioactive contamination from equipment and allow some equipment to be reused rather than treated as waste.

In addition, the EREF process systems that handle UF_6, other than the Product Liquid Sampling System, will operate entirely at sub-atmospheric pressure to prevent outward leakage of UF_6. Cylinders, initially containing liquid UF_6, will be transported only after being cooled, so that the UF_6 is in solid form, to minimize the potential risk of accidental releases due to mishandling.

ALARA controls will be maintained during facility operation to minimize the generation of radioactive waste as directed in 10 CFR 20 (CFR, 2008a). The outer packaging associated with consumables will be removed prior to use in a contaminated area. The use of glove boxes will minimize the spread of contamination and waste generation.

9.2.2.4 Data Analysis

Written procedures will be in place to ensure the collection of representative samples, use of appropriate sampling methods and equipment, proper locations for sampling points, and proper handling, storage, transport, and analyses of effluent samples. In addition, the plant's written procedures also ensure that sampling and measuring equipment, including ancillary equipment such as airflow meters, are properly maintained and calibrated at regular intervals. Sampling equipment (pumps, pressure gages, and air flow calibrators) will be calibrated by qualified individuals. Sampling equipment and lines will be inspected for defects, obstructions, and cleanliness. Calibration intervals will be developed based on applicable industry standards.

9.2.2.5 Laboratory Quality Control

All environmental samples will be analyzed onsite. However, samples may also be shipped to a qualified independent laboratory for analyses. The EREF will require that all radiological and non-radiological laboratory vendors are certified by the National Environmental Laboratory Accreditation Program (NELAP) or an equivalent state laboratory accreditation agency for the analytes being tested.

The Quality Control (QC) procedures used by the laboratories performing the plant's Radiological Environmental Monitoring Program will be adequate to validate the analytical results and will conform with the guidance in Regulatory Guide 4.15 (NRC, 1979). These QC procedures include the use of established standards such as those provided by the National Institute of Standards and Technology (NIST), as well as standard analytical procedures such as those established by the National Environmental Laboratory Accreditation Conference (NELAC).

The EREF will ensure that the onsite laboratory and any contractor laboratory used to analyze EREF samples participates in third-party laboratory inter-comparison programs appropriate to the media and analytes being measured.

9.2.2.6 Action Levels

Administrative action levels are established for effluent samples and monitoring instrumentation as an additional step in the effluent control process. All action levels are sufficiently low so as to permit implementation of corrective actions before regulatory limits are exceeded.

As noted in ER Section 6.2.8, Quality Assurance, corrective actions will be instituted when an administrative action level is exceeded for any of the measured parameters. Action levels will be divided into three priorities: (1) if the sample parameter is three times the normal background level; (2) if the sample parameter exceeds any existing administrative limits, or; (3) if the sample parameter exceeds any regulatory limit. Corrective actions will be implemented to ensure that the cause for the action level exceedance can be identified and immediately corrected, applicable regulatory agencies are notified, if required, communications to address lessons learned are dispersed to appropriate personnel, and applicable procedures are revised accordingly if needed.

9.2.2.7 Federal and State Standards for Discharges

ER Section 1.3, Applicable Regulatory Requirements, Permits and Required Consultations, describes all applicable federal and Idaho state standards for discharges, as well as required permits issued by local, Idaho, and Federal governments.

9.2.2.8 Reporting

Radiological reporting procedures will comply with the requirements of 10 CFR 70.59 (CFR, 2008e) and the guidance specified in Regulatory Guide 4.16 (NRC, 1985). Reports of the concentrations of principal radionuclides released to unrestricted areas in effluents will be provided and will include the Minimum Detectable Concentration (MDC) for the analysis and the error for each data point. Each year, the EREF will submit a summary report of the environmental sampling program to the NRC, including all associated data as required by 10 CFR 70 (CFR, 2008e). The report will include the types, numbers, and frequencies of environmental measurements and the identities and activity concentrations of facility-related radionuclides found in environmental samples, in addition to the MDC for the analyses and the error associated with each data point.

9.2.3 Integrated Safety Analysis

AES has prepared an integrated safety analysis (ISA) in accordance with 10 CFR 70.60 (CFR, 2008h). The ISA:

- Provides a complete list of the accident sequences that if uncontrolled could result in radiological and non-radiological releases to the environment with intermediate or high consequences.
- Provides reasonable estimates for the likelihood and consequences of each accident identified.
- Applies acceptable methods to estimate environmental effects that may result from accidental releases.

The ISA also

- Identifies adequate engineering and/or administrative controls for each accident sequence of environmental significance
- Assures adequate levels are afforded so those items relied on for safety (IROFS) will satisfactorily perform their safety functions.

The ISA demonstrates that the facility and its operations have adequate engineering and/or administrative controls in place to prevent or mitigate high and intermediate consequences from the accident sequences identified and analyzed.

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TABLES

Table 9.2-1 Effluent Monitoring Program
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Sample Location	Sample Type	Analysis / Frequency
Separations Building GEVS exhaust vents TSB GEVS exhaust vent TSB Contaminated Area HVAC System exhaust vent Centrifuge Test and Post Mortem Facilities GEVS exhaust vent[a] Centrifuge Test and Post Mortem Facilities Exhaust Filtration System exhaust vent[a] Ventilated Room HVAC System exhaust vent	Continuous air particulate filter	Gross alpha/beta-Weekly Isotopic analysis[d]-Quarterly composite
Evaporator	Continuous liquid condensate sample from exhaust vent	Gross alpha/beta – Weekly Isotopic analysis[d] – Quarterly composite
Process Areas[b]	Local area continuous air particulate filter[c]	Gross alpha/beta-Weekly Isotopic analysis[d]-Quarterly composite
Non-Process Areas[b]	Local area continuous air particulate filter[c]	Gross alpha/beta-Quarterly composite

Notes:

[a] The continuous sampling system is operated only when the Centrifuge Test Facility or Post Mortem Facility is in operation.

[b] A "Process Area" is any area of the facility where UF_6 process flow between feed, product, or tails cylinders occurs, including areas where cylinders containing UF_6 are opened for testing, inspection, or sampling. A "Non-Process Area" is any other area where uranic material is present in an open form.

[c] These will generally be collected with mobile continuous air monitors, as required to complement the effluent monitoring program.

[d] Isotopic analysis for Uranium if gross alpha and gross beta activities indicate that an individual radionuclide could be present in a concentration greater than 10 percent of the concentrations specified in Table 2 of Appendix B to 10 CFR Part 20 (CFR, 2008a).

Table 9.2-2 Required Lower Limit of Detection for Effluent Sample Analysis (Page 1 of 1)

Effluent Type	Nuclide	MDC[a] in Bq/ml (µCi/ml)
Gaseous[b]	Isotopic U	1.8×10^{-9} (5.0×10^{-14})
Gaseous[b]	Gross Alpha	1.8×10^{-9} (5.0×10^{-14})

Notes:

[a] These MDCs are 5% of the limits in 10 CFR 20 Appendix B, Table 2 Effluent Concentrations (retention Class W) (CFR, 2008a).

[b] Liquid condensate samples from the Evaporator exhaust vent will be analyzed to an MDC equivalent to 5% or less of the 10 CFR 20 Appendix B, Table 2, Col. 1 (Air) value for retention Class W (CFR, 2008a).

Table 9.2-3 Radiological Environmental Monitoring Program (Page 1 of 2)

Sample Type/Location	Minimum Number of Sample Locations	Sampling and Collection Frequency	Type of Analysis
Continuous Airborne Particulate	5	Continuous operation of air sampler with sample collection as required by dust loading but at least biweekly. Quarterly composite samples by location.	Gross beta/gross alpha analysis each filter change. Quarterly isotopic analysis on composite sample.
Vegetation	9	1 to 2-kg (2.2 to 4.4-lb) samples collected semiannually	Isotopic analysis [a]
	6	Quarterly if present (i.e., during growing seasons); one sample at each location	Fluoride uptake
Groundwater	10	4-L (1.06-gal) samples collected semiannually	Isotopic analysis [a]
Basins	1 from each of 5 basins [b]	4-L (1.06-gal) water sample/1 to 2-kg (2.2 to 4.4-lb) sediment sample collected quarterly	Isotopic analysis [a]
	Discharge points to the basins [b]	Quarterly for one sediment sample at each location	Fluoride uptake
Soil	9	1 to 2-kg (2.2 to 4.4-lb) samples collected semiannually	Isotopic analysis [a]
	3 plus 1 at each of the three detention basin outfalls	Quarterly, near vegetation sample locations; one sample at each location	Fluoride uptake
Domestic Sanitary Sewage Treatment Plant	1	4-L (1.06-gal) water fraction/1 to 2-kg (2.2 to 4.4-lb) solid fraction; samples collected semiannually[c]	Isotopic analysis [a]
TLD	18	Quarterly	Gamma and neutron dose equivalent

Table 9.2-3 Radiological Environmental Monitoring Program (Page 2 of 2)

Notes:

[a] Isotopic analysis for Uranium.

[b] Site Stormwater Detention Basins and Cylinder Storage Pads Stormwater Retention Basins.

[c] Both treated residual solids and clarified liquids are collected from the Domestic Sanitary Sewage Treatment Plant.

Table 9.2-4 Required MDC for Environmental Sample Analysis (Page 1 of 1)

Medium	Analysis	MDC Bq/ml or g (μCi/ml or g)
Ambient Air[a]	Gross Alpha	7.4×10^{-10} (2.0×10^{-14})
Vegetation	Isotopic U	1.9×10^{-4} (5.0×10^{-9})
Soil/Sediment	Isotopic U	1.1×10^{-2} (3.0×10^{-7})
Groundwater[a]	Isotopic U	1.1×10^{-4} (3.0×10^{-9})

[a] MDCs are 2% or less of the limits in 10 CFR 20 Appendix B, Table 2 Effluent Concentrations (retention Class W for ambient air) (CFR, 2008a).

FIGURES

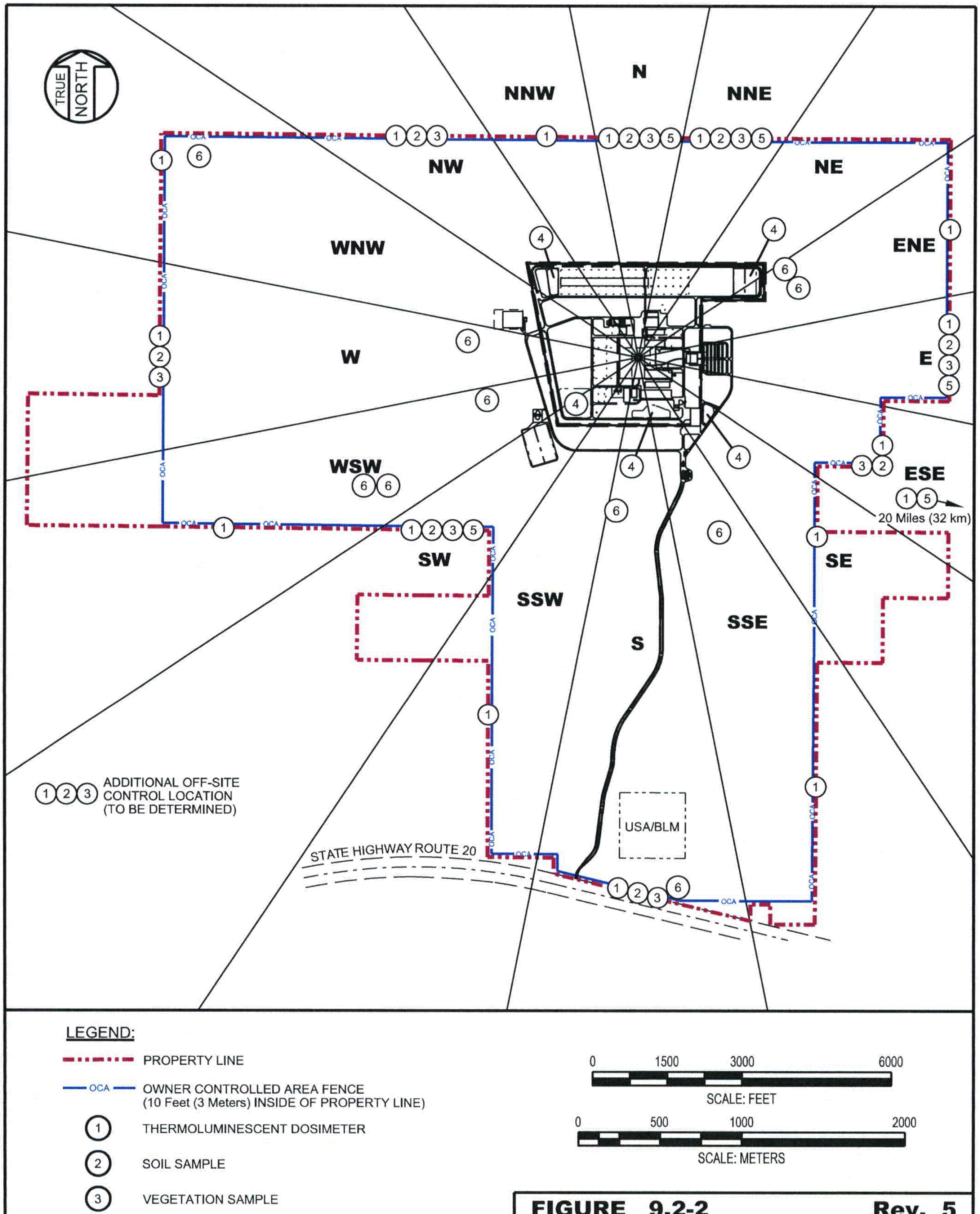

FIGURE 9.2-2 **Rev. 5**

Modified Site Features with Proposed Sampling Stations and Monitoring Locations

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