AREVA

10 CFR 70.5

February 9, 2012

AES-O-NRC-12-01982

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: License Basis Documents, Revision 4 and Quality Assurance Program Description, Revision 6

This letter submits the AREVA Enrichment Services (AES) Eagle Rock Enrichment Facility (EREF) License Basis Documents (LBD) Revision 4 and the Quality Assurance Program Description (QAPD) Revision 6. The revisions incorporate the following:

- Changes made to the site plan during detailed design. A more detailed description of the physical changes to the site plan is provided in Enclosure 1.

- Process changes to the cylinder management plan that allows the use of fork lifts and tractors pulling trailers when the cranes, carriages or transporters are not available. The product cylinder storage pad will be used to stage full feed cylinders ready to be used in the enrichment process as well as full tails cylinders ready to be stored at the Northern Cylinder Storage Pads.

- Update the ownership percentages for the AREVA SA parent company with the largest change being that Siemens AG is no longer a part owner of AREVA SA. The foreign ownership, control and influence of AREVA SA over AREVA Enrichment Services have not changed.

- Revision of the Quality Assurance Program Description to correct the error in the definition of Basic Component for QA Level 1 and QA Level 2 application, to clarify that QA Level 3 does not include QA Level Fire Protection (FP), to clarify that QA Level FP IROFS inspections also use applicable National Standards or the International Building Code to inspect components in question.

All changes are marked with a side bar and revision number on each page.

Enclosure 1 provides a summary description of the changes incorporated into the revisions.

Q004
NMSS01

Enclosure 2 contains the revised pages.

Enclosure 3 contains those revised pages that contain security-related sensitive unclassified nonsafeguards information (SUNSI) and should be withheld from public disclosure in accordance with 10 CFR 2.390.

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 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,

J. G. Kay

James A. Kay
Licensing Manager

Enclosures:
1) Revision 4 to License Basis Documents and QAPD Revision 6, Summary of Changes
2) Revised Pages to the Environmental Report and Safety Analysis Report, and the Quality Assurance Program Description
3) Revised Pages to the SUNSI portions of the Environmental Report and Safety Analysis Report; Emergency Plan; Fundamental Nuclear Material Control Plan; Physical Security Plan; Standard Practice and Procedure Plan; and Integrated Safety Analysis Summary

cc:
Cathy Haney, Director, Office of Nuclear Safety and Safeguards (w/o enclosures)
John Kinneman, Director, Division of Fuel Cycle Safety and Safeguards (w/o enclosures)
Patricia Silva, Branch Chief (w/o enclosures)
Diana Diaz-Toro, Branch Chief (w/o enclosures)
Breeda Reilly, Senior Project Manager
Steve Lemont, Senior Project Manager

Summary of Changes

The following provides a summary description of changes reflected in Revision 4 of the LBD and Revision 6 of the QAPD.

__Physical Changes__

1. **Site Plan Building Relocation**
The site plan was revised by shifting the Administration and Security and Secure Administration Building and parking lot from the south to the east and combining both buildings into one. This change did not affect the ISA consequence analysis nor the criticality and chemical hazard analysis. The impact to the ISA was a change in the site plan figures and the location of these buildings. The dose to site radiation workers was unaffected and the dose to the public remained at a small fraction of one percent of the allowable dose to the public. Therefore, the relocation of some buildings will affect radiation dose rates on site, but at levels well below 10 CFR 70.61 criteria and under the control of the EREF radiation safety program.

   This change does not alter UF_6 or UF_6 byproduct systems, nor IROFS inside or associated with these relocated structures. Building seismic qualification, IROFS51, is unaffected and remains applicable to the relocated process structures. The management measures to be applied to ensure safe operation of material at risk systems and IROFS are described in Chapter 11 of the EREF Safety Analysis Report. The individual programs, procedures, training and training curriculum, and quality assurance measures are not altered, decreased, nor is there a reduction in the commitment to management measures.

2. **Revised Security Perimeter Fence and Vehicle Barrier System (VBS)**
The security perimeter fence and vehicle barrier system were revised consistent with the site building relocation changes. The figures of the Controlled Access Area were corrected to clearly indicate that the VBS is outside the security fence. This change did not affect the ISA consequence analysis nor the criticality and chemical hazard analysis. The impact to the ISA was a change in the site plan figures. The dose consequences were the same as described for the site plan building relocation. The change is not a decrease in commitment to security requirements.

3. **Revised Cylinder Overpack Storage Pad Location**
The Cylinder Overpack Storage Pad was relocated closer to the CRSB to facilitate cylinder shipping and storage for those cylinders requiring an overpack. This change did not affect the ISA consequence analysis nor the criticality and chemical hazard analysis. The impact to the ISA was a change in the site plan figures. The dose consequences were the same as described for the site plan building relocation.

4. **Revised Tails, Empty and Feed Cylinder Storage Pads Layout**
The tails, feed and empty cylinder storage pads layout was revised to reflect an updated cylinder management program. The cylinders will be stored with 4 foot spacing between cylinders and each pad may contain either tails, feed or empty

cylinders. This revised strategy allows the feed and empty cylinders to be stored in a pattern that will provide shielding to the tails cylinders stored on the same pad. An additional 10% space on each pad was added to allow for cylinder staging. The pads were renamed as the Northern Cylinder Storage Pads.

This change does not increase the maximum material-at-risk (MAR) inventory on the cylinder storage pads beyond SAR Chapter 6 maximum inventories. It also does not increase the cumulative material-at-risk for any specific ISAS accident scenario. A criticality safety assessment of the storage array for 48Y feed cylinders and 30B product cylinders was performed. The assessment used an infinite co-planar (2-D) array of 48Y feed cylinders touching each other, reflected underneath by 1 meter of concrete and above by one inch (2.54 cm) of water. A similar assessment was performed for the 30B product cylinders. Movement of single cylinders into and over the 48Y and 30B arrays was also accounted for in this analysis. This analysis bounds the revised cylinder handling and storage practices discussed in this submittal. Therefore, IROFS 22 and the accident sequences are not affected.

5. **Relocated Gasoline & Diesel Dispensing Station**

The gasoline and diesel fuel dispensing station was relocated farther from the process buildings. There is no increase in the risk of fire-induced release and no reduction in safety margin or safety effectiveness for EREF Safety Systems from the potential effects of fire as a result of this relocation. This change did not affect the ISA consequence analysis nor the criticality and chemical hazard analysis. The impact to the ISA was a change in the site plan figures. The change does not affect IROFS48 because an escort is still required for fuel deliveries to the fuel tanker offload area at the gasoline and diesel fuel dispensing station. The escort ensures that an adequate distance from MAR is maintained by the truck over designated routes.

6. **Revised Basin Designs**

A new retention basin for effluent from the sanitary sewage treatment plant was added to the site plan. This change separates the sanitary sewage treatment plant effluent from the stormwater effluent. This change did not affect the ISA consequence analysis nor the criticality and chemical hazard analysis. The impact to the ISA was a change in the site plan figures.

The stormwater retention basin was split into three basins and each basin was located closer to the source of the stormwater runoff. This change along with the site layout changes resulted in less acreage needing stormwater runoff. Each basin will be monitored for radiological and chemical constituents consistent with the current sampling plan. This change did not affect the ISA consequence analysis nor the criticality and chemical hazard analysis. The impact to the ISA was a change in the site plan figures.

7. **Relocated the Main Access Road**

The main access road was relocated and the highway entrance design was revised as a result of ongoing discussions with the Idaho Department of Transportation. This change did not affect the ISA consequence analysis nor the criticality and chemical hazard analysis. The impact to the ISA was a change in the site plan figures.

Process Changes

1. Allow the Use of Fork Lifts and Tractors Pulling Trailers for Cylinder Handling

This change allows the use of fork lifts with gripper arms and tractors pulling trailers to and from the storage pads when normal cranes, carriages, or transporters are not available. Modification of cylinder handling practices requires modification to one IROFS description. By adding an allowance for a cylinder handling forklift to operate on the cylinder pads, the following changes to the ISAS and supporting ISA are required:

- The addition of a cylinder handling forklift for use on the cylinder pads adds another vehicle for analysis and inclusion under IROFS67 as reflected in Fire Accident Sequence FF99-1.
- The use of the cylinder forklift vehicle also alters Fire Accident Sequences FF23-1A and FF34-1B to reflect the additional handling vehicle (i.e., IROFS67 also applies to these sequences). Prior ISA analysis for direct cylinder handling on the pads was limited to crane movement to and from trailers or entry/exit carriages.

The following IROFS boundary and/or function modifications are required:

- Fire Accident Sequences FF99-1, FF23-1A and FF34-1B and IROFS67 were altered in ISAS Table 3.7-3, Table 3.7-4, Table 3.8-1, and Table 3.8-2 to reflect the cylinder handling forklift operation.

The Impact / Drop Analysis of cylinders being moved on the handling vehicle is limited to crane movement to and from trailers or entry/exit carriages with a bounding release due to impact / drop equivalent to a 48Y cylinder lug punching a hole in itself (if dropped on a flat surface) or in another cylinder (if below the dropped cylinder). The use of the cylinder forklift vehicle using grippers will not increase the potential energy in a crash / handling accident or the size of the analyzed cylinder breach.

Supporting ISA Documentation for these accident sequences will be modified.

The management measures to be applied to ensure safe cylinder handling (i.e., crane operations, vehicle operations, handling practices or associated training) for cylinder movements are described in generic terms in Chapter 11 of the Safety Analysis Report. The individual programs, procedures, training and training curriculum, and quality assurance measures that will implement safe cylinder handling will reflect the changes to the cylinder handling process.

2. Use the Product Cylinder Storage Pad to Stage Full Feed and Full Tails Cylinders

The cylinder handling practices were modified to allow for feed and full tails cylinders to be stored temporarily on the Product Cylinder Storage Pad.

Movement of Feed and/or Tails Cylinders with Product Cylinders does not alter the analyzed movement of one Product Cylinder over another Product Cylinder with a prohibition on stacking as described in IROFS22.

A criticality safety assessment of the storage array for 48Y feed cylinders and 30B product cylinders was performed using an infinite co-planar (2-D) array of 48Y feed cylinders touching each other, reflected underneath by 1 meter of concrete and above by one inch (2.54 cm) of water. A similar assessment was performed for the 30B product cylinders. Movement of single cylinders into or over the 48Y and 30B arrays was also accounted for in this analysis. This analysis bounds the revised cylinder handling and storage practices. Therefore, IROFS 22 and the accident sequences are not affected.

3. Clarified that Non-Destructive Assay is Performed on Feed Cylinders in the CRSB

This change clarified where the non-destructive assay of feed cylinders takes place. This change did not affect the ISA consequence analysis nor the criticality and chemical hazard analysis. The impact to the ISA was to clarify where the non-destructive assay takes place on the feed cylinders before they are used in the enrichment process.

Organization Changes

The following change does not impact the ISA:

1. The AREVA SA parent company principal ownership shares were revised to show the current ownership percentages and also show that Siemens AG, a German company, is no longer a part owner of AREVA.

Quality Assurance Program Changes

The following changes do not affect the ISA:

1. The typographical error in the definition of Basic Component for QA Level 1 and QA Level 2 applications was corrected.

2. The definition for QA Level 3 was clarified to include those items not classified as QA Level 1, QA Level 2 or QA Level FP.

3. The description for QA Level FP IROFS inspections was revised to include use of applicable National Standards or the International Building Code for the component in question.

Miscellaneous

Miscellaneous editorial, administrative, grammatical and conforming changes to the License Basis Documents were also incorporated.

Revised Pages to the non-SUNSI portions of the

Environmental Report;

Safety Analysis Report; and

Quality Assurance Program Description

This ER evaluates the environmental impacts of the proposed facility. Accordingly, this document discusses the proposed action, the need for and purposes of the proposed action, and applicable regulatory requirements, permits, and required consultations (ER Chapter 1, Introduction to the Environmental Report); considers reasonable alternatives to the proposed action (Chapter 2, Alternatives); describes the proposed EREF facility and the environment potentially affected by the proposed action (Chapter 3, Description of Affected Environment); presents and compares the potential impacts resulting from the proposed action and its alternatives (Chapter 4, Environmental Impacts); identifies mitigation measures that could eliminate or lessen the potential environmental impacts of the proposed action (Chapter 5, Mitigation Measures); describes environmental measurements and monitoring programs (Chapter 6, Environmental Measurements and Monitoring Programs); provides a cost benefit analysis (Chapter 7, Cost-Benefit Analysis); and summarizes potential environmental consequences (Chapter 8, Summary of Environmental Consequences). A list of references and preparers is also provided in Chapter 9, References, and Chapter 10, List of Preparers, respectively.

AREVA Enrichment Services

AREVA Enrichment Services (AES), LLC 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 NC Inc. AREVA NC Inc. is a wholly owned subsidiary of AREVA NC SA, 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 owners are as follows:

• Commissariat à l'Energie Atomique (French Atomic Energy Commission)	73.03%
• French State	10.17%
• Caisse des dépôts and et consignations	3.32%
• CA CIB	0.89%
• Electricité d 'France	2.24%
• Public	4.01%
• Framepargne	0.35%
• Kuwait Investment Authority	4.82%
• Group Total	0.95%
• AREVA Treasury Shares	0.22%
TOTAL	100%

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

- Mr. Jacques Besnainou
  President and Chief Executive Officer of AREVA NC Inc.
  Chief Executive Officer of AREVA Inc.
  4800 Hampden Lane, Bethesda MD 20814, USA

  Mr. Besnainou is a citizen of the United States of America and a citizen of France

(LES, 1991). The NEF design uses ten cylinders in single cooling stations (LES, 2005). Other than this difference, the EREF and NEF designs are the same.

The EREF "Cylinder Preparation System" uses a process similar to the Claiborne Enrichment Center design in conditioning empty, clean or used (i.e., with heel) 30B or 48Y cylinders except the EREF has six conditioning stations rather than the four the Claiborne Enrichment Center design has. The EREF also has a Cylinder Evacuation System which is used to reduce the heel in used 30B and 48Y cylinders and the Claiborne Enrichment Center and NEF designs does not. This system uses six donor stations, two receiver stations and two large capacity cold traps arranged in two subsystems.

The major structures and areas of the EREF are described below and shown in Figure 1.2-4, EREF Buildings. A more detailed discussion of these structures and areas, which are different than the corresponding structures and areas for the Claiborne Enrichment Center and the NEF, is provided in the Integrated Safety Analysis Summary, Section 3.3, "Facility Description."

The Security and Secure Administration Building serves as the primary access control point for the facility. It also contains the necessary space and provisions for an alternate Emergency Operations Center (EOC) should the primary facility become unusable.

The Separations Building Modules (SBM) house two, essentially identical, plant process units. Each SBM is comprised of a UF_6 Handling Area, two Cascade Halls, and a Process Services Corridor. The EREF has four SBMs. UF_6 is fed into the Cascade Halls and enriched UF_6 and depleted UF_6 are removed.

The Centrifuge Assembly Building (CAB) is used to assemble centrifuges before the centrifuges are moved to the Separations Building Modules and installed in the cascades.

The Technical Support Building (TSB) contains various laboratories and maintenance facilities necessary to safely operate and maintain the facility. The Operation Support Building (OSB) contains a Medical Room and the Control Room. In an emergency, the Control Room serves as the primary Emergency Operations Center (EOC) for the facility. Most site infrastructure facilities (i.e., laboratories for sample analysis) are located in the TSB and the OSB.

The Electrical Services Building (ESB) houses four standby diesel generators (DGs) that provide power to protect selected equipment in the unlikely event of loss of off-site supplied power. The ESB also contains electrical equipment. The ESB for the CAB houses four transformers and switchgear, and control and lighting panels which provide the CAB and the adjacent long term warehouse with power. The Mechanical Services Buildings (MSBs) house air compressors, the demineralized water system and portions of the centrifuge cooling water system.

The Gasoline and Diesel Fueling Station (GDFS) will be used for vehicle repair and maintenance and for fuel dispensing from an adjacent pump island.

The Cylinder Receipt and Shipping Building (CRSB) is used to receive, inspect, and weigh cylinders of natural UF_6 sent to the facility and ship cylinders of enriched UF_6 to customers.

The Cylinder Storage Pads are a series of concrete pads designed to temporarily store empty and full feed, product, and tails cylinders. The Northern Cylinder Storage Pads would need to accommodate a total of 25,718 cylinders generated over the lifetime of the facility. Two single-lined Cylinder Storage Pads Stormwater Retention Basins, each with two cells, will be used specifically to retain runoff from the Cylinder Storage Pads during heavy rainfalls. Treated effluent from the domestic SSTP will be discharged to the lined SSTP basin with two cells. The Site Stormwater Detention Basins will receive rainfall runoff from the balance of the developed plant site. No other liquid effluent will be discharged from the facility.

2008c) gives the Idaho Department of Environmental Quality (IDEQ) the authority to promulgate rules governing quality and safety of drinking water (IDAPA, 2008b). The Water Quality Division (WQD) is delegated responsibility to implement the SDWA. The state 1) ensures that water systems are tested for contaminants, 2) reviews plans for water system improvements, 3) conducts on-site inspections and sanitary surveys, 4) provides training and technical assistance, and 5) takes action against water systems not meeting standards (EPA, 2004). In addition, a state has primary enforcement responsibility for drinking water systems in the state (CFR, 2008q).

Therefore, drinking water provided at the proposed facility will be governed by the SDWA as a public drinking water system. Rules governing quality and safety of drinking water in Idaho have been promulgated in IDAPA 58.01.08 (IDAPA, 2008b). No person may construct a drinking water system until it is demonstrated to the WQD that the water system will have adequate technical, financial, and managerial capacity (IDAPA, 2008b). Although there is not a permit required for a drinking water system, AES must have a drinking water facility plan that includes sufficient detail to demonstrate that the proposed project meets applicable criteria. The facility plan generally addresses the overall system-wide plan. The facility plan shall identify and evaluate problems related to the drinking water system, assemble basic information, present criteria and assumptions, examine alternative solutions with preliminary layouts and cost estimates, describe financing methods, set forth anticipated charges for users, and review organizational and staffing requirements.

The WQD requires facility owners of drinking water systems to place the direct supervision and operation of their systems under a properly licensed operator. All drinking water systems are also required to have a licensed backup or substitute operator. Operators are licensed by the Idaho State Board of Drinking Water and Wastewater Professionals.

Water systems serving fewer than 10,000 persons are considered to be small systems. IDAPA 58.01.08.005(02)(b) (IDAPA, 2008b) and 40 CFR 142 (CFR, 2008r) provide authorization for obtaining variances from the requirement to comply with Maximum Contaminant Level (MCL) or treatment techniques to systems serving fewer than 10,000 persons. Although a permit is not required for a drinking system serving fewer than 10,000 persons, the IDEQ requires a comprehensive treatment plan and licensed plant operator. The drinking water plan for the proposed EREF will include sufficient detail to demonstrate that the proposed project meets applicable criteria.

An on-site domestic sanitary sewage treatment plant will treat sanitary sewage. Liquid effluents would be discharged into a two cell lined Sanitary Sewage Treatment Plant (SSTP) basin. Because the basin is lined, the system is considered a zero discharge system. Therefore, a sanitary sewage system permit is not required.

As previously stated, industrial point sources of pollution that discharge wastewater directly to surface waters are required to obtain NPDES permits that limit the amount of pollution that may be discharged into surface waters (IDEQ, 2008c).

In Idaho, the NPDES permit program is administered by the EPA, which means that EPA is responsible for issuing and enforcing all NPDES permits in Idaho. The state of Idaho's role in this process is to certify that NPDES-permitted projects comply with state water quality standards (IDEQ, 2008b) in accordance with Section 401 of the CWA (USC, 2008c), which is implemented in 40 CFR 121 (CFR, 2008o). IDEQ is the state agency responsible for implementing the Section 401 certification process (IDEQ, 2008b).

Section 401 of the Clean Water Act certification is required for any permit or license issued by a federal agency for any activity that may result in a discharge into waters of the state to ensure

The city of Idaho Falls, the nearest major city, is located about 32 km (20 mi) east southeast from the site. The towns of Rigby and Rexburg are located approximately 23 km (14 mi) and 42 km (26 mi) north of Idaho Falls, respectively. Atomic City is about 32 km (20 mi) west of the site. South of the proposed site are the towns of Blackfoot at 40 km (25 mi) and Pocatello at 76 km (47 mi). The Fort Hall Indian Reservation comprises about 220,150 ha (544,000 ac) and also lies to the south. The nearest boundary of the reservation is about 44 km (27 mi) from the proposed site. The town of Fort Hall is located a distance of approximately 60 km (37 mi).

The nearest residence is 7.7 km (4.8 mi) east of the proposed site. Temporarily occupied structures in the 8-km (5-mi) radius include a transformer station adjacent to the proposed site to the east, and potato cellars, one 3.2 km (2 mi) west of the proposed site, and one 7.7 km (4.8 mi) to the east. Public use areas include a hiking trail south of the proposed site in Hell's Half Acre Wilderness Study Area (WSA) and a small lava tube cave located approximately 8 km (5 mi) east and south. The Wasden Complex, consisting of caves formed by collapsed lava tubes, is located approximately 3.2 km (2 mi) northeast from the footprint of the EREF.

Figure 2.1-2, Site Area and Facility Layout Map 1.6-Kilometer (1-Mile) Radius, Figure 2.1-3, Existing Conditions Site Aerial Photograph, and Figure 2.1-4, EREF Buildings show the site property boundary and the general layout of the buildings on the EREF site.

Refer to ER Figure 1.2-3, EREF Location Relative to Transportation Routes, for the location of highways and railroad lines relative to the proposed site.

2.1.2.2 Applicant for the Proposed Action

AREVA Enrichment Services (AES), LLC 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 NC Inc. AREVA NC Inc. is a wholly owned subsidiary of AREVA NC SA, 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)	73.03%
• French State	10.17%
• Caisse des dépôts and et consignations	3.32%
• CA CIB	0.89%
• Electricité d 'France	2.24%
• Public	4.01%
• Framepargne	0.35%
• Kuwait Investment Authority	4.82%
• Group Total	0.95%
• AREVA Treasury Shares	0.22%
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.

2.1.2.3.8 Mechanical Services Buildings (MSBs)

The Mechanical Services Buildings are located south of the Separation Building Modules. They house air compressors, the demineralized water systems, and the centrifuge cooling water system pumps, heat exchangers and expansion tanks.

2.1.2.3.9 Cylinder Storage Pads

The EREF uses several outside areas for storage of full cylinders containing UF_6 and empty cylinders.

Cylinders containing UF_6 that is depleted in ^{235}U are temporarily stored on the Northern Cylinder Storage Pads. The depleted UF_6 is stored under vacuum in corrosion resistant Type 48Y cylinders. Approximately 1,222 full tails cylinders per year could be stored on the storage pads. A storage area to support lifetime plant operations would need to accommodate a maximum of 25,718 cylinders of depleted uranium. These cylinders could be stacked two high and are temporarily stored on concrete saddles that elevate the cylinders approximately 0.2 m (0.65 ft) above ground level. (See ER Section 4.13.3.2, DUF_6 Cylinder Temporary Storage.) Entry/exit carriages and cylinder hauling trailers towed by tractors move the cylinders from the Blending, Sampling, and Preparation Building out to the Northern Cylinder Storage Pads, where cranes remove the cylinders from the trailers and place them on the storage pads. Since it is expected that full tails storage cylinders will be shipped offsite soon after they are filled, the storage pads will be developed in sections over the life of the facility on an as-needed basis.

Full feed cylinders containing natural UF_6 will be temporarily stored on the Northern Cylinder Storage Pads prior to use in the facility. The pads are sized to store approximately 712 full feed cylinders. Full feed cylinders will not be stacked. Cylinder hauling trailers towed by tractors will move the cylinders after delivery to the Cylinder Receipt and Shipping Building out to the Northern Cylinder Storage Pads, where cranes remove the cylinders from the trailers and place them on the storage pads. The full feed cylinders will be subsequently transported to the Blending, Sampling, and Preparation Building prior to use in the UF_6 Handling Area.

Empty cylinders (feed, product without heels and tails) will be temporarily stored (up to six months) on the Northern Cylinder Storage Pads. The pads are sized to store approximately 1,840 empty cylinders. Empty cylinders can be stacked two high. Cylinder hauling trailers towed by tractors will move the empty cylinders from various areas of the facility out to the Northern Cylinder Storage Pads, where cranes remove the cylinders from the trailers and place them on the storage pads. Empty cylinders will subsequently be transported to the Blending, Sampling, and Preparation Building for use.

The Northern Cylinder Storage Pads are at the north end of the facility and are adjacent pads.

Full product cylinders containing enriched UF_6 and empty product cylinders containing heels will be temporarily stored on the Full Product Cylinder Storage Pad prior to shipment offsite to a fuel fabrication facility. The pad is sized to store approximately 1,032 product cylinders. Full product cylinders and empty product cylinders containing heels will not be stacked. Entry/exit carriages will move the recently filled cylinders from the Blending, Sampling, and Preparation Building out to the Full Product Cylinder Storage Pad, where cranes remove the cylinders from the carriages and place them on the storage pad. The full product cylinders will subsequently be transported to the Cylinder Receipt and Shipping Building prior to shipment offsite. Empty product cylinders containing heels will be delivered to the CRSB from fuel fabricators. They will be transported from the CRSB to the Full Product Cylinder Storage Pad by entry/exit carriages, where cranes remove the cylinders from the carriages and place them on the storage pad. The empty (with heels) product cylinders will subsequently be transported to the BSPB for preparation and filling in the BSPB or the UF_6 handling area.

The Full Product Cylinder Storage Pad is located near the Blending, Sampling, and Preparation Building adjacent to the Cylinder Receipt and Shipping Building.

The Cylinder Overpack Storage Pad is also located adjacent to the Cylinder Receipt and Shipping Building. The cylinder overpack protective packaging is stored on this pad.

2.1.2.3.10 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 contains general office areas. All personnel access to the plant occurs at this location. 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.

Approximately 30 work locations are provided for the plant office staff. The office environment consists of private, semiprivate, and open office space. It also contains a kitchen, break room, conference rooms, building service facilities such as the janitor's closet and public telephone, and a mechanical equipment room.

2.1.2.3.11 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 enter the Security and Secure Administration Building after passing through the Administration Building.

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.

Entry to the plant area from the Security and Secure Administration Building is only possible through the EECP. Approximately 20 work locations are provided for the plant office staff. The office environment consists of private, semiprivate, and open office space. It also contains a kitchen, break room, conference rooms, building service facilities such as the janitor's closet and public telephone, and a mechanical equipment room.

2.1.2.3.12 Guard House(s)

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 Facility Guard House. Smaller Vehicle Inspection Guard Houses are situated at each of the three locations where vehicles gain access to the Controlled Access Area of the facility.

2.1.2.3.13 Visitor Center

A Visitor Center is located outside the security fence area near Highway 20.

2.1.2.3.14 Electrical Services Building for the CAB (ESB-CAB)

The ESB-CAB houses four transformers and switchgear, which provide the CAB and the adjacent long term warehouse with power. The building contains switchgear, transformers, and control and lighting panels. The rooms are sized with adequate provisions made for maintenance, as well as equipment removal and equipment replacement.

2.1.2.3.15 Gasoline and Diesel Fueling Station

A Gasoline and Diesel Fueling Station (GDFS) is located to the southeast of the CAB. The GDFS supports vehicle fueling from an adjacent fuel pump island and on-site vehicle repair and maintenance conducted inside the building.

2.1.2.4 Process Control Systems

The EREF uses various operations and Process Controls Systems to ensure safe and efficient plant operations. The principal process systems include:

- Decontamination System
- Liquid Effluent Collection and Treatment System
- Solid Waste Collection System
- Gaseous Effluent Ventilation System
- Centrifuge Test Facility and Post Mortem Gaseous Effluent Ventilation System
- Centrifuge Test and Post Mortem Facilities Exhaust Filtration System
- Technical Support Building Contaminated Area Heating, Ventilation and Air Conditioning (HVAC) System
- Ventilated Room Heating, Ventilation and Air Conditioning (HVAC) System

2.1.2.4.1 Decontamination System

The Decontamination System is designed to remove radioactive contamination - in the form of uranium hexafluoride (UF_6), uranium tetrafluoride (UF_4) and uranyl fluoride (UO_2F_2), i.e., uranium compounds from contaminated materials and equipment. The system consists of a series of steps, including equipment disassembly, degreasing, decontamination, drying, and inspection.

Items commonly decontaminated include pumps, valves, piping, instruments, sample bottles, and scrap metal. Decontamination is typically accomplished by immersing the contaminated component in a 5% citric acid bath with ultrasonic agitation, rinsing with water, drying using compressed air, and then inspecting before release. The process time is about one hour for most plant components. Liquid waste is sent to the Liquid Effluent Collection and Treatment System; solid waste/sludge to the Solid Waste Collection System, and enclosure exhaust air to the Gaseous Effluent Ventilation System prior to venting.

Action, summarizes the impact by environmental resource and provides a reference to the corresponding section in ER Chapter 4, Environmental Impacts, which includes a detailed description of the impacts. Detailed discussions of proposed mitigation measures and environmental monitoring programs are provided in ER Chapter 5, Mitigation Measures, and Chapter 6, Environmental Measurements and Monitoring Programs, respectively.

Operation of the EREF would result in the production of gaseous, liquid, and solid waste streams. Each stream could contain small amounts of hazardous and radioactive compounds either alone or in a mixed form.

Gaseous effluents from both non-radiological and radiological sources will be below regulatory limits as specified in permits issued by the Idaho Department of Environmental Quality Air Quality Division (IDEQ/AQD) (IDAPA, 2008i) and release limits by NRC (CFR, 2008x). Thus, potential impacts to members of the public and workers will be minimal.

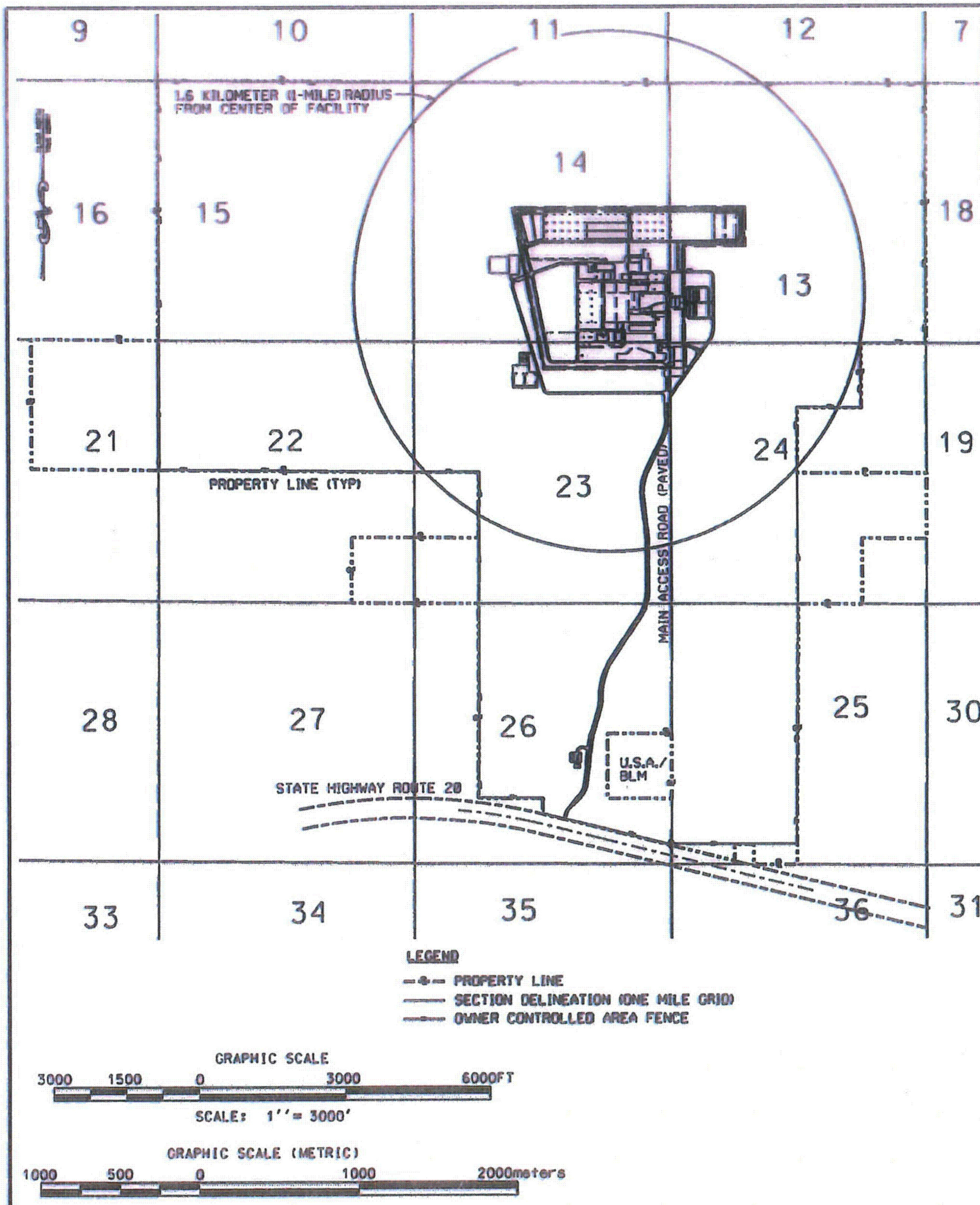
Liquid effluents would include stormwater runoff and treated sanitary effluent from the site Domestic Sanitary Sewage Treatment Plant (SSTP). All proposed liquid effluents would be discharged on site to the retention basins (either the Cylinder Storage Pads Stormwater Retention Basins or to the Domestic SSTP basin).

General site stormwater runoff is collected and released untreated to the Site Stormwater Detention Basins. Two single-lined retention basins, each having two cells, the Cylinder Storage Pads Stormwater Retention Basins, will collect stormwater runoff from Cylinder Storage Pads (Northern Cylinder Storage Pads and Full Product Cylinder Storage Pad) and the Cylinder Transport Path. All stormwater discharges will be regulated, as required, by a National Pollutant Discharge Elimination System (NPDES) Stormwater permit. Approximately 65,240 m^3/yr (17,234,700 gal/yr) of stormwater from the Cylinder Storage Pads and the Cylinder Transport Path are expected to be released, based on mean precipitation discharging to the Cylinder Storage Pads Stormwater Retention Basins. There is no infiltration into the site soils. Based on average precipitation, approximately 85,175 m^3/yr (22,501,000 gal/yr) of stormwater runoff from the site is expected to be released annually to the Site Stormwater Detention Basins. This value takes into account infiltration into the area soils associated with landscaped areas, natural areas and loose gravel areas of the developed portion of the site providing stormwater runoff reaching the Site Stormwater Detention Basins.

EREF liquid effluent discharge rates would be relatively low, for example, total annual discharge from the site domestic SSTP is expected to be approximately 18,700 m^3/yr (4,927,500 gal/yr). These treated discharges would be collected and contained in the single lined cylinder storage pads Stormwater Retention Basins. Emergency hand washing and shower water is collected, monitored and treated by the Liquid Effluent Collection Treatment System as necessary.

Groundwater from two on-site wells would supply water for the proposed EREF. The wells could supply up to 1,713 m^3/day (452,500 gpd) under the current property water appropriation. 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.

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.



NOTES:

1. SEE FIGURE 2.1-4 FOR ENLARGED FACILITY LAYOUT.

Figure 2.1-2 **Rev. 4**

Site Area and Facility Layout Map
1.6 Kilometer (1 Mile) Radius

EAGLE ROCK ENRICHMENT FACILITY
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Table 3.3-2 Site Soil Sample Locations
(Page 1 of 1)

Soil Sample No.	Location Description	Latitude	Longitude
SS1	Northeast corner of site	43° 35' 39.7"	112° 24' 59"
SS2	Northern Cylinder Storage Pad	43° 35' 31.7"	112° 25' 54"
SS3	Northwest portion of site	43° 35' 25.3"	112° 26' 48.3"
SS4	West of Cascade Halls	43° 35' 17.1"	112° 25' 54"
SS5	Cascade Hall	43° 35' 10.6"	112° 25' 35"
SS6	Between access road, stormwater detention basin and perimeter drainage swale	43° 34' 50.7"	112° 25' 54"
SS7	South portion of footprint	43° 34' 50.5"	112° 25' 23"
SS8	West of facility	43° 34' 47.6"	112° 26' 44.2"
SS9	Down gradient of facility along drainage	43° 34' 29.6"	112° 25' 35"
SS10	South east portion of site	43° 33' 40.7"	112° 25' 10.9"

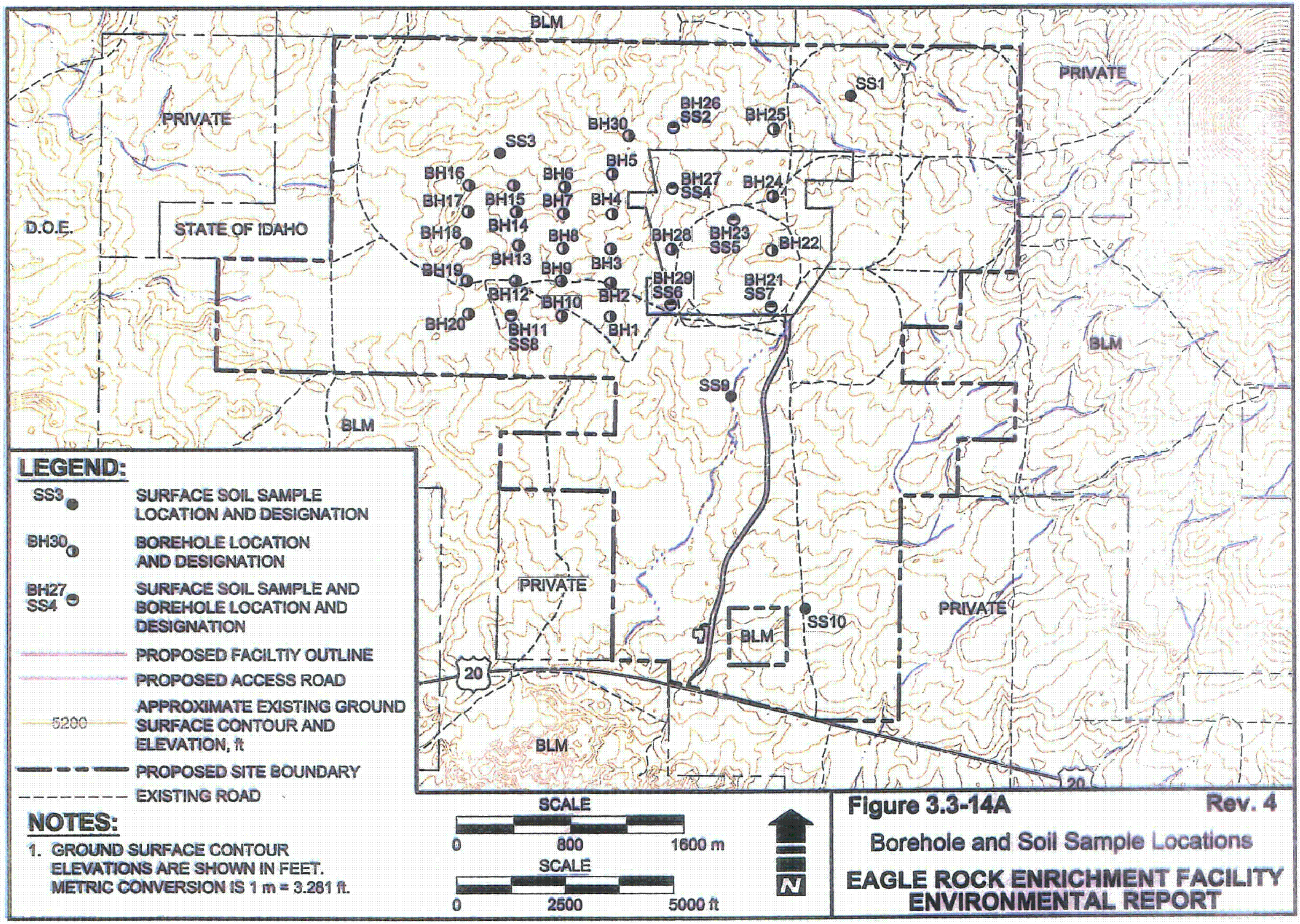

Figure 3.3-14A Rev. 4

Borehole and Soil Sample Locations

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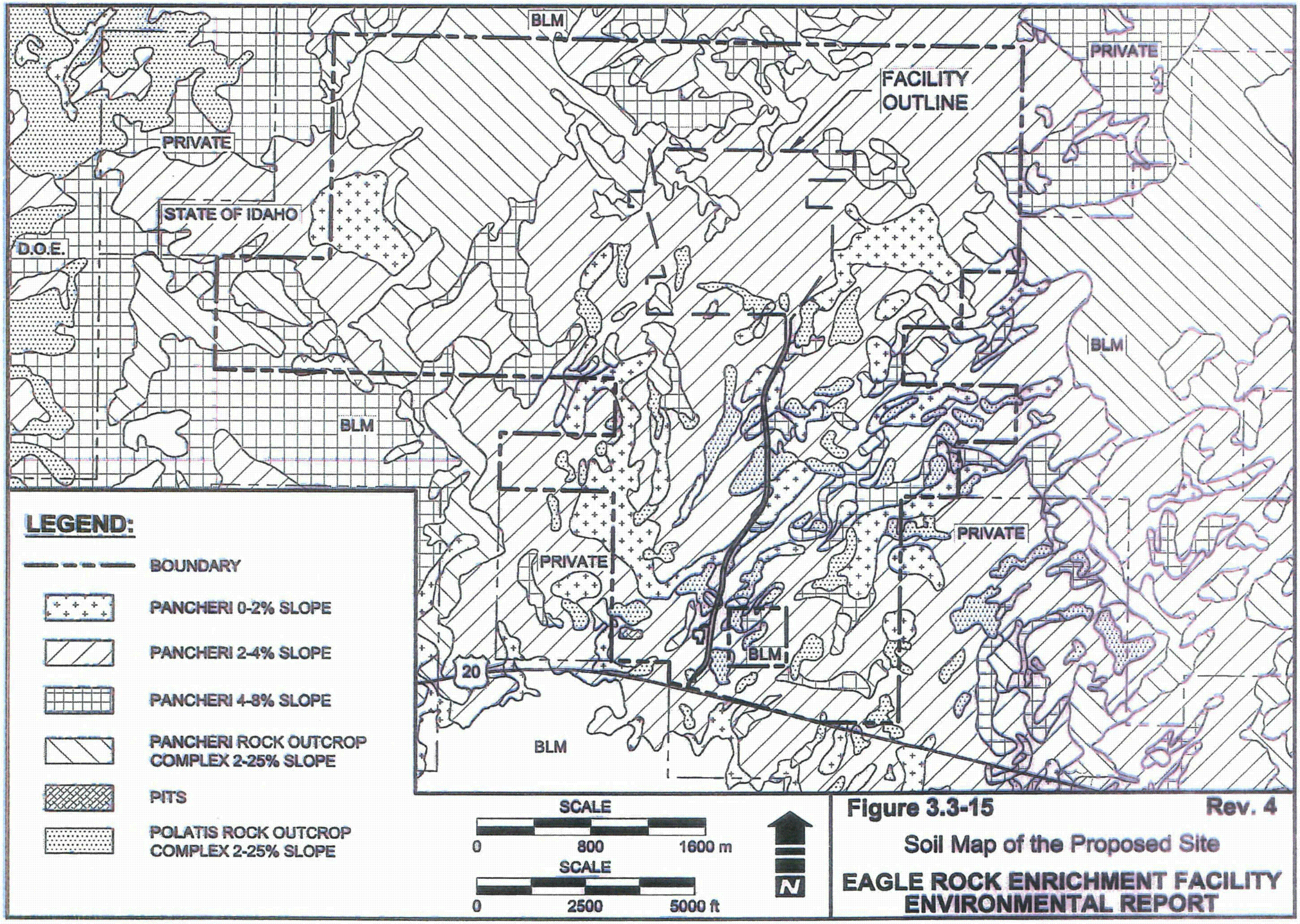


Figure 3.3-15 **Rev. 4**

Soil Map of the Proposed Site

EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT

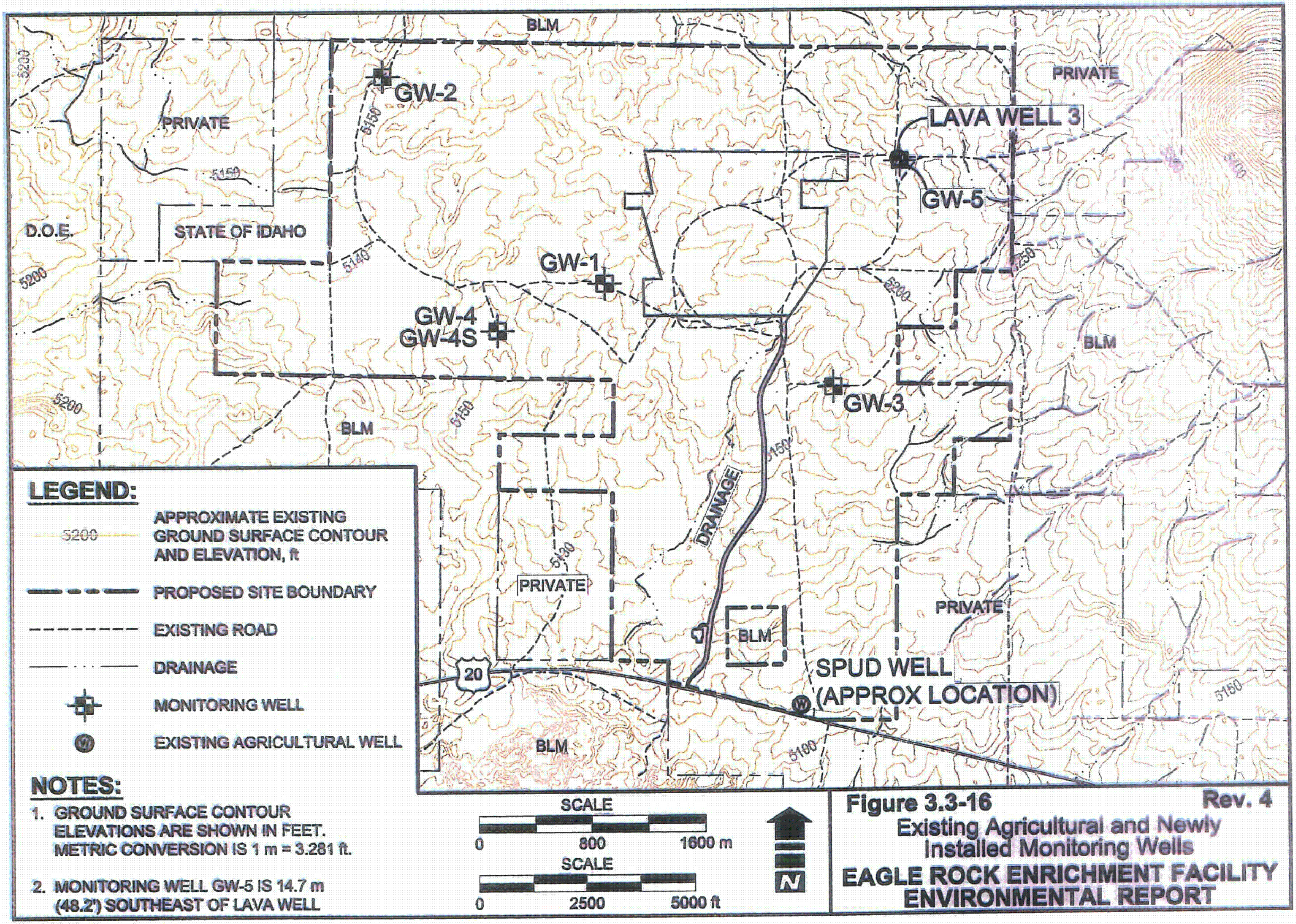


Figure 3.3-16 Rev. 4

Existing Agricultural and Newly Installed Monitoring Wells

EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT

Retention Basins, each having two cells, will be utilized for the collection and containment of water from stormwater runoff from the Cylinder Storage Pads. Daily treated domestic sanitary effluent discharges will be to the Domestic Sanitary Sewage Treatment Plant (SSTP) Basin, which will have two cells. The annual treated domestic sanitary effluent discharge to the basin will be approximately 18,700 m^3/yr (4,927,500 gal/yr).

The annual stormwater runoff discharge from the Cylinder Storage Pads to the Cylinder Storage Pads Stormwater Retention Basins will be approximately 65,240 m^3/yr (17,234,700 gal/yr). The locations of the Cylinder Storage Pads Stormwater Retention Basins are shown on Figure 4.4-1, Facility Layout with Detention/Retention Basins. Evaporation will provide the only means of liquid disposal from the Cylinder Storage Pads Stormwater Retention Basins. The Cylinder Storage Pads Stormwater Retention Basins will include a single membrane liner, to eliminate infiltration into the ground. Residual dry solids, if any, after evaporation of water, will be impounded within the basin.

Each of the two Cylinder Storage Pads Stormwater Retention Basins is designed to contain a volume of approximately 83,019 m^3 (67.3 acre-ft) maintaining a freeboard of 0.9 m (3.0 ft). Under highly unlikely events, the volume of each basin will contain approximately 113,700 m^3 (92.2 acre-ft), maintaining a freeboard of 0.3 m (1.0 ft). The area served by the basin includes 25.6 ha (63.3 acres), the total area of the Cylinder Storage Pads. The retention basins are designed to contain runoff for a volume equal to twice that for the 24-hour, 100-year return frequency rain storm, a 5.70-cm (2.24-in) rainfall.

Residual solids, after evaporation of water from the Cylinder Storage Pads Stormwater Retention Basins, will be removed off site by a licensed contractor. The wastes will be disposed based on their characterization and in accordance with the U.S. EPA and State of Idaho regulatory requirements. The State of Idaho has adopted the U.S. EPA hazardous waste regulations governing the generation, handling, storage, transportation, and disposal of hazardous materials (IDAPA, 2008f). These regulations are found in ER Section 1.3, Applicable Regulatory Requirements, Permits and Required Consultations.

A packaged treatment plant is planned to dispose of domestic sanitary wastes at the site. The solid wastes generated by the domestic Sanitary Sewage Treatment Plant will be temporarily stored in a holding tank for periodic disposal at an off-site location, as described in ER Section 4.1.2, Utilities Impacts. Daily treated domestic sanitary effluent from the sewage treatment plant will be directed to the SSTP basin consisting of two alternating cells. Under normal design conditions with a freeboard of 0.6 M (2.0 ft), the SSTP basin will have an available storage volume of 6,784 m^3 (5.5 acre-ft). With a freeboard of 0.3 m (1.0 ft), the available storage volume will be 9,128 m^3 (7.4 acre-ft). The overall size of the SSTP basin, to top of berm, will be approximately 0.8 ha (2.0 acres) with each cell being 0.4 ha (1.0 acre) in size. Each cell will be 1.5 m (5 ft) deep and have an approximate available storage capacity of 5,551 m^3 (4.5 acre-ft). During normal operation, only one of the two cells will be in operation. During the winter months, if one cell cannot provide enough storage, the second cell will be available for use. Annual operation will rotate between the two cells. Domestic sanitary sewage collection will be treated to applicable requirements for discharge utilizing the SSTP basin.

Stormwater runoff from the developed site will be collected in the three Site Stormwater Detention Basins. The Site Stormwater Detention Basins are located at the southern portion of the developed site and will collect runoff from various developed parts of the site, including roads, parking areas, and building roofs (see Figure 4.4-1, Facility Layout with Detention/Retention Basins). The detention basins will be unlined and will have an outlet structure to control discharges above the design level. Normal discharge will be through low flow orifices to downstream areas and infiltration into the ground. The detention basins will be designed to contain runoff for a volume equal to the 24-hour, 100-year return frequency rain storm of 5.70 cm (2.24 inch) rainfall. The combined total storage capacity available in the three basins for maintaining a freeboard of 0.6 m (2.0 ft) is approximately 32,835 m^3 (27 acre-ft). For a highly unlikely storm scenario maintaining a freeboard of 0.3 m (1.0 ft), the basins will have approximately 49,600 m^3 (40 acre-ft) of storage capacity. The area served by the detention basins is about 139.3 ha (344.2 acres). They will also be designed to detain post-construction peak flow runoff rates from their outfall that are equal to or less than the pre-construction runoff rates from the site area.

Water balances for the Cylinder Storage Pads Stormwater Retention Basins are presented in Tables 3.4-4 and 3.4-5, Water Balance for the Cylinder Storage Pads Stormwater Retention Basins (minimum and maximum scenarios, respectively). Similarly, water balances for the Site Stormwater Detention Basins are found in Tables 3.4-6 and 3.4-7, Water Balance for the Site Stormwater Detention Basins (minimum and maximum scenarios, respectively). Water balance for the domestic SSTP basin is presented in Table 3.4-17 (maximum scenario). The water balance tables consider the following components:

- Precipitation runoff
- Direct precipitation
- Treated domestic sanitary effluent to the SSTP basin
- Infiltration from the detention basins
- Outlet structures including low flow discharge orifices for the detention basins, and
- Evaporation for only the retention basins.

The water balances include the following inputs and assumptions in addition to those cited in the table notes:

- The annual minimum and maximum precipitation amounts were distributed by month using the recorded direct and wettest distribution by month. Use of the minimum precipitation amounts provides a minimum discharge scenario. Use of the maximum precipitation amounts (highest recorded consecutive monthly means) provides a maximum discharge scenario. The information conservatively represents what could possibly occur (although highly unlikely) over a very dry or very wet calendar year based on the 53 year period of record.
- Precipitation inflow to the retention basins is based on 100% impervious surface contribution from the Cylinder Storage Pads.
- Precipitation inflow to the detention basins is based on the proposed developed surface characteristics of impervious areas, gravel areas, lawn and natural areas contributing to the basins. Inflows were calculated using the HydroCAD Stormwater Modeling System computer software. Urban Hydrology for Small Watersheds, TR-55 was used to calculate runoff curve numbers, taking into account the frozen ground conditions during the winter season.

The tables provide the monthly balance (inflow minus outflow). A positive value indicates that the inflow components exceed the outflow components for the respective basin. A negative value indicates that outflow components will dispose of a portion of or the entire monthly inflow for the respective basin. The tables also provide the monthly net in the basin. A non-zero value indicates that the basin will contain standing water.

operations overlap is shown in Table 3.4-16, Operations Water Use (2011-2022). 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 24,669,000 L (6,517,020 gal) 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. The water supply will be adequate for construction, 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

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 Basins and the SSTP 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.

During operation, stormwater will be collected from appropriate site areas and routed to detention/retention basins. The stormwater plan is described in ER Section 4.4.1, Receiving Waters and shown in Figure 4.4-1, Facility Layout with Detention/Retention Basins. Treated domestic sanitary effluents will be discharged to the SSTP basin.

3.4.10 Description of Wetlands

An evaluation of wetlands mapped by the Fish and Wildlife Service determined that the site does not contain jurisdictional wetlands (USFWS, 1980) (USFWS, 2008c).

3.4.11 Federal and State Regulations

ER Section 1.3, Applicable Regulatory Requirements, Permits, and Required Consultations, describes the applicable regulatory requirements and permits for this project. ER Section 4.4, Water Resources Impacts, describes potential site impacts as they relate to environmental permits regarding water use by the proposed EREF (refer to ER Section 1.3.1, Federal Agencies and ER Section 1.3.2, State Agencies).

Applicable regulations for water resources for this proposed site include:

- The Safe Drinking Water Act (SDWA) requirements on a state level: The Idaho Environmental Protection and Health Act (Idaho Code Chapter 1, Title 39) gives the Idaho Department of Environmental Quality (IDEQ) the authority to promulgate rules governing quality and safety of drinking water. The Water Quality Division (WQD) is delegated responsibility to implement the SDWA. Rules governing quality and safety of drinking water in Idaho have been promulgated in IDAPA 58.01.08. Although a permit is not required for a drinking water system serving fewer than 10,000 persons (IDAPA, 2008b), the IDEQ requires a comprehensive treatment plan and licensed plant operator. The drinking water plan for the proposed EREF will include sufficient detail to demonstrate that the proposed project meets applicable criteria. The facility plan generally addresses the overall system-wide plan.
- National Pollution Discharge Elimination System (NPDES): The NPDES permit program includes an industrial stormwater permitting component adopted under Section 402 of the CWA. The NPDES Stormwater Program regulates discharges of stormwater from industrial and commercial facilities to waters of the United States. Since the construction of the proposed EREF would be greater than 0.4 ha (1.0 ac), AES will obtain a NPDES Construction General Permit to establish the provisions for meeting stormwater regulations at the EREF. For operations, AES will obtain a NPDES Multi-Sector General Permit for stormwater discharges. Design, construction, and operational details of facility groundwater systems and stormwater pollution prevention plans will be provided to EPA and IDEQ as part of the Notice of Intent to obtain each permit. Water Well Permit: A permit application to drill a well must be approved by staff of the IDWR. The information required on the application includes the well location, proposed use, and well construction methods. Wells must be drilled by persons holding a driller's license from the IDWR. Wells must also comply with Idaho's well construction standards found at IDAPA 37.03.09 (IDAPA, 2008h). A drilling permit must be obtained before the construction of any well greater than 5.5 m (18.0 ft) in depth. The drilling permit is valid for two months from the approval date for the start of construction.

3.4.12 Surface Water Characteristics for Relevant Water Bodies

No off-site surface water runoff will occur from the proposed facility. One minor, natural erosional drainage exists within the proposed site boundary (described in ER Section 3.4.1, Surface Hydrology). It is located in the southwestern corner of the proposed site and runs from the south-central area of the proposed site southward toward Highway 20. Highway 20 has a culvert to convey water from this drainage to the south, away from the roadway. Precipitation that will fall on the developed areas of the proposed site will be collected in stormwater retention and detention basins where it will be allowed to evaporate or infiltrate into the subsurface in the case of the detention basins.

3.4.12.1 Freshwater Streams, Lakes, Impoundments

The proposed site does not include any freshwater streams or lakes. Retention and detention basins designed to contain stormwater runoff and treated effluent from the Domestic Sanitary Sewage Treatment Plant from the EREF will be constructed as part of the facility. These components are described in ER Section 3.4.1.1, Facility Withdrawals and/or Discharges to Hydrologic Systems.

3.4.14 Water Impoundments

Impoundments to contain stormwater runoff and treated domestic sanitary effluent will be constructed as part of the facility. These features are described in ER Section 3.4.1.1, Facility Withdrawals and/or Discharges to Hydrologic Systems.

3.4.14.1 Elevation-Area-Capacity Curves

Impoundments to contain stormwater runoff and treated domestic sanitary effluent will be constructed as part of the proposed EREF. These features are described in ER Section 3.4.1.1, Facility Withdrawals and/or Discharges to Hydrologic Systems.

The three Site Stormwater Detention Basins located at the southern portion of the site will be designed to contain runoff for a volume equal to a 24-hour, 100-year return frequency rain storm of 5.70 cm (2.24 inch) rainfall. The combined total storage capacity available for maintaining a freeboard of 0.6 m (2.0 ft) will have approximately 49,600 m^3 (40 acre-ft). For a highly unlikely storm scenario maintaining a freeboard of 0.3 m (1.0 ft), the basins will have approximately 49,600 m^3 (40 acre-ft) of storage capacity. The area served by the detention basins is 139.3 ha (344.2 acres).

The two Cylinder Storage Pads Stormwater Retention Basins are located at the western and eastern ends of the Cylinder Storage Pads and will be designed to contain a volume up to approximately 83,019 m^3 (67.3 acre-ft) maintaining a freeboard of 0.9 m (3.0 ft). Under highly unlikely events, the volume of each basin will contain approximately 113,700 m^3 (92.2 acre-ft), maintaining a freeboard of 0.3 m (1.0 ft). The area served by the retention basins will be 25.6 ha (63.3 acres). The retention basins are designed to contain runoff for a volume equal to twice that for the 24-hour, 100-year return frequency rain storm, a 5.70-cm (2.24-in) rainfall.

The Domestic SSTP Basin is located southwest of the main facility footprint and will be designed to have an available storage volume of 6,784 m^3 (5.5 acre-ft) with a freeboard of 0.6 m (2.0 ft). With a freeboard of 0.3 m (1.0 ft), the available storage volume of the SSTP basin will be 9,128 m^3 (7.4 acre-ft). Approximately 18,700 m^3 (4,927,500 gal) of treated sanitary effluents will be discharged to the SSTP basin annually.

3.4.14.2 Reservoir Operating Rules

The proposed facility will not make use of any reservoir.

3.4.14.3 Annual Yield and Dependability

The proposed facility will not take or discharge process water to any local water body; thus, it will not affect water storage in any water body.

3.4.14.4 Inflow/Outflow/Storage Variations

The proposed facility will not take or discharge process water to any local water body; thus, it will not affect water storage in any water body.

3.4.14.5 Net Loss, Including Evaporation and Seepage

The proposed facility will not take or discharge process water to any local water body. Discharge of treated effluent from the Domestic SSTP will be to the Domestic SSTP Basin. The retention basins will be designed so that evaporation is the sole discharge route. The potential

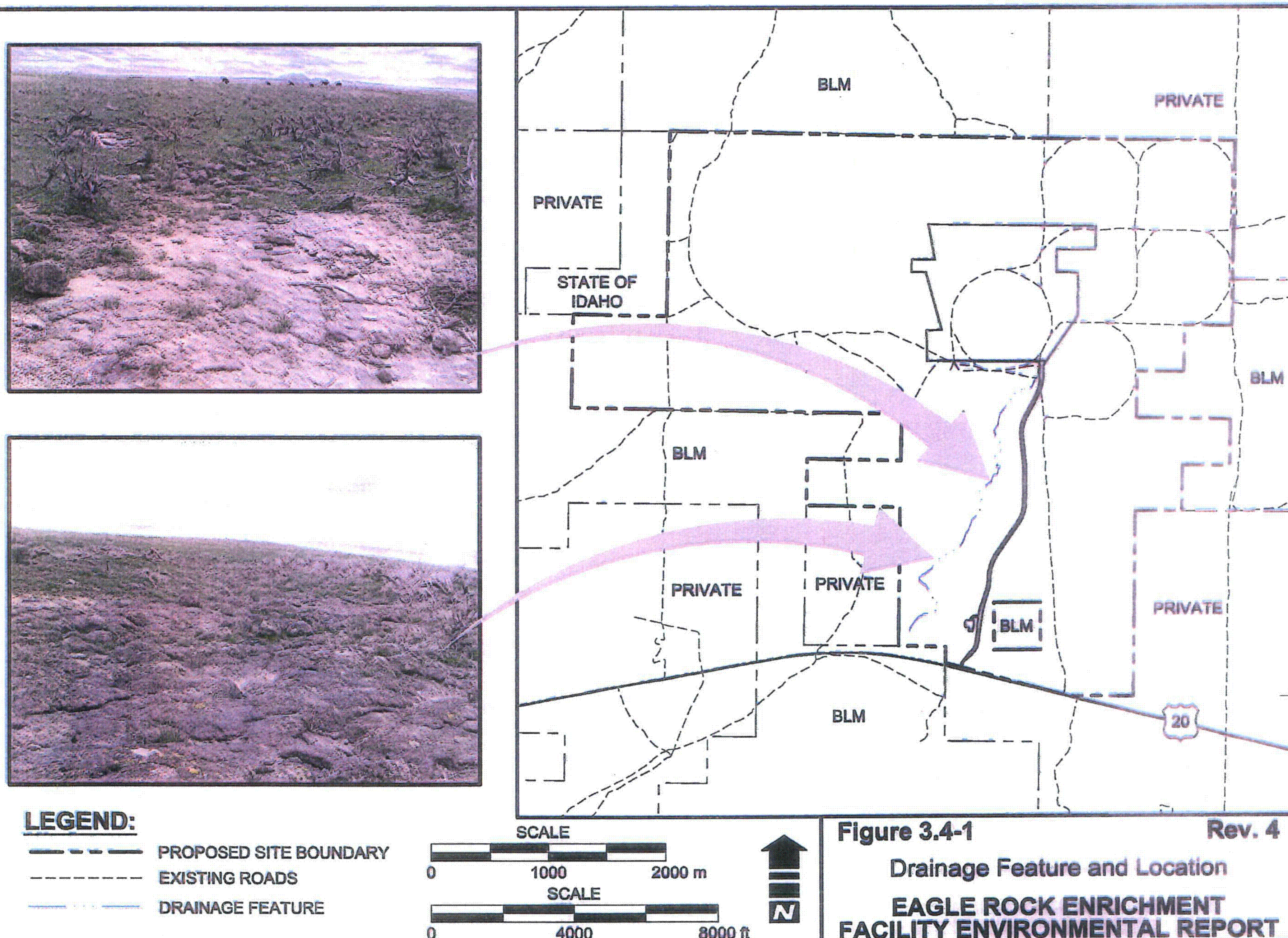
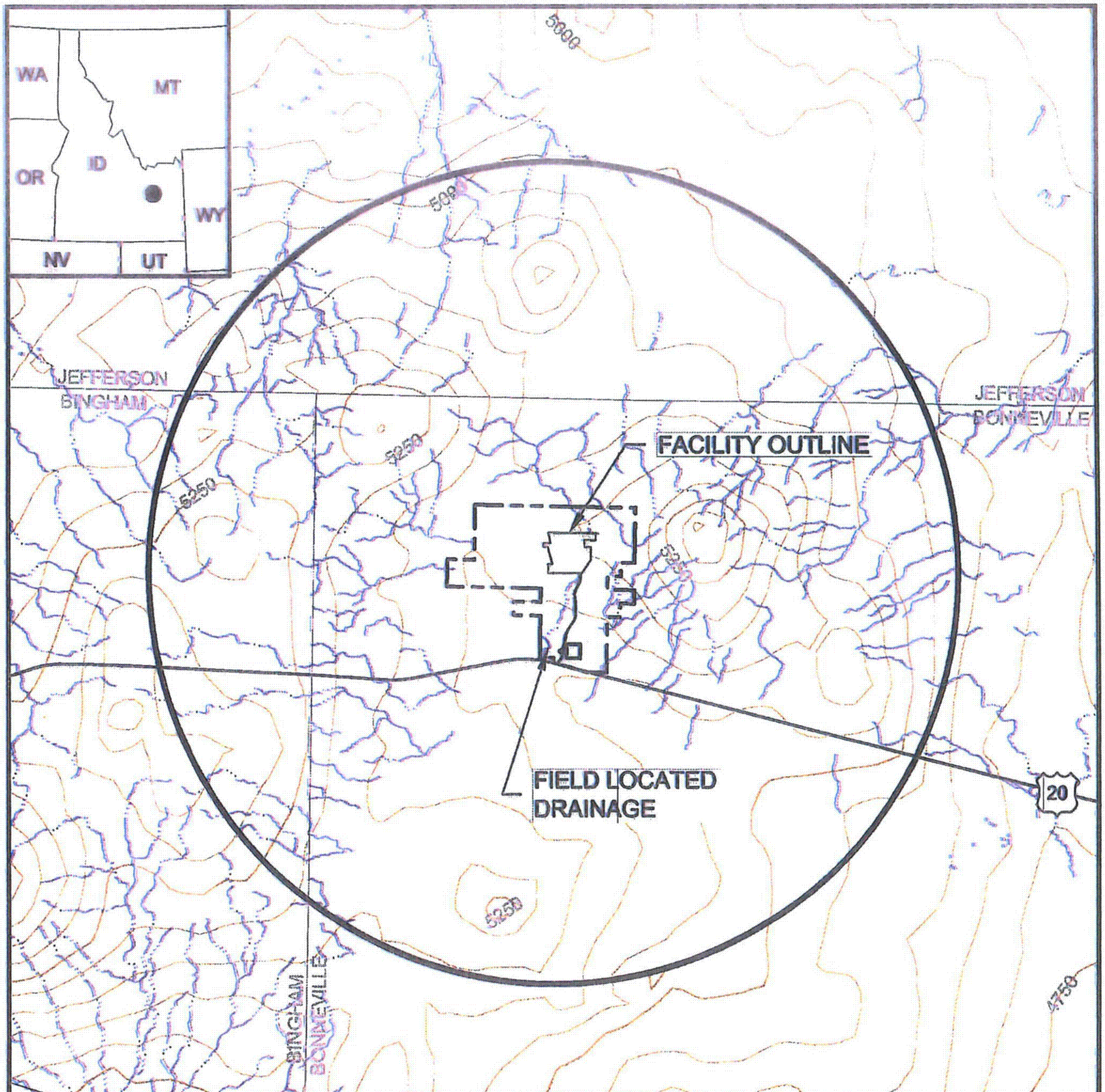


Figure 3.4-1 **Rev. 4**

Drainage Feature and Location

EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT



LEGEND:

5250 — APPROXIMATE EXISTING GROUND SURFACE CONTOUR AND ELEVATION, ft

PROPOSED SITE BOUNDARY

8 km (5 mi) RADIUS

DRAINAGE

SCALE

0 4 8 km

SCALE

0 2 4 mi

N

NOTE:

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

Figure 3.4-3 **Rev. 4**

Local Hydrologic Features Within 8 km (5 mi)

EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT

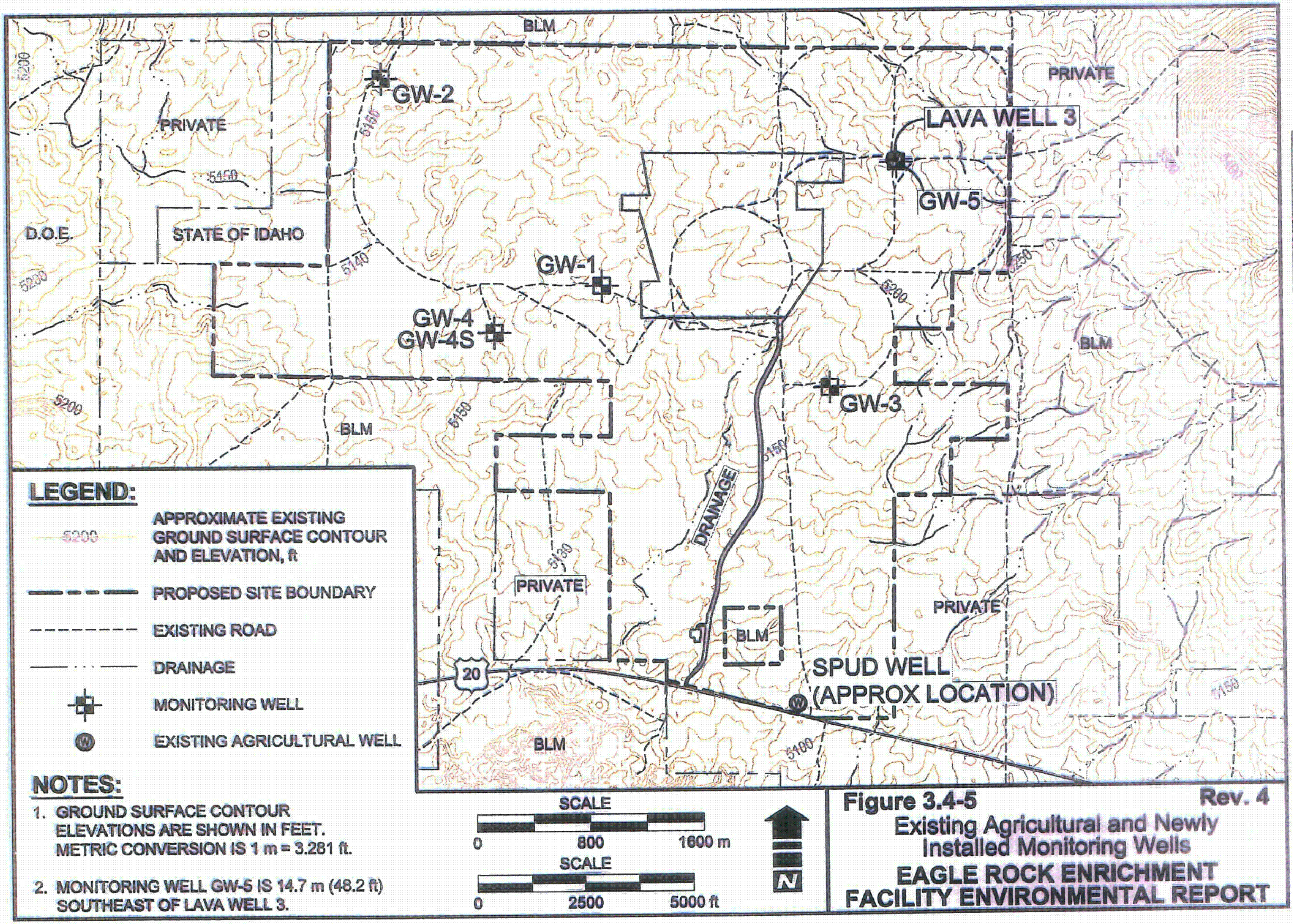


Figure 3.4-5 Existing Agricultural and Newly Installed Monitoring Wells

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EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT

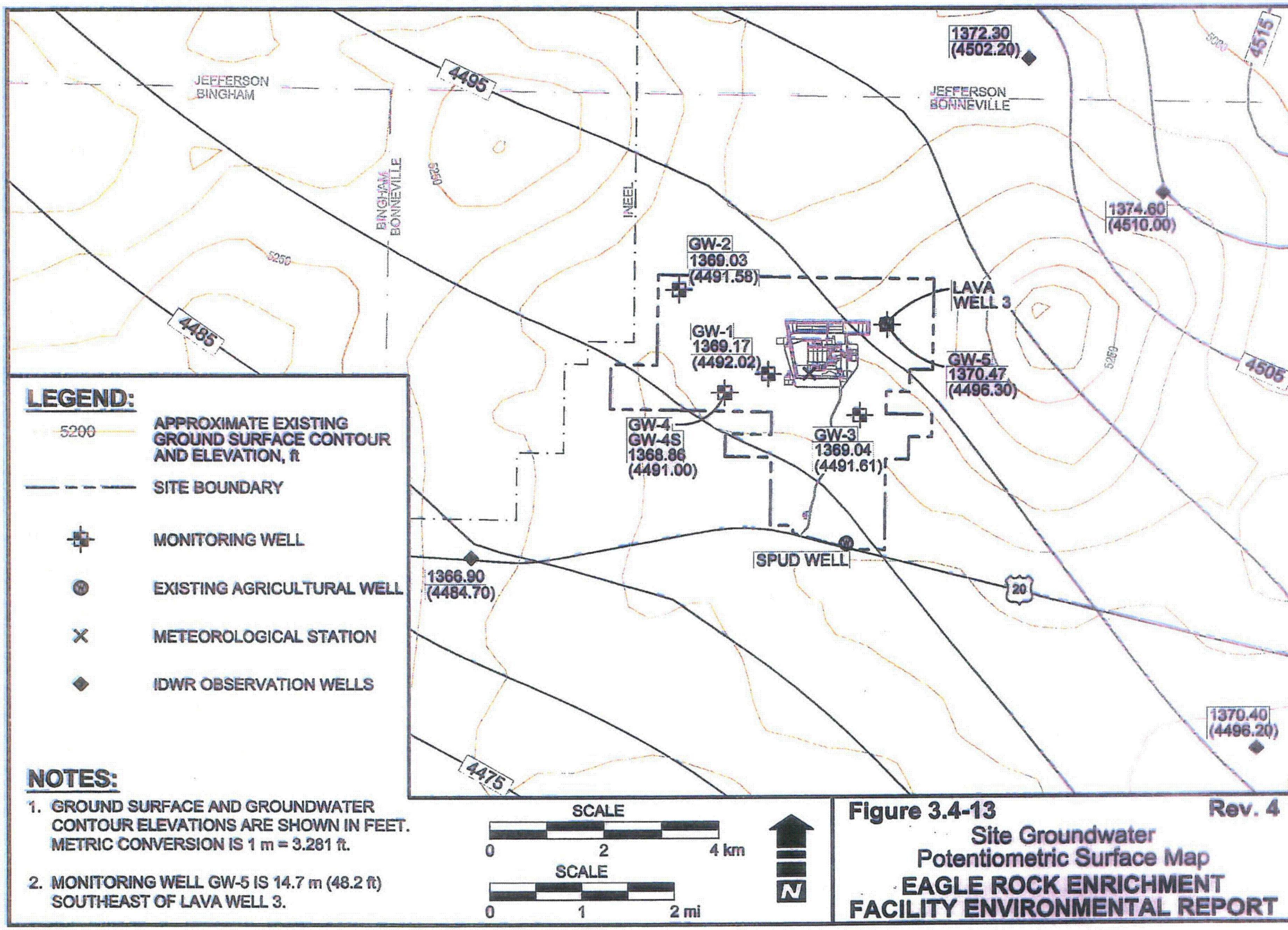

Figure 3.4-13 Rev. 4

Site Groundwater Potentiometric Surface Map

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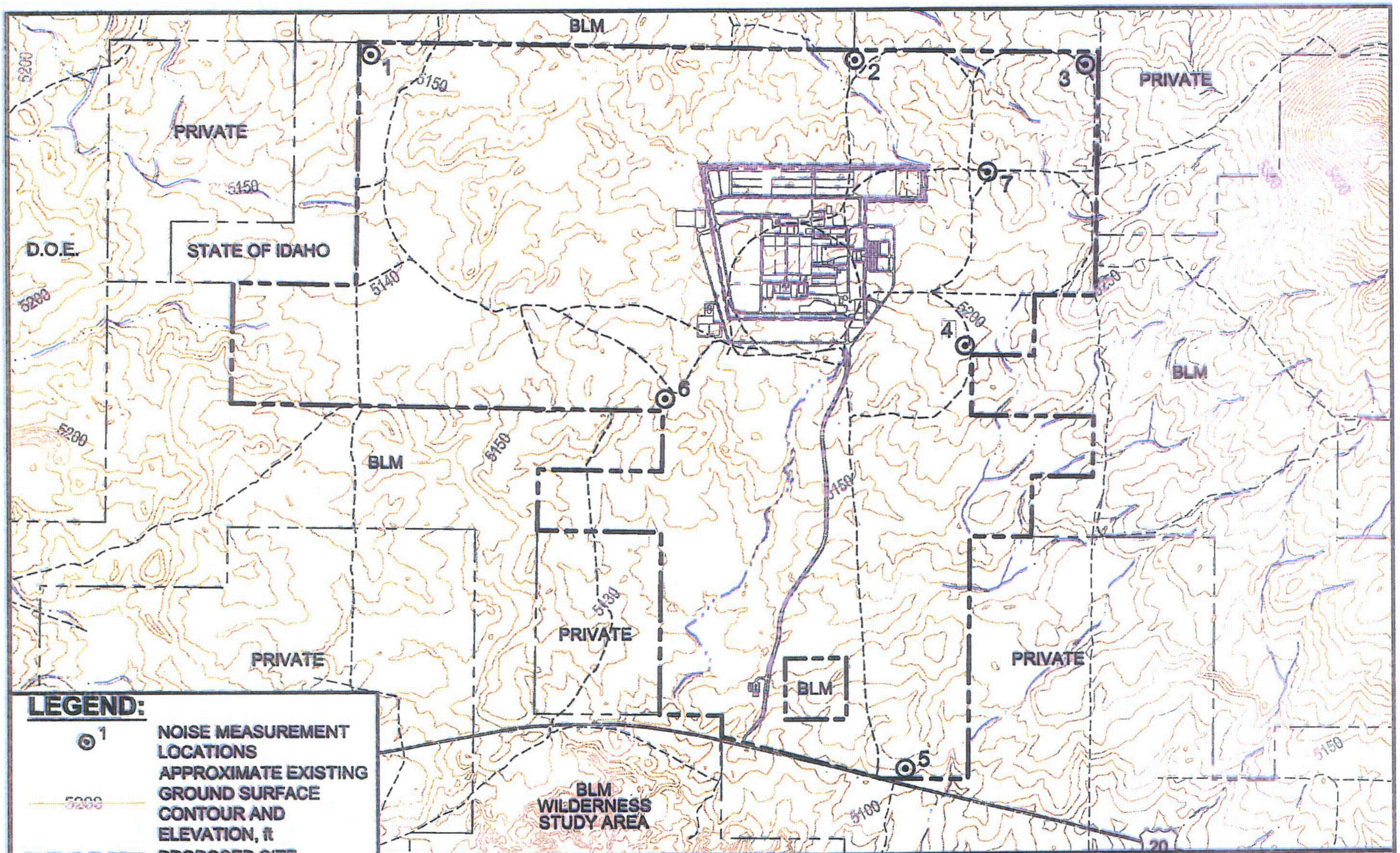

Figure 3.7-1 Rev. 4

Noise Measurement Locations

EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT

recommended by Regulatory Guide 8.37 (NRC, 1993a). These effluents are evaporated and the sludge is solidified and disposed of as solid waste.

Hand Wash and Shower Effluents are treated when necessary. Otherwise, these effluents are discharged to the domestic sanitary sewage treatment system. Two single-lined Cylinder Storage Pads Stormwater Retention Basins, each having two cells, will be used specifically to retain runoff from the Cylinder Storage Pads (Northern Cylinder Storage Pads and Full Product Cylinder Storage Pad) during heavy rainfalls. A Domestic SSTP Basin, having two cells, will receive treated effluent from the packaged domestic sanitary sewage treatment plant. The unlined Site Stormwater Detention Basins will receive rainfall runoff from the balance of the developed plant site.

The sanitary sewage treatment system is capable of handling approximately 18,700 m^3/yr (4,927,500 gal/yr) based on the design number of employees of approximately 550. Figure 3.12-1, Domestic Sanitary Sewage Treatment Plant, shows the planned location of the domestic Sanitary Sewage Treatment Plant. Treated domestic sanitary effluent is discharged to the SSTP Basin and allowed to evaporate.

3.12.2 Solid Waste Management

Solid waste generated at the EREF will be grouped into industrial (nonhazardous), radioactive and mixed, and hazardous waste categories. In addition, solid radioactive and mixed waste will be further segregated according to the quantity of liquid that is not readily separable from the solid material. The solid waste management systems will be a set of facilities, administrative procedures, and practices that provide for the collection, temporary storage, (no solid waste processing is planned), and disposal of categorized solid waste in accordance with regulatory requirements. All solid radioactive wastes generated will be Class A low-level wastes as defined in 10 CFR 61 (CFR, 2008ee).

Industrial waste, including miscellaneous trash, vehicle air filters, empty cutting oil cans, miscellaneous scrap metal, and paper will be shipped offsite for minimization and then sent to a licensed waste landfill. The EREF is expected to produce approximately 70,307 kg (155,000 lbs) of this industrial waste annually. Table 3.12-2, Estimated Annual Non-Radiological Wastes, identifies normal waste streams and quantities.

Radioactive waste will be collected in labeled containers in each Restricted Area and transferred to the Solid Waste Collection Room for inspection. As appropriate, waste will be volume-reduced and all radioactive waste disposed of at a licensed low-level waste disposal facility. The EREF is expected to produce approximately 146,500 kg (323,000 lbs) of radioactive waste annually.

Hazardous wastes (e.g., spent blasting sand, empty spray paint cans, empty propane gas cylinders, solvents such as acetone and toluene, degreaser solvents, hydrocarbon sludge, and chemicals, such as methylene chloride and petroleum ether) and some mixed wastes will be generated at the facility. These 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 offsite as low-level waste for disposal. Table 3.12-2, Estimated Annual Non-Radiological Wastes, lists anticipated hazardous wastes and quantities. The EREF is expected to produce approximately 3,378 kg (7,448 lbs) of hazardous wastes annually.

Restricted Areas are disposed of as industrial scrap metal unless there is reason to suspect they contain hazardous material.

Scrap metal is monitored for contamination before it leaves the site. Metal found to be contaminated is either decontaminated or disposed of as radioactive waste. When feasible, decontamination is the preferred method.

Decontamination is performed in situ for large items and in the Decontamination Workshop for regular items used in performing maintenance. Decontamination of large items should not be required until the end of plant life. Items that are not suitable for decontamination are inspected to determine the quantity of uranium present, packaged, labeled, and shipped either to a CVRF or a radioactive waste disposal facility.

Metallic items containing hazardous materials are collected at the location of the hazardous material. The items are wrapped to contain the material and taken to the Solid Waste Collection Room.

The items are then cleaned onsite if practical. If onsite cleaning cannot be performed then the items are sent to a hazardous waste processing facility for offsite treatment or disposal.

3.12.2.1.2.7 Laboratory Waste

Small quantities of dry solid hazardous wastes are generated in laboratory activities, including small amounts of unused chemicals and materials with residual hazardous compounds. These materials are collected, sampled, and stored in the Solid Waste Collection Room.

Precautions are taken when collecting, packaging, and storing these wastes to prevent accidental reactions. These materials are shipped to a hazardous waste processing facility where the wastes will be prepared for disposal.

Some of the hazardous laboratory waste may be radioactively contaminated. This waste is collected, labeled, stored, and recorded as mixed waste. This material is shipped to a licensed facility qualified to process mixed waste for ultimate disposal.

3.12.2.1.2.8 Evaporator

Treated aqueous effluent is evaporated in an evaporator. Evaporation produces a chemically decontaminated gaseous effluent. The concentrate, composed of residual impurities, is periodically drained and constitutes a low volume liquid effluent that is removed, analyzed, processed, and disposed of. The evaporator concentrate will be sampled and analyzed for isotopic uranium content for each batch of waste bottoms generated by the evaporator.

3.12.2.1.2.9 Depleted UF_6

The enrichment process yields depleted UF_6 streams with assays of up to 0.4 $^{w}/_{o}$ ^{235}U. The approximate quantity and generation rate for depleted UF_6 is 15,270 MT (16,832 tons) per year. This equates to approximately 1,222 depleted uranium tails cylinders of UF_6 per year. The depleted uranium tails cylinders will be temporarily stored onsite before transfer to a processing facility for subsequent reuse or disposal. The depleted uranium tails cylinders are stored in the outdoor storage areas known as the Northern Cylinder Storage Pads.

The Northern Cylinder Storage Pads consist of outdoor storage areas with concrete saddles on which the cylinders rest. An entry/exit carriage and a cylinder hauling trailer towed by a tractor transfers cylinders from the Blending, Sampling and Preparation Building to the Northern

Cylinder Storage Pads. Depleted uranium tails cylinder transport between the Separations Building modules and the storage area is discussed in the Integrated Safety Analysis Summary Section 3.4.11.2, Cylinder Transport within the Facility. Refer to Section 4.13.3, Waste Disposal Plan, for information regarding the EREF depleted UF_6 management practices and the disposition plan for depleted uranium tails cylinders.

The potential environmental impacts from direct radiation exposure from the depleted uranium tails cylinders are described in Section 4.12.2.1.3, Direct Radiation Impacts. For the purposes of the dose calculation in that section, the Northern Cylinder Storage Pads have a capacity of 29,857 containers. A detailed discussion on the environmental impacts associated with the 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.

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.

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)

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

Table 3.12-4 Estimated Annual Liquid Effluent
(Page 1 of 1)

Effluent	Typical Annual Quantities	Typical Uranic Content
Contaminated Liquid Process Wastes:	L (gal)	kg (lb)
Laboratory Effluent/Floor Washings/Miscellaneous Condensates	46,280 (12,226)	32 (70.5)[1]
Degreaser Water	7,419 (1,960)	37 (81.6)[1]
Spent Citric Acid	5,440 (1,437)	44 (98)[1]
Total Effluent Discharged[2] to Atmosphere by Evaporation via Liquid Effluent System Evaporator:	59,100 (15,625)[2]	N/A [2]
Sanitary:	18,652,600 (4,927,500)	None
Stormwater Discharge:		
Gross Discharge[3]	420,090,000 (110,976,000)	None

1 Uranic quantities are before treatment. Volumes for degreaser water and spent citric acid include process tank sludge.

2 Total annual effluents to atmosphere by evaporation via liquid effluent system evaporator is approximately 59,100 L (15,625 gal) with total uranic input approximately 114 kg (251 lb). Effluents are treated to remove uranic content by precipitation, filtration, and evaporation and discharged to atmosphere. The anticipated atmospheric distillate release is expected to be < 0.0356 g/yr (1.26E-03 oz/yr) of total uranium. The EREF design precludes operational process discharges from the plant to surface or groundwater.

3 Maximum gross discharge is based on total mean annual precipitation falling on the developed portion of the site associated with the runoff to the Site Stormwater Detention Basins and the Cylinder Storage Pads Stormwater Retention Basins, neglecting infiltration into the site soil and evaporation.

LIST OF FIGURES

4.1 LAND USE IMPACTS

4.1.1 Construction Impacts

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

The proposed EREF site is approximately 1,700 ha (4,200 ac) in size. Construction activities, including permanent plant structures (including Rocky Mountain Power Facilities) will disturb about 203 ha (500 ac). The temporary construction area, including temporary construction facilities, parking areas, material storage, and excavated areas for underground utilities will disturb an additional 37 ha (92 ac). The total disturbed area will, therefore, be 240 ha (592 acres). The temporary construction area will be restored using native vegetation after completion of plant construction. The balance of the property, 1,460 ha (3,608 ac), will be left in a natural state with no designated use. The plot plan and site boundaries of the permanent facilities indicating the areas to be cleared for construction activities are shown in ER Figure 2.1-2, Site Area and Facility Layout Map, and Figure 2.1-3, Existing Conditions Site Aerial Photograph.

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

According to the Kettle Butte, Idaho, U.S.G.S. Quadrangle Map, the proposed property terrain currently ranges in elevation from about 1,556 m (5,106 ft) near U.S. Highway Route 20 to about 1,600 m (5,250 ft) in a small area at the eastern edge of the property. The terrain in the area of the developed site facility footprint ranges in elevation from about 1,573 m (5,161 ft) above msl in the vicinity of the stormwater basins to 1,588 m (5,210 ft) above msl. Approximately 164.9 ha (407.5 ac) will be graded to bring the developed portion of the property to a final grade between 1,576 m (5,170 ft) to 1,592 m (5,223 ft) above msl. The material excavated will be used for on-site fill. Site preparation will include the cutting and filling of approximately 778,700 m^3 (27,500,000 ft^3) of soil with the deepest cut being approximately 6 m (20 ft) and the deepest fill being 6 m (20 ft). Blasting will be used as necessary to aid in the removal of fractured basalt (hardened lava) where depth to bedrock interferes with the installation of utilities and installation of substructures.

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

Impacts to land and groundwater will be controlled during construction through compliance with the National Pollutant Discharge Elimination System (NPDES) Construction General Permit obtained from Region 10 of the U.S. Environmental Protection Agency (EPA). A Spill Prevention, Control and Countermeasures (SPCC) plan will also be implemented during construction to minimize environmental impacts from potential spills and to ensure prompt and appropriate remediation. Potential spills during construction are likely to occur around vehicle maintenance and fueling locations, storage tanks, and painting operations. The SPCC plan will identify sources, locations and quantities of potential spills and response measures. The plan will also identify individuals and their responsibilities for implementation of the plan and provide for prompt notifications to state and local authorities, as required.

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

4.1.2 Utilities Impacts

The EREF will require the installation of water and electrical utility lines. Sanitary waste will be treated in a packaged domestic Sanitary Sewage Treatment Plant (SSTP). Solid wastes from the treatment system will be temporarily stored in a holding tank and disposed of at an off-site location. Residual treated sanitary effluent will be directed to the domestic SSTP Basin (see Section 3.4, Water Resources).

Water will be provided from on-site groundwater wells for the proposed facility. Since there are no bodies of water between the site and Idaho Falls, no waterways will be disturbed.

The proposed 161-kV transmission line route would extend west from the existing RMP Bonneville Substation, located in Bonneville County, Idaho, along the following route (refer to Appendix H, Figure H-1):

1. West along the county road (West 65 North Street) to the existing RMP Kettle Substation, a distance of approximately 14.5 km (9 mi); continuing west to the eastern portion of the EREF site, a distance of 1.2 km (0.75 mi); then north within the EREF site to its northern end, then west and south to the new RMP Twin Buttes Substation, for a distance of approximately 6.4 km (4 mi); a total distance of approximately 22.1 km (13.75 mi).

AES would construct, own, and operate a 161-kV substation immediately adjacent to the new RMP Twin Buttes Substation that would distribute power within the EREF.

The proposed route traverses private property. Easements from private landowners would be required for proposed routes on their lands. No federal or state lands are crossed by the proposed 161-kV transmission line.

A detailed discussion of the proposed 161-kV transmission line is provided in Appendix H, 161-kV Transmission Line Project.

Overall land use impacts to the site and vicinity will be changing the use from agriculture to industrial. The area is currently zoned G-1 (grazing), which permits manufacturing process facilities. A majority of the site (approximately 86%) will remain undeveloped, and the

The proposed facility will be located on flat terrain, requiring cut and fill of significant areas to bring ground level to a final grade of 1,576 to 1,592 m (5,170 to 5,223 ft). The excavation of the detention basins will also produce fill material. The material excavated will be a combination of soil and basaltic bedrock. It is planned that the volume of material excavated from the higher portions of the site will be fully utilized for fill at the lower areas of the site, with a total of about 778,700 m^3 (1,018,500 yd^3) cut and used as fill. The modification of the site to a finished grade of 1,576 to 1,592 m (5,170 to 5,223 ft) will cause about 79 ha (196 acres) of the site to be raised with soil fill and 47 ha (117 acres) to be excavated down to that elevation. There are no current plans to dispose of excavated materials off site. Because of the agricultural history of the site, the resulting terrain change for the site from gently sloping to flat topography as a result of construction of the proposed facility is expected to cause a small environmental impact to the site geology or soils.

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

Short-term increases in soil erosion and dust generation in the areas in and adjacent to the proposed facility footprint and roads may occur during construction due to earth-moving activities, clearing of vegetation, and compaction of soils. However, rainfall in the region is limited and erosional impacts due to site clearing and grading will be mitigated by utilization of construction and erosion control best management practices (BMPs). (See ER Section 4.1, Land Use Impacts, for a discussion of construction BMPs.) Disturbed soils would be stabilized as part of construction work. Earth berms, dikes, and sediment fences will be utilized as necessary during all phases of construction to limit runoff. These measures will prevent the local surface drainages from being affected substantially by construction activities. Much of the excavated areas would be covered by structures or paved, limiting the creation of new dust sources. At a minimum (when needed) twice-daily watering will be used to control potentially fugitive construction dust in addition to other fugitive dust prevention and control BMPs discussed in ER Section 4.6.5, Mitigative Measures for Air Quality Impacts. Because site preparation and construction result in only short-term effects to the geology and soils, the impacts will be small.

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

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

Department of the Army (DA) jurisdictional waters at the EREF site and for this reason the project does not require a 404 permit (USACE, 2008). As a result, a Section 401 certification is not required.

The EREF site design addresses the following:

- General construction activities
- Domestic Sanitary Sewage Treatment Plant design and construction
- Discharge of stormwater and treated domestic sanitary effluents to site detention and retention basins during operations.

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. The BMPs will also be used for dust control associated with excavation and fill operations during construction. See Section 4.1, Land Use Impacts, for more information on construction BMPs.

During operation of the proposed EREF, domestic sanitary wastewater and stormwater runoff will be controlled by routing to the detention and retention basins. These basins are described in Section 3.4.1.1, Facility Withdrawals and/or Discharges to Hydrologic Systems, and include the following:

- Site Stormwater Detention Basins
- Cylinder Storage Pads Stormwater Retention Basins
- Domestic SSTP Basin

The locations of these basins are shown in Figure 4.4-1, Facility Layout with Detention/Retention Basins.

The three Site Stormwater Detention Basins will collect stormwater runoff from parking lots, roofs, roads, and diversions from unaltered areas around the site. The detention basins are designed to contain runoff for a volume equal to the 24-hour, 100-year return frequency rain storm of 5.70 cm (2.24 in) rainfall. The storage capacity available for maintaining a freeboard of 0.6 m (2.0 ft) is approximately 32,835 m^3 (27 acre-ft). For a highly unlikely storm scenario maintaining a freeboard of 0.3 m (1.0 ft), the basin will have approximately 49,600 m^3 (40 acre-ft) of storage capacity. The area served by the detention basin is about 139.3 ha (344.2 acres).

Water quality of the Site Stormwater Detention Basins will be typical of runoff from building roofs and paved areas from any industrial facility and natural runoff from diversions in unaltered areas of the site. Except for small amounts of oil and grease typically found in runoff from paved roadways and parking areas, the runoff is not expected to contain other chemical contaminants. The detention basins will not be lined so that the collected runoff is allowed to infiltrate as well as evaporate.

The Site Stormwater Detention Basins will each be designed with an outlet structure for overflow. It is possible that overflow from the basins will occur during a rainfall event larger than the design basis. Overflow of the basins is an unlikely event, but if it does occur, then the local downgradient terrain will serve as the receiving area for the excess runoff. The additional impact to the surrounding land above what would occur during such a flood is expected to be small. Therefore, the potential overflow of the Site Stormwater Detention Basins during an event beyond their design capacity is expected to have a small impact to surrounding land.

The Cylinder Storage Pads Stormwater Retention Basins will be utilized for the collection and containment of stormwater runoff from the Cylinder Storage Pads. The Cylinder Storage Pads Stormwater Retention Basins will be lined to prevent infiltration and open to the air to allow evaporation. There will be no direct discharge to waters of the U.S. or to groundwater. The retention basins will not have an outfall.

Stormwater runoff from the Cylinder Storage Pads, where full tails, full feed, full product and empty cylinders are stored, will be directed to the Cylinder Storage Pads Stormwater Retention Basins. The area served for stormwater retention by the basins is 25.6 ha (63.3 acres) and is the total area of the facility where the Cylinder Storage Pads are located. Stormwater runoff from the Cylinder Storage Pads will be distributed between the two retention basins. Each retention basin has two cells and is designed to contain a volume of approximately 83,019 m^3 (67.3 acre-ft) maintaining a freeboard of 0.9 m (3.0 ft). Under highly unlikely events, the volume of each basin will contain approximately 113,700 m^3 (92.2 acre-ft), maintaining a freeboard of 0.3 m (1.0 ft). As designed, the retention basins can contain runoff for a volume equal to twice that for the 24-hour, 100-year return frequency rain storm, a 5.70-cm (2.24-in) rainfall.

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.

For an average annual rainfall at the site of 25.4 cm/yr (10.0 in/yr), the potential stormwater runoff volumes reaching the basins are approximately 85,175 m^3/yr (22,501,000 gal/yr) for the Site Stormwater Detention Basins and 65,240 m^3/yr (17,234,700 gal/yr) for the Cylinder Storage Pads Stormwater Retention Basins. The potential stormwater runoff volume for the balance of the property is 3,892,815 m^3/yr (1,028,372,815 gal/yr). This is the pure volume of the mean precipitation falling (before evapotranspiration and infiltration) upon the remaining undeveloped area. Considering the size of the property at approximately 1,700 ha (4,200 acres) compared to the developed central footprint area of 164.9 ha (407.5 acres), about 9.7% of the property, the attenuation of the increase of runoff by the detention and retention basins, the placement of the developed area being a considerable distance to the property lines, and the semi-arid climate, it is unlikely that there will be an increase of stormwater runoff to adjacent properties.

A Domestic SSTP Basin, with two cells, will be utilized for the discharge of treated domestic sanitary effluent. Sanitary effluent discharges will total approximately 18,700 m^3/yr (4,927,500 gal/yr). The collected effluent will be allowed to evaporate. Under normal design conditions with a freeboard of 0.6 m (2.0 ft), the SSTP Basin will have an available storage volume of 6,784 m^3 (5.5 acre-ft). With a freeboard of 0.3 m (1.0 ft), the available storage volume will be 9,128 m^3 (7.4 acre-ft). During winter time, if one cell cannot provide enough storage, the second cell will be available.

4.4.1 Receiving Waters

The proposed EREF will not discharge any process effluents from plant operations onto the site or into surface waters. Daily treated domestic sanitary effluent will be discharged from the Domestic Sanitary Sewage Treatment Plant to the Domestic SSTP Infiltration Basin. Stormwater runoff from most of the developed portions of the site will be collected in the Site Stormwater Detention Basins with the exception of the Cylinder Storage Pads. Stormwater runoff from the Cylinder Storage Pads will be directed to the Cylinder Storage Pads Stormwater Retention Basins.

Discharge from the Site Stormwater Detention Basins will occur through evaporation, low discharge orifices, and infiltration into the ground. Discharge from the Cylinder Storage Pads Stormwater Retention Basins will occur by evaporation only. The detention and retention basins are designed to provide a means of controlling discharges of runoff for approximately 79.8 ha (197.3 acres) of pavement, parking lots, and roofs of the EREF structures and landscaped areas plus an additional 21.9 ha (54 acres) of the Cylinder Storage Pads. Combined, these areas represent about 101.7 ha (251.3 acres) of the approximate 1,700 ha (4,200 acres) total EREF site area. Discharge from the Domestic SSTP Basin will occur through evaporation.

Due to high evapotranspiration rates for the area, it is not anticipated that runoff derived from the proposed EREF will reach receiving waters. The soils in the site area are thin, and the vertical conductivity of the bedrock is high. Therefore, it is likely that a portion of the stormwater collected in the detention basins will infiltrate into the subsurface and eventually reach groundwater. The Site Stormwater Detention Basins are designed to have an outlet structure for overflow, if needed, such as for a storm event exceeding the design basis. The local terrain serves as the receiving area in the rare event that there is enough stormwater to cause release from the outlet of the detention basins. Under normal weather conditions, evapotranspiration will likely consume the majority of water released from the outlet, and a fraction will be expected to infiltrate into the subsurface. The infiltrating water is expected to have a chemical composition typical of runoff from paved roadways, roofs, parking areas, and natural runoff. Similarly, evaporation is expected to consume the treated sanitary effluent within the SSTP Basin. The detention basins will be included in the site environmental monitoring program as described in Section 6.1, Radiological Monitoring, and ER Section 6.2, Physiochemical Monitoring. The sanitary sewage treatment system will be monitored as described in ER Section 6.1, Radiological Monitoring.

As discussed in ER Section 3.4.15, Groundwater Characteristics, water that reaches the basalt bedrock will likely infiltrate and flow vertically downward until reaching a low permeability layer, such as the sedimentary interbeds. Once encountering a low permeability layer, the water could become temporarily perched and/or flow laterally until the low permeability layer pinches out or contacts a higher permeability zone. At this point the water will continue to migrate vertically until reaching the next low permeability layer. The water will migrate from the ground surface downward in a step-wise manner until reaching the saturated groundwater zone. Some vaporization of the moisture may occur in the thick vadose zone causing additional diffusion of the wetting front in its downward migration to the aquifer. Further transport will be a function of the transmissivity and flow direction of the groundwater in the aquifer.

The Cylinder Storage Pads Stormwater Retention Basins, which will serve the concrete paved outdoor cylinder storage areas, will be single-lined to prevent infiltration and designed to retain a volume that is slightly more than twice that for the 24-hour, 100-year storm. The configuration of the retention basins will allow for radiological testing of water and sediment (see ER Section 4.4.2, Impacts on Surface Water and Groundwater Quality). Neither retention basin will have an outlet. The only discharge allowed from the Cylinder Storage Pads Stormwater Retention

Basins will be through evaporation. If applicable, residual solids, after evaporation of water, will be removed through approved procedures.

The Cylinder Storage Pads will be constructed of reinforced concrete with a minimal number of construction joints, and pad joints will be plugged with joint sealer and water stops as a leak prevention measure. The ground surfaces around the Cylinder Storage Pads will be contoured to prevent rainfall in the area surrounding the pads from entering the pad drainage system.

4.4.2 Impacts on Surface Water and Groundwater Quality

Groundwater of good quality and quantity exists at the proposed EREF site, but there are no natural surface water bodies. During construction of the proposed EREF, surface water runoff will be controlled in accordance with the NPDES Construction General Permit (CGP). Therefore, no significant impacts are expected for either surface water bodies or groundwater as a result of construction activities.

During operation, stormwater runoff from the developed portions of the site, such as parking lots, roads, and roofs, will be collected in the Site Stormwater Detention Basins as described above in ER Section 4.4.1, Receiving Waters, and shown in Figure 4.4-1, Facility Layout with Detention/Retention Basins. No wastes from facility operational systems will be discharged to the detention basins. Therefore, the water from the detention basins is not expected to have any impact on water quality in the downgradient groundwater system. Water collected in the detention basins will be routinely monitored for chemical composition to detect the presence of any contaminants. ER Section 6.2, Physiochemical Monitoring, provides the details of the monitoring plan for the detention basins. In addition, stormwater discharges during plant operation will be controlled by a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP will identify potential sources of pollution that may reasonably be expected to affect the quality of stormwater discharge from the site, describe the practices used to reduce pollutants in stormwater, and define compliance with the terms and conditions of the CGP.

During operation of the proposed EREF, the Cylinder Storage Pads Stormwater Retention Basins will collect runoff water from the Cylinder Storage Pads. Runoff from the Cylinder Storage Pads has the extremely remote potential to contain low-level radioactivity from cylinder surfaces or leaks. However, an assessment of a potential release of radioactive constituents from the Cylinder Storage Pads from a single precipitation event based on conservative assumptions about contamination levels on cylinder surfaces and 100% washoff showed that the level of radioactivity in such a discharge to the basins will be below the regulatory criteria. The capacities of the retention basins are designed to be sufficient for containment of the volume of runoff predicted for more than twice the 100-year, 24-hour frequency precipitation event.

To prevent potential losses of runoff from the Cylinder Storage Pads to the environment, the drainage system from the pads to the retention basins for surface water runoff will include pre-cast catch basins and concrete trench drains, and piping will have sealed joints to preclude leakage. Each retention basin will be lined with a single layer of impervious synthetic fabric with ample soil cover over the liner to prevent surface damage and degradation by ultraviolet radiation. The liner will prevent infiltration of water, thereby averting potential impacts to the groundwater system.

Wastewater associated with the Domestic Sanitary Sewage Treatment Plant will be directed to the Domestic SSTP Basin as described in ER Section 3.4.1.1, Facility Withdrawals and/or Discharges to Hydrologic Systems. Sanitary effluents will be treated to applicable requirements prior to discharge into the SSTP Basin. The sanitary sewage treatment plant will also be monitored under the radiological environmental monitoring program as described in ER Section 6.1, Radiological Monitoring.

In summary, runoff controls incorporated into the facility design and treatment of sanitary waste effluents, are expected to prevent impacts to surface water and groundwater.

4.4.3 Hydrological System Alterations

Excavation and placement of fill for construction of the proposed EREF will result in a final site grade between 1,576 m (5,170 ft) and 1,592 m (5,223 ft). An approximate total of 778,700 m^3 (1,018,500 yd^3) of cutting and filling is required for site preparation. Approximately 79 ha (196 acres) of the site will be raised with soil fill and 47 ha (117 acres) will be excavated down to that elevation. This earthwork will not require alteration or filling of surface water features on the site.

No alterations to groundwater systems will occur due to facility construction. The construction will involve the excavation and placement of fills at the surface, but these activities are not expected to affect the groundwater system, which is located at depths from 199.5 m (654.4 ft) and 219.4 m (719.9 ft) below ground surface. Runoff controls will be in place both during construction as part of BMPs and during operation to prevent uncontrolled releases of water. These control systems are described above in ER Sections 4.4, Water Resources Impacts, and 4.4.1, Receiving Waters. The potential for water or other liquids from spills or pipeline leaks to introduce sufficient amounts of liquid to saturate the top soil and bedrock surfaces to cause significant migration of contaminants downward to the groundwater system, is considered unlikely.

4.4.4 Hydrological System Impacts

The proposed EREF will obtain its water supply from on-site wells. Rates of water usage consumption are summarized in Table 3.4-2, Anticipated Normal Plant Water Consumption and Table 3.4-3, Anticipated Peak Plant Water Consumption. The ESRP Aquifer that underlies the proposed EREF is extremely productive (Garabedian, 1992). For example, typical well yields for most seasonally pumped agricultural wells in the ESRP Aquifer range from 3.4 m^3/min (900.0 gal/min) to 12.5 m^3/min (3,300.0 gal/min) and experience less than 6.1 m (20.0 ft) of drawdown (Garabedian, 1992). In comparison, the normal and peak potable water requirements for operation of the EREF are expected to be approximately 0.05 m^3/min (12.5 gal/min) and 2.8 m^3/min (739 gal/min), respectively. In consideration of the productivity of the ESRP Aquifer and high rates of normal water usage for irrigation, the amounts of water used at the proposed EREF are not expected to cause significant impacts to the site hydrologic systems.

Control of surface water runoff will be required for the EREF construction activities and will be covered by the NPDES Construction General Permit. As a result, no significant impacts are expected to either surface or groundwater bodies. Control of impacts from construction runoff is discussed below in ER Section 4.4.7, Control of Impacts to Water Quality.

The volume of water discharged into the ground from the Site Stormwater Detention Basins is expected to be minimal, as evapotranspiration is expected to be the dominant natural influence on standing water.

irrigate several crop fields. There are also three IDWR observation wells shown on Figure 4.4-2, Water Wells in the Vicinity of the EREF, approximately 3.2 km (2.0 mi) from the site boundary; two of the wells are hydrologically upgradient of the proposed EREF site and one is downgradient. The water right appropriation associated with the EREF property transfer defines the amount of water allowed for use and is less than the current irrigation appropriation. As a result, the impact of groundwater withdrawals during operation of the EREF is expected to be less than current impacts from irrigation practices.

There are no permanent surface water bodies on the site or within 1.6 km (1.0 mile), and no surface water users in the vicinity of the EREF. Therefore, there will be no impacts to surface water users.

4.4.7 Control of Impacts to Water Quality

Site runoff water quality impacts will be controlled during construction by compliance with NPDES Construction General Permit requirements, and BMPs will be described in a site SWPPP.

Wastes generated during site construction will be varied, depending on the stage of construction. Any hazardous wastes from construction activities will be handled and disposed of in accordance with applicable state and federal regulations. These regulations include proper labeling, recycling, controlling and protecting storage, and shipping off site to approved disposal sites. Sanitary wastes generated at the site will be handled by portable systems until the Domestic Sanitary Sewage Treatment Plant is available for use.

The need to level the site for construction will require some soil excavation as well as fills. Native soils will be used for fill. Therefore, fill placed on the site will provide the same characteristics as the existing natural soils and runoff from altered soil areas will have the same chemical characteristics as natural soils on the site.

During operation, the EREF's stormwater runoff detention and retention system will provide a means to allow controlled releases of site runoff only from the Site Stormwater Detention Basins in the event of a major precipitation event exceeding the 24-hr, 100-yr design criteria. Stormwater discharge will be periodically monitored in accordance with state and/or federal permits. A Spill Prevention, Control, and Countermeasure (SPCC) plan will be implemented for the facility to identify potential spill substances, sources, and responsibilities and perform any mitigations that are necessary. This plan is described in ER Section 4.1, Land Use Impacts. A SWPPP will also be implemented for the EREF so that runoff released to the environment will be of suitable quality.

Water discharged from the EREF Domestic Sanitary Sewage Treatment Plant will only consist of treated sanitary effluents; no facility process related effluents will be introduced into the Domestic Sanitary Sewage Treatment Plant. The Liquid Effluent Collection and Treatment System for the EREF will provide a means to control liquid process wastes within the plant. The system provides for the collection and treatment of liquid process wastes to remove contaminants by filtration and precipitation prior to being sent to an evaporator for vaporization; there will be no liquid effluent discharges from plant operations. Refer to ER Section 3.12, Waste Management, for further information on this system.

The Cylinder Storage Pads Stormwater Retention Basins will be lined to prevent infiltration. The basins will be designed to retain a volume slightly more than twice that for the 24-hour, 100-year frequency storm.

The Site Stormwater Detention Basins are designed with outlet structures for overflow. It is possible that overflow from the basins could occur during a rainfall event larger than the design basis. Overflow of the basins is an unlikely event, but if it does occur, then the local downgradient terrain will serve as the receiving area for the excess runoff. The additional impact to the surrounding land over what would occur during such a flood alone is expected to be small.

The Domestic SSTP Basin will be designed to provide storage for treated sanitary effluents as well as rainwater that falls directly on the basin and will include two feet of freeboard. The basin will consist of two equally sized lined cells. Only one cell is in operation at a time. Annual operation will rotate between the two cells. The overall size of each cell is equivalent to 1.7 ha (4.1 acres). At a maximum water depth of 1.2 m (4 ft), the storage volume of each cell is 27,048 cm (21.93 acre-ft). During winter time, if one cell cannot provide enough storage, the second cell will be available for use.

The retention basins have no flow outlets so that the only means for water loss is by evaporation. The retention and detention basins will be designed for sampling and radiological testing of the contained water and sediment. The sanitary sewage treatment system will be designed for radiological testing.

4.4.7.1 Mitigations

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

- Construction equipment will be in good repair without visible leaks of oil, grease, or hydraulic fluids.
- The control and mitigation of spills during construction will be in conformance with the SPCC plan.
- Use of the BMPs will control stormwater runoff to prevent releases to nearby areas to the extent possible. See ER Section 4.1.1, Construction Impacts, for descriptions of construction BMPs.
- In addition to twice-daily watering (when needed), other BMPs will also be used for dust control associated with excavation and fill operations during construction.
- Silt fencing and/or sediment traps will be used.
- External vehicle washing will use only water (no detergents).
- Stone construction pads will be placed at entrance/exits if unpaved construction access adjoins a state road.
- All temporary construction and permanent basins will be arranged to provide for the prompt, systematic sampling of runoff in the event of any special needs.
- Water quality impacts will be controlled during construction by compliance with the NPDES – Construction General Permit requirements and by applying BMPs as detailed in the site SWPPP.
- A SPCC plan will be implemented for the facility to identify potential spill substances, sources and responsibilities.
- All above-ground gasoline and diesel fuel storage tanks will be bermed or self contained.

- Any hazardous materials will be handled by approved methods and shipped off site to approved disposal sites. Sanitary wastes generated during site construction will be handled by portable systems until the Domestic Sanitary Sewage Treatment Plant is available for site use. An adequate number of these portable systems will be provided.
- The Liquid Effluent Collection and Treatment System will use evaporators, eliminating the need to discharge treated process water to an on-site basin.
- Control of surface water runoff will be required for activities covered by the NPDES Construction General Permit.

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

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

4.4.8 Identification of Predicted Cumulative Effects on Water Resources

The cumulative impact to water resources is limited to those resulting from construction and operation of the EREF, and the existing development on surrounding properties, because AES does not know of any other Federal, State, or private development plans within 16 km (10 mi) of the EREF.

The proposed EREF will not extract groundwater from the site in excess of its water right appropriation. Stormwater runoff from the Cylinder Storage Pads will be discharged to lined, engineered basins. Treated sanitary effluents will be discharged to the lined Domestic SSTP Basin. There will be no liquid effluent discharges from plant operations. As a result, no significant effects on natural water systems are anticipated and the cumulative impact to the water resources will be small.

4.4.9 Comparative Water Resources Impacts of No Action Alternative Scenarios

ER Chapter 2, Alternatives, provides a discussion of possible alternatives to the construction and operation of the EREF, including an alternative of "no action," i.e., not building the EREF. The following information provides comparative conclusions specific to the concerns addressed in this subsection for each of the two "no action" alternative scenarios addressed in ER Section 2.4, Table 2.4-2, Comparison of Environmental Impacts for the Proposed Action and the No-Action Alternative Scenarios.

Alternative Scenario C - No EREF; LES and USEC deploy gas centrifuge plants, USEC phases out the Paducah gaseous diffusion plant (GDP) and GEH deploys their plant using Silex

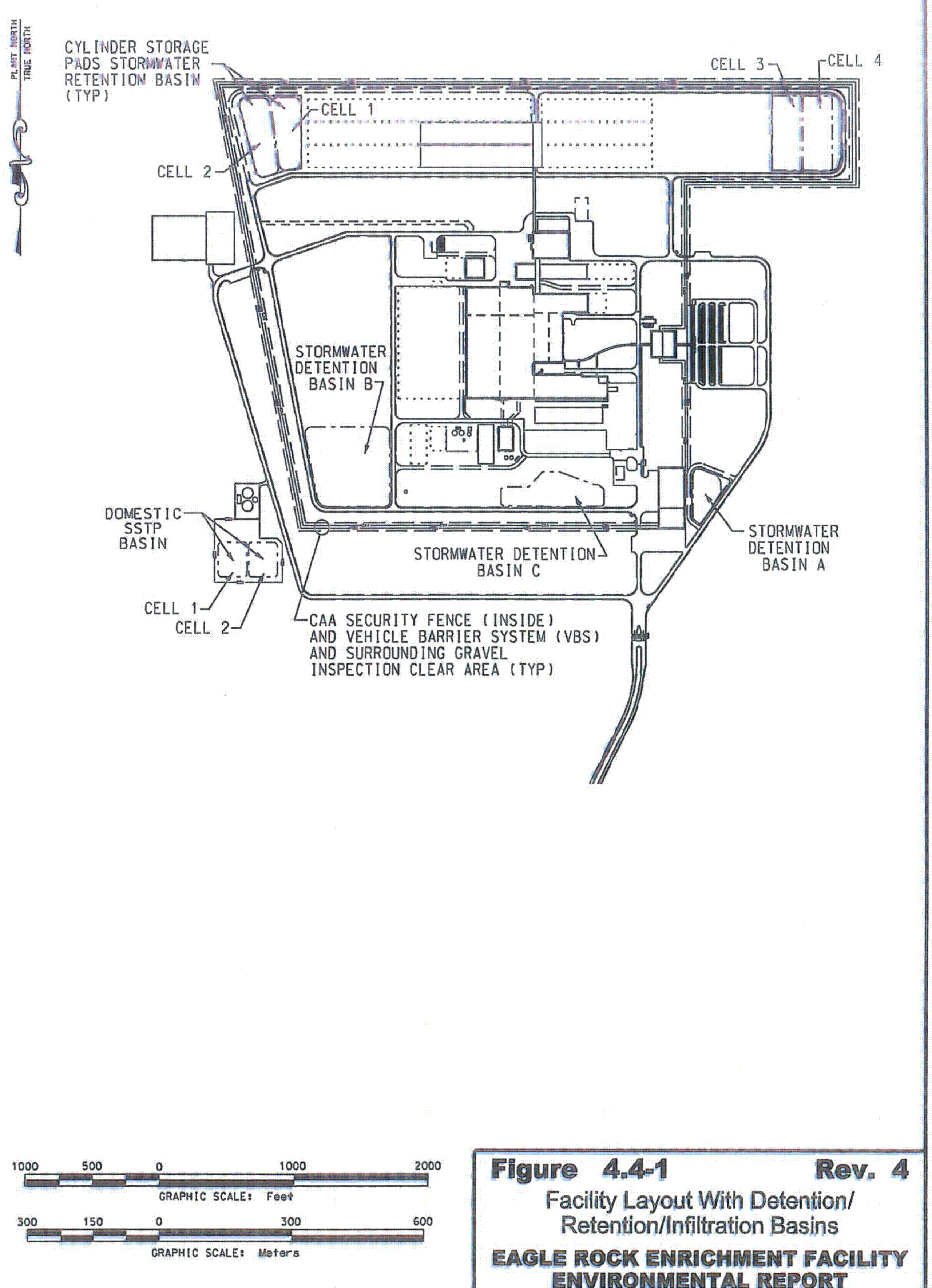

Figure 4.4-1 **Rev. 4**

Facility Layout With Detention/ Retention/Infiltration Basins

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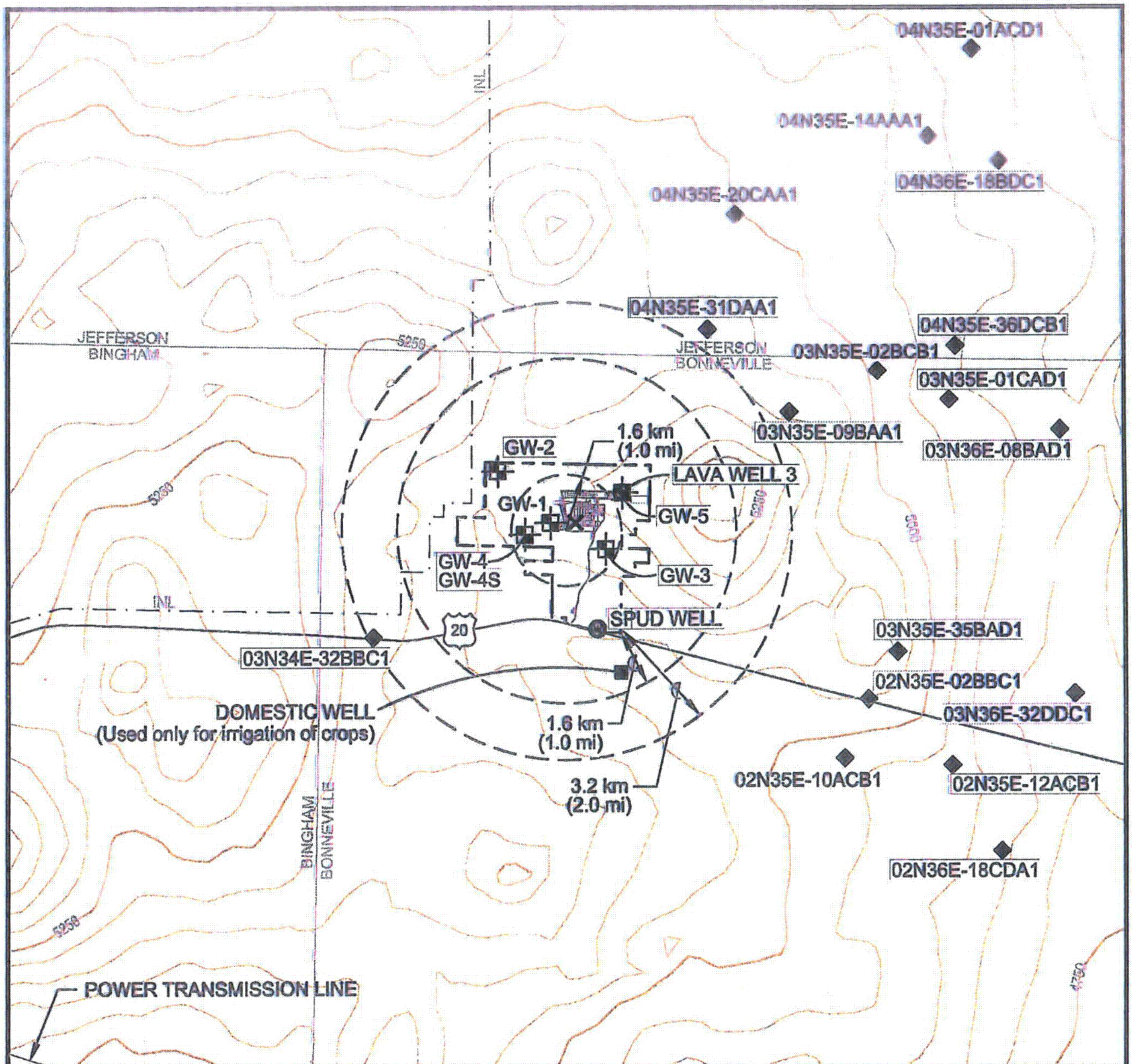

LEGEND:

- 5200 — APPROXIMATE EXISTING GROUND SURFACE CONTOUR AND ELEVATION, ft
- — — — SITE BOUNDARY
- — · — · — IDAHO NATIONAL LABORATORY (INL) BOUNDARY
- MONITORING WELL
- EXISTING AGRICULTURAL WELL
- × METEOROLOGICAL STATION
- ◆ IDWR OBSERVATION WELLS
- ■ DOMESTIC WELL

NOTE:

1. GROUND SURFACE CONTOUR ELEVATIONS ARE SHOWN IN FEET. METRIC CONVERSION IS 1 m = 3.281 ft.
2. MONITORING WELL GW-5 IS 14.7 m (48.2 ft) SOUTHEAST OF LAVA WELL 3.
3. OBSERVATION WELLS OBTAINED FROM (IDWR, 2008b).

SCALE: 0 — 4 — 8 km

SCALE: 0 — 2 — 4 mi

N

Figure 4.4-2 **Rev. 4**

Water Wells in the Vicinity of the EREF

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Presence of workers will result in avoidance of habitat immediately adjacent to construction and operation activities. Human presence will have the greatest impact during site preparation and construction, when workers are outside and using the most area within the proposed site. During operations worker presence will be lower (i.e., fewer workers, less amount of time outside) and animal populations will have adjusted during the first few years of plant construction. Presence of humans will be in part associated with noise impacts and the spatial extent of human activity will be limited to about 240 ha (592 ac); therefore, impacts will be small.

Traffic and use of onsite access roads can result in vehicle-wildlife collisions and fragmentation of seeded crested wheatgrass vegetation. Collisions will be minimized by maintaining reduced speeds for vehicles. Small mammals and birds will be the most affected by onsite traffic and roads, because few, if any, large mammals use this area on the property. However, the habitat value of this vegetation type potentially will improve with the removal of livestock grazing. The reduced grazing will result in increased vertical structure and a potential increase in plant diversity. This potential increase in plant community structure will offset potential loss from traffic although big game species (e.g., pronghorn) may begin to use the habitat if structure and diversity improves. Offsite traffic will increase along U.S. Highway 20 resulting in increased vehicle-wildlife collisions. The increased traffic volume over existing levels will range from about 37% during operations to about 53% during construction. Impacts from onsite and offsite traffic will be small.

The retention and detention basins and the Domestic SSTP Basin could be attractants to wildlife. The water quality of discharges to the stormwater basins will meet standards for stormwater. The water quality of discharges to the Domestic SSTP Basin will meet standards for treated effluent as required by the State of Idaho. The retention basins will be fenced to minimize the potential for land animals to use the water. Detention Basins B and C are within the fenced facility. Detention Basin A and the Domestic SSTP Basin will be surrounded by animal friendly fencing. Impacts from the retention and detention basins will be negligible to small.

4.5.5 Expected Impacts to Communities or Habitats

The communities and habitats on the proposed site are not unique or rare. No currently listed rare, threatened, or endangered species have been found or are known to occur on the proposed site. USFWS and IDFG identified that pronghorn (*Antilocapra americana*), greater sage grouse (*Centrocercus urophasianus*), and pygmy rabbit (*Brachylagus idahoensis*) were the three sensitive species of greatest interest to the agencies related to this project.

The proposed site is within BLM-designated crucial winter-spring pronghorn habitat. The sagebrush steppe habitat on the proposed site is adjacent and contiguous to habitat identified as key greater sage grouse habitat (ISGAC, 2006). The sagebrush steppe vegetation also represents potential habitat for pygmy rabbits. The sagebrush steppe habitat and the seeded crested wheatgrass vegetation provide nesting habitat for migratory birds, including various sparrow species, western meadowlark (*Sturnella neglecta*), sage thrasher (*Oreoscoptes montanus*), northern harrier (*Circus cyaneus*), short-eared owl (*Asio flammeus*), killdeer (*Charadrius vociferous*), and long-billed curlew (*Numenius americanus*), all of which were observed during site surveys. Impacts to these species will be similar to the impacts discussed in Section 4.5.4, Activities Expected to Impact Communities or Habitats. Specific potential impacts to these species are discussed below. See Section 4.5.10, Coordination with Federal and State Agencies, regarding regulatory compliance and protection of these species.

The construction and operation of the proposed EREF will result in the loss of about 75 ha (185 ac) of sagebrush steppe which is used by pronghorn. This is a small percent of this crucial

4.5.6 Tolerances or Susceptibilities of Important Biota to Pollutants

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

4.5.7 Maintenance Practices

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

4.5.7.1 Special Maintenance Practices

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

4.5.8 Construction Practices

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

4.5.9 Practices and Procedures to Minimize Adverse Impacts

Several practices and procedures have been designed to minimize adverse impacts to the ecological resources of the proposed site. These practices and procedures include the use of BMP's recommended by various state and federal management agencies (refer to Section 4.5.8, Construction Practices), minimizing the construction footprint to the extent possible, avoiding all direct discharge (including stormwater) to any waters of the United States (i.e., the use of temporary detention ponds), and site stabilization practices to reduce the potential for erosion and sedimentation. The use of native plant species in disturbed area revegetation will enhance and maximize the opportunity for native wildlife habitat to be re-established at the site. In addition, AREVA has identified the following additional mitigations to reduce impacts to ecological resources:

- Dust suppression methods will be used to minimize dust emissions.
- Fence the stormwater discharge retention and detention basins and the domestic SSTP Basin to limit access by wildlife.
- Improve the existing boundary fence by using smooth wire on the bottom wire and maintaining a minimum distance of about 40 cm (16 in) between the bottom wire and the ground.
- Continue seasonal monitoring of habitat to confirm habitat use by sensitive species.
- To protect migratory birds during the construction and decommissioning of the EREF, the following measures will be taken:
    - Clearing or removal of habitat (e.g., sagebrush), including buffer zones, will be performed outside of the breeding and nesting season for migratory birds.
    - If additional areas are to be disturbed or impacted that have not been cleared outside of breeding and nesting season, surveys will be performed to identify active nests during breeding and nesting season for migratory birds. Activities in areas containing active nests for migratory birds will be avoided.
    - AES will consult with the United States Fish and Wildlife Service to determine the appropriate actions to take a migratory bird, if needed.
- The use of low maintenance landscaping in and around the stormwater detention basins.
- The management of unused open areas (i.e. leave undisturbed), including areas of native grasses and shrubs for the benefit of wildlife.
- Eliminate livestock grazing on the property, when the plant becomes operational.
- Re-seed cropland areas on the property with native species, when the plant becomes operational.

4.5.10 Coordination with Federal and State Agencies

Currently, no listed rare, threatened, or endangered species or habitats are known to occur on the proposed site. However, the sagebrush community isolated to the northwestern one-third of the proposed site has the potential to provide habitat for the pygmy rabbit and is used by the greater sage grouse. In January 2008, the USFWS initiated a status review for the pygmy rabbit (USFWS, 2008d) and in February 2008 for the greater sage grouse (USFWS, 2008e) (USFWS, 2008f) to determine if listing of either species is warranted. In addition, multiple agencies, including IDFG, published an updated sage grouse conservation plan (ISGAC, 2006). The life history and habitat requirements for both species are discussed in Section 3.5.3, Description of Important Wildlife and Plant Species. By letter dated June 30, 2008, the USFWS notified AES of its determination that Endangered Species Act consultation is not needed. In March 2010, the USFWS announced that listing of the greater sage grouse as an endangered species is warranted, but listing precluded by higher listing priorities (USFWS, 2010a). In September 2010, the USFWS announced that it had completed a status review of the pygmy rabbit and concluded that it does not warrant protection under the Endangered Species Act in Idaho and other western states (USFWS, 2010b).

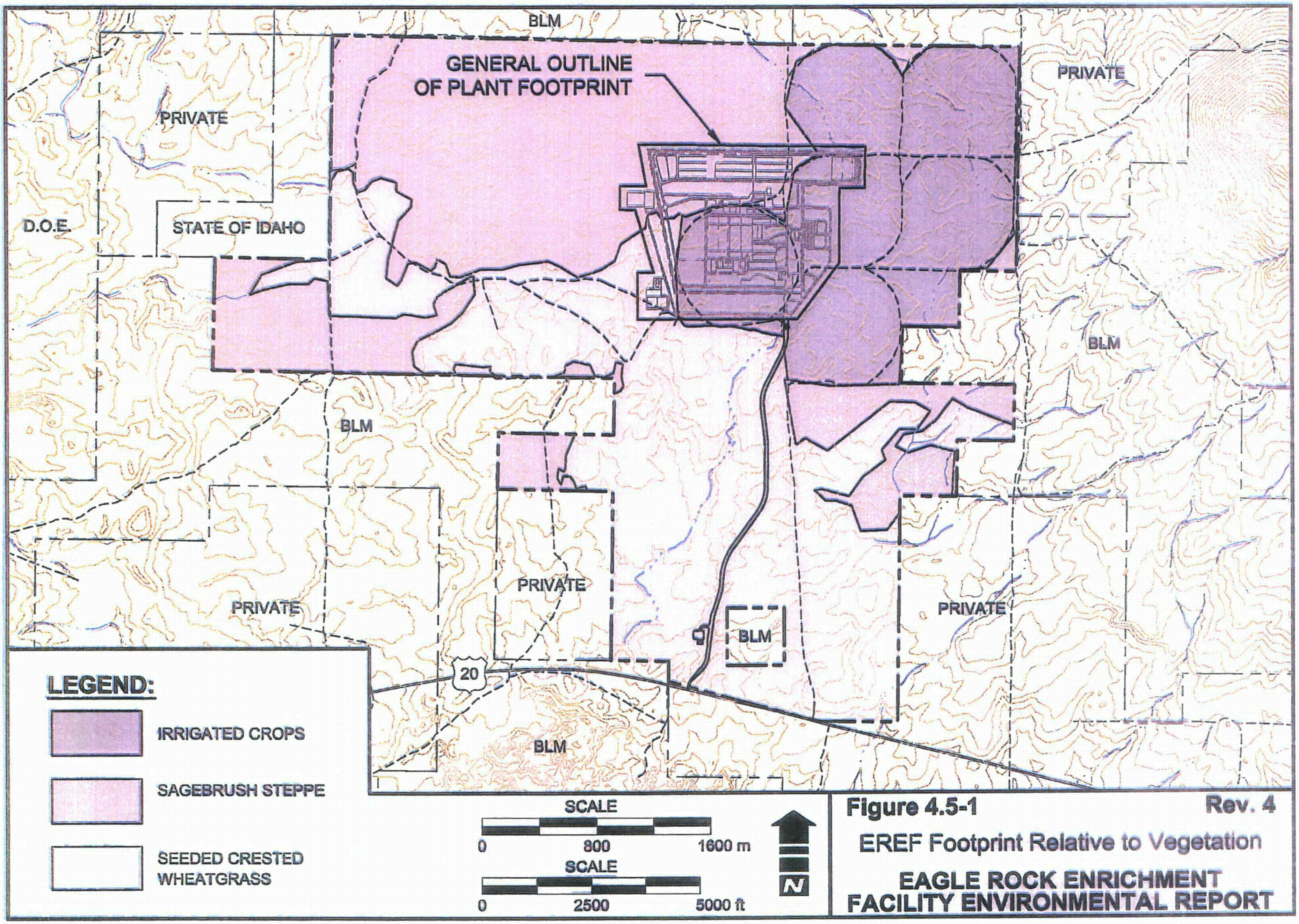

Figure 4.5-1 Rev. 4

EREF Footprint Relative to Vegetation

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4.9.7 Cumulative Impacts to Visual/Scenic Quality

The cumulative impacts to the visual/scenic quality of the proposed EREF site were assessed by examining the proposed actions associated with construction of the proposed EREF and the development of surrounding properties. AES does not know of any other Federal, State, or private development plans within 16 ki (10 mi) of the EREF.

Proposed EREF site development potentially impacting the visual/scenic quality of the proposed site includes:

- Several buildings surrounded by chain link fencing;
- Large storage areas for feed, product and depleted uranium cylinders;
- Stormwater retention and detention basins and a Domestic SSTP Basin;
- Equipment storage areas;
- Electrical substation and supply power line;
- Facility access and security roads; and
- Barbed wire fencing along property perimeters

Existing off site development on surrounding properties impacting the visual/scenic quality of the site and vicinity includes continuing use of:

- Farm buildings (e.g., potato sheds, equipment sheds);
- Center pivot irrigation systems;
- Dirt and gravel covered roadways;
- Power poles, a small substation, and a high-voltage utility line; and
- U.S. Highway 20

By considering both proposed onsite and nearby existing developments, modification to the proposed site would result in small visual impacts. Therefore, cumulative impacts will be small on the visual/scenic quality of the proposed site.

4.9.8 Comparative Visual/Scenic Resources Impacts of the No Action Alternative

ER Chapter 2, Alternatives, provides a discussion of possible alternatives to the construction and operation of the EREF, including an alternative of "no action," i.e., not building the EREF. The following information provides comparative conclusions specific to the concerns addressed in this subsection for the two "no action" alternative scenarios addressed in ER Section 2.4, Table 2.4-2, Comparison of Environmental Impacts for the Proposed Action and the No-Action Alternative Scenarios.

Alternative Scenario C - No EREF; LES and USEC deploy gas centrifuge plants, USEC phases out the Paducah gaseous diffusion plant (GDP) and GEH deploys their plant using Silex enrichment technology: The visual/scenic resources impacts would be the same since three enrichment plants would be built.

Alternative Scenario D - No EREF; LES and USEC deploy gas centrifuge plants, USEC phases out the Paducah gaseous diffusion plant (GDP) and USEC increases its centrifuge plant

NOTES:

1. THE HIGHLIGHTED GREEN SHADING IS INDICATIVE OF NATURAL OR PROPOSED VEGETATION.
2. FIGURE NOT TO SCALE.

FIGURE 4.9-1 **Rev. 4**

Aerial View

EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT

southwest. At 8 km (5 mi), the concentration is calculated to be 1.3×10^{-5} μg/m^3. The nearest resident to the site, or other sensitive receptor (e.g., schools and hospitals) is located beyond 8 km (5 mi) from the proposed EREF footprint.

These comparisons demonstrate that the Eagle Rock Enrichment Facility gaseous HF emissions (even at rooftop without dispersion considered) will be well below any existing standard and, as a result, will have a negligible environmental and public health impact.

Methylene chloride is used in small bench-top quantities to clean certain components. All chemicals at EREF will be used in accordance with the manufacturers recommendations, health and safety regulations and under formal procedures. AES will investigate the use of alternate solvents and/or apply control technologies as required. Mitigation measures to control methylene chloride release are described in Section 5.2.12.1. The remaining effluents listed in Table 3.12-4, Estimated Annual Liquid Effluent, will have no significant impact on the public because they will be used in deminimus levels or are nonhazardous by nature. All regulated gaseous effluents will be below regulatory limits as specified by the Idaho DEQ Air Quality Division.

Worker exposure to in-plant gaseous effluents listed in Table 3.12-3, Estimated Annual Gaseous Effluent, will be minimal. No exposures exceeding 29 CFR 1910, Subpart Z are anticipated (CFR, 2008n). Leaks in UF_6 components and piping would cause air to leak into the system and would not release effluent. All maintenance activities utilize mitigative features including local flexible exhaust hoses connected to the Gaseous Effluent Vent System, thereby minimizing any potential for occupational exposure. Laboratory and maintenance operations activities involving hazardous gaseous or respirable effluents will be conducted with ventilation control (i.e., fume hoods, local exhaust or similar) and/or with the use of respiratory protection as required.

4.12.1.2 Routine Liquid Effluent

Routine liquid effluents are listed in Table 3.12-4, Estimated Annual Liquid Effluent. The facility does not discharge any industrial effluents to natural surface waters or grounds on site, and there is no facility tie-in to a Publicly Owned Treatment Works (POTW). Liquid process effluents will be contained on the EREF site via collection tanks, sampled and analyzed to determine if treatment is required before release to the atmosphere by evaporation. See Section 2.1.2.3.3 for further discussion of the Liquid Effluent Collection and Treatment System.

There is no water intake from surface water systems in the region. Water supplies will be from on-site groundwater wells. Treated domestic sanitary effluents will flow to a Domestic SSTP Basin. Stormwater from the Cylinder Storage Pads will flow to lined retention basins to prevent infiltration. No public acute or chronic (cumulative) impact is expected from routine liquid effluents.

Worker exposure to liquid in-plant effluents shown in Tables 3.12-2, Estimated Annual Non-Radiological Wastes and 3.12-4, Estimated Annual Liquid Effluent will be minimal. No exposures exceeding 29 CFR 1910, Subpart Z are anticipated (CFR, 2008n). Additionally, handling of all chemicals and wastes will be conducted in accordance with the site Environment, Health, and Safety Program which will conform to 29 CFR 1910 and specify the use of appropriate engineered controls, including personnel protective equipment, to minimize potential chemical exposures. As a result, no worker acute or chronic (cumulative) impact is expected from routine liquid effluents.

process lines during routine operations and from decontamination and maintenance of equipment, and (2) direct radiation exposure associated with transportation and storage of UF_6 feed cylinders, product cylinders, depleted uranium or tails cylinders and empty cylinders with heels or residual uranic materials and progeny decay products.

The potential radiological impacts to the public from operations at the EREF are those associated with chronic exposure to low levels of radiation, not the immediate health effects associated with acute radiation exposure. The major sources of potential radiation exposure are the effluent from the Separations Building Modules, Technical Support Building (TSB) and direct radiation from the Northern Cylinder Storage Pads and, to a lesser degree, the Full Product Cylinder Storage Pad. The Centrifuge Assembly Building is a potential minor source of radiation exposure. It is anticipated that the total amount of uranium released to the environment via airborne effluent discharges from the EREF will be less than 20 grams (0.71 ounces) (0.506 MBq or 13.7 μCi) per year. Due to the anticipated low volume of contaminated liquid waste and the effectiveness of treatment processes, no waste in the form of liquid effluent discharges are expected. Water vapor from liquid processing that is released to the atmosphere is not expected to have a significant radiological impact to the public or the environment. In addition, the radiological impacts associated with direct radiation from indoor operations from a relatively small number of UF_6 cylinders at any time are not expected to be a significant contributor because the low-energy gamma-rays associated with the uranium will be absorbed almost completely by the process lines, equipment, and building structures at the EREF. However, the outdoor accumulation of full feed, full tails, full product and empty cylinders with heels on all the cylinder storage pads may present the highest potential for direct radiation impact to the public at or beyond the plant fence line. The combined potential radiological impacts associated with the small quantity of uranium in effluent discharges and direct radiation exposure due to stored feed, product, tails and empty UF_6 cylinders are expected to be a small fraction of the general public dose limits established in 10 CFR 20 (CFR, 2008x) and within the uranium fuel cycle standards established in 40 CFR (CFR, 2008f). The site area itself is very sparsely populated with no permanent residences within 5 miles of the center of the facility complex. Figures 4.12-1 and 4.12-2 show the site plan and facility layout for the EREF.

The principle isotopes of uranium, ^{238}U, ^{236}U, ^{235}U, and ^{234}U, are expected to be the primary nuclides of concern in effluent waste discharged from the plant. However, their concentrations in waste released to the atmosphere are expected to be very low because of engineered controls and treatment processes prior to discharge. In addition, a combination of the effluent monitoring and environmental monitoring/sampling programs will provide data to identify and assess plant's contribution to environmental uranium at the EREF site. Both monitoring programs have been designed to provide comprehensive data to demonstrate that plant operations have no adverse impact on the environment. Section 6.1, Radiological Monitoring, provides detailed descriptions of the two monitoring programs.

The enrichment process system operates sub-atmospherically such that any air leaks are into the equipment and not into the building environment. There are ten Gaseous Effluent Ventilation Systems for the plant: (1) the Separations Building Modules (SBM) GEVS with Passive IROFS that Contain Safe-by-Design Component Attributes (one in each of the four modules), (2) the Separations Building Modules Local Extraction GEVS (one in each of the four modules), (3) the Technical Support Building (TSB) GEVS and (4) the Centrifuge Test and Post Mortem Facilities GEVS within the Centrifuge Assembly Building (CAB). In addition, the TSB, the Blending, Sampling & Preparation Building (BSPB), and the Centrifuge Test and Post Mortem Facilities have HVAC systems that function to maintain negative pressure and exhaust filtration for rooms served by these systems.

take them into the general area of the plant property away from the buildings. As with the group of local area businesses noted above, the residential shielding factor is set at 1.0 (no shielding credit) since any activity is assumed to take place outdoors. In addition, only the gaseous release exposure pathways of inhalation and plume immersion along with direct dose equivalent from ground plane deposition are applied (no food product ingestion pathways are expected to exist along the site boundary line). The total impact for the site boundary also includes direct radiation from the Full Product Cylinder Storage Pad and the Northern Cylinder Storage Pads on-site. The age group of interest is taken as adults as these locations are associated with worker related activities.

In addition to the above noted critical groups for members of the public, a bounding assessment was performed by assuming a hypothetical residence was located at the highest impacted site boundary (North (N) to Northeast (NE)). All the potential exposure pathways including direct radiation from cylinder storage pads, plume inhalation, and plume immersion, direct dose from ground plane deposition (30 year build-up of deposited material), and ingestion of food products (made up of fresh and stored vegetables, milk, and meat postulated to be grown or raised at the maximally impacted site boundary location) were assumed. The analysis included dose equivalent assessments for all four age groups (adults, teens, children, and infants) for these pathways, and 100% occupancy time for a full year, along with a conservative residential shielding factor of 1.0 for direct radiation exposures. The use of a hypothetical residence for all pathways and age groups places an upper bound on the dose impact that might be associated with changes in land use around the facility over its operating life.

Transit time for an accidental gaseous release (involving uranic or HF materials) ranges from a few minutes (to the boundary) to hours (to the nearest resident) for the critical populations discussed above. The nearest known location from which a member of the public can obtain drinking water is associated with irrigated crop lands that fall within an 8 km (5 mi) radius of the site, where transit times for gaseous releases are on the order of tens of minutes. Other than walking trails within 8 km (5 mi) of the site, there are no recreational facilities, schools or hospitals within 8 km (5 mi) of the EREF.

Projected annual average air concentrations of uranic material assumed to be released (19.5 MBq/yr (528 μCi/yr) are also estimated at critical receptor group locations. Table 4.12-26, Annual Average Effluent Air Concentrations at Critical Receptors, provides the calculated air concentrations at the maximum site boundary, nearest resident and off-site business location. Table 4.12-27, 30 Years Accumulation Soil Concentrations at Critical Receptors, provides estimates of surface soil concentrations at the same critical receptor group locations assuming 30 years of gaseous effluent accumulation.

4.12.2.1.2 Routine Liquid Effluent

The design of the EREF includes liquid waste processing to remove uranic material from the waste stream by precipitation, filtration and evaporation. Section 2.1.2, Proposed Action, provides an overview of the liquid effluent treatment system. From an effluent standpoint, an important design feature of the liquid effluent treatment system is that there is no direct discharge of liquid effluents off-site.

The Liquid Effluent Collection and Treatment System for the EREF includes two stages of precipitation and filtration to remove uranic material contained in liquid effluents collected from plant processes. The final process stage of evaporation releases the resulting distillate steam directly to the atmosphere without condensing vapor out of the air stream.

The liquid waste system collects liquid effluents including citric acid and degreasing water used in the decontamination of plant components, and miscellaneous effluents from laboratory operation, system condensates, and floor washings for treatment and removal of any uranic content before release to the environment. The first processing or treatment stage (KDU Recovery Stage) takes the collected waste liquids and adds a precipitating agent (KOH) to recover solids that can be removed in this form. The supernatant from this stage is passed through a micro filtration unit to clarify the liquid stream before passing it on to the second stage (Fluoride Recovery Stage) of precipitation. In this second stage, $Ca(OH)_2$ is added to form a fluoride precipitate. This waste stream is then passed through a filter to remove any solids remaining from the precipitation step. The remaining liquid stream is then collected and fed to a waste evaporator which releases the distillate steam to the atmosphere. As a result of these multiple stages of precipitation, filtration and evaporation, no significant amount of uranic material is expected to be released to the environment.

The Liquid Effluent Collection and Treatment System is designed for a uranium concentration of 0.5 mg/liter in the waste fed to the evaporator. From NUREG-0017 (PWR-GALE code) (NRC, 1985a), the decontamination factor (DF) between the feed liquid and the distillate for evaporators is assumed to be 1,000. This factor can be applied to the feed concentration in order to estimate the carryover to the distillate. It is also estimated that the processing of liquid effluent will generate approximately 59,240 L/yr (15,650 gal/yr) of distillate released to the atmosphere from the evaporator. By multiplying the volume of distillate released by the estimated distillate concentration of uranic material, the annual release of uranium can be estimated. An additional margin of 20% is added to the resulting estimates to cover uncertainties in the estimates as the following shows.

<u>Atmospheric distillate release:</u>

$$0.50 \text{ mg/L} \times 10^{-3} \text{ (DF)} = 5.0 \times 10^{-4} \text{ mg/L in evaporator distillate.}$$

Next:

$$59{,}240 \text{ L/yr distillate release} \times 5.0 \times 10^{-4} \text{ mg/L} = 29.6 \text{ mg/yr of uranic material released}$$

Plus margin (20%):

$$29.6 \text{ mg/yr of uranic material released} \times 1.2 \times 10^{-3} \text{ g/mg} = 0.0355 \text{ g/yr total U}$$

Assuming natural uranium, this mass is equivalent to 900 Bq (2.43×10^{-2} µCi).

This release via the distillate is only 0.0046% of the bounding source term of 19.5 MBq/yr (528 µCi/yr) assumed for plant gaseous effluent releases. Therefore, the source term for gaseous releases bounds the liquid pathway as well.

4.12.2.1.3 Direct Radiation Impacts

Storage of feed, product, and depleted and empty uranium cylinders at the EREF may have an impact due to direct and scatter (sky shine) radiation to the site boundary, and to lesser extents, off-site locations. The Northern Cylinder Storage Pads are the most significant portion of the total direct dose equivalent to areas at the site boundary and beyond.

The MCNP5 computer code (LANL, 2003) was used to calculate the direct dose equivalent from the full cylinder storage pads. A conservative maximum number of full tails cylinders accumulated after 30 years of operations (25,718 cylinders) at the EREF was used in this calculation. Also included in the analysis were full feed cylinders (712), empty feed cylinders (712), empty product cylinders (516), and empty cylinders waiting to be filled with tails (612). The empty feed cylinders were included because they contain radioactively decaying residual material. These empty cylinders produce a higher dose equivalent than full cylinders due to the absence of self-shielding from the UF_6 feed material. The empty cylinders waiting to be filled with tails were conservatively treated as empty feed cylinders with regards to the decaying residual materials. Direct dose from product cylinders stored on the Full Product Cylinder Storage Pad (1,032 cylinders) were also included in the analysis. Values used for full tails cylinders and empty tails cylinders waiting to be filled are greater than the calculated number of cylinders, therefore, the environmental impact due to direct radiation is conservative. The location of the cylinder storage pads are shown in Figures 4.12-1 and 4.12-2.

The photon source intensity and spectrum were calculated using the ORIGEN-2 computer code (NRC, 2000). The generation of photons in UF_6 from beta particles emitted by the decay of uranium (i.e., Bremsstrahlung) is conservatively treated as if the material was UO_2 by the ORIGEN-2 code based on density differences between UO_2 and UF_6.

In addition to the photon source term, there is a two-component neutron source term from the cylinders. The first component of the neutron source term is due to spontaneous fission by uranium. For this component a fission spectrum for ^{252}Cf, as taken from the Monte Carlo N-particle (MCNP) manual (LANL, 2000), is assumed. The second component is due to neutron emission by fluorine after alpha particle capture ("alpha-n reaction"). ORIGIN-S from the SCALE 5.1 package was used to determine the neutron spectrum from the alpha-n reaction. ORIGEN-S also provided the source intensity for both components of the neutron source term.

The regulatory dose equivalent limit to members of the public for areas beyond the EREF fence boundary is 0.25 mSv (25 mrem) per year (including direct and effluent contributions) (CFR, 2008x) (CFR, 2008f). The evaluation of the combined Northern Cylinder Storage Pads and Full Product Cylinder Storage Pad contribution to the off-site dose equivalent was based upon a site design criterion of no more than 0.20 mSv (20 mrem) at the site boundary to account for uncertainties in the calculation and to provide conservatism. The annual off-site dose equivalent was calculated at the EREF site boundary assuming 2,000 hours per year occupancy. Implicit in the use of 2,000 hours is the assumption that the dose equivalent is calculated to a non-resident (i.e., a worker at an unrelated business or someone engaged in outdoor farming, ranching, or recreational activities). The annual dose equivalents for the actual nearest off-site work location and at the nearest real residence were also calculated.

The dose equivalent at the maximum impacted EREF site boundary (North) is 0.0142 mSv/yr (1.42 mrem/yr) assuming 2,000 hours per year occupancy. The dose equivalent at the nearest actual off-site work location, Southwest, 4.7 km (2.9 mi) is less than 1E-12 mSv/yr (less than 1E-10 mrem/yr). The dose equivalent at the nearest real residence, which lies beyond 8 km (5 mi) of the facility structures, is estimated to be less than 1E-12 mSv/yr (less than 1E-10 mrem/yr). In the latter case, full-time occupancy (i.e., 8,766 hours per year) is assumed. Figure 4.12-3, Combined Cylinder Storage Pad Dose Equivalent Isopleths (mSv/2,000 hrs), and Figure 4.12 4, Combined Cylinder Storage Pad Dose Equivalent Isopleths (mrem/2000 hrs), show the on-site dose equivalent contours for the summed contributions from the combined Northern Cylinder Storage Pads and the Full Product Cylinder Storage Pad for 2,000 hours per year occupancy. Figure 4.12-5, Combined Cylinder Storage Pad Annual Dose Equivalent Isopleths (mSv/8,766 hrs), and Figure 4.12.2-6, Combined Cylinder Storage Pad Annual Dose Equivalent Isopleths (mrem/8,766 hrs), show the dose equivalent contours assuming full-time occupancy (8,766 hrs per yr). Table 4.12-1, Direct Radiation Annual Dose Equivalent by Source, summarizes the annual dose equivalents from fixed radiation sources at different locations of interest.

Although the size of the cylinder storage pads have been revised to reflect the detailed design, the maximum number of cylinders stored on the pads has not changed. Therefore, the dose equivalent isopleths remain representative of the cylinder direct radiation annual dose equivalents.

The annual dose equivalent from exposure to the Cylinder Storage Pads, 0.0142 mSv/yr (1.42 mrem/yr), is lower than that calculated for the smaller 3.3M SWU facility, 0.0171 mSv/yr (1.71 mrem/yr). This is primarily due to the modified configuration of the Cylinder Storage Pads for the 6.6M SWU facility, whereby the empty cylinders are distributed among the cylinder rows of the Northern Cylinder Storage Pads. With this configuration, the empty cylinders are shielded by the full tails and full feed cylinders on these pads, i.e., relative to the northern site boundary.

4.12.2.1.4 Population Dose Equivalents

The local area population distribution was derived based on the four most recent U.S. Census Bureau decennial census data (1970 – 2000) for the twelve counties in Idaho (Bannock, Bingham, Blaine, Bonneville, Butte, Caribou, Clark, Fremont, Jefferson, Lemhi, Madison, and Power) that fall within (entirely or in part) the 80 km (50 mi) radius of the EREF site (USCB, 2008b; USCB, 2008d). Additional annual county population projections were obtained for 2001 to 2004 (USCB, 2008c). Quadratic or linear equations were fit to trend lines to calculate population projections for each county for the period 2010 through 2050 to estimate the population close to the end of plant operating life. The population distribution was projected within SECPOP 2000 population rosette and tables (NRC, 2003e) in 10 concentric bands at 0 to 1.6 km (0 to 1 mi), 1.6 to 3.2 km (1 to 2 mi), 3.2 to 4.8 km (2 to 3 mi), 4.8 to 6.4 km (3 to 4 mi), 6.4 to 8.0 km (4 to 5 mi), 8.0 to 16 km (5 to 10 mi), 16 to 32 km (10 to 20 mi), 32 to 48 km (20 to 30 mi), 48 to 64 km (30 to 40 mi), and 64 to 80 km (40 to 50 mi), and 16 directional sectors, each consisting of 22 ½ degrees, centered on the EREF site. The resident populations have been projected by calculating a decadal growth rate using county population projections. Decadal growth rate projections were entered into SECPOP 2000 (NRC, 2003e) population multiplier for the time period of interest. Table 4.12-2, Population Data for the Year 2050, provides the resulting 80 km (50 mi) population distribution for the year 2050. The age distribution (adults-71%, teens-11%, children-18%, infants-2%) from Regulatory Guide 1.109 (NRC 1977b) was applied to the total population for all exposure pathways including the determination of annual committed dose equivalent from ingestion and inhalation where age also affects the amount of annual intake (air and food).

The collective dose equivalent from gaseous effluents from all Separation Building GEVS, the TSB GEVS, TSB liquid waste evaporator distillate, and the Centrifuge Test and Post Mortem GEVS, and negative pressure HVAC units servicing those areas of the facilities which could contain contaminated exhaust room air, are calculated for the 80 km (50 mi) population based on all pathways calculated for the nearest resident, applied to the general population. For the ingestion of food products, it was assumed that the 80 km (50 mi) area produced sufficient volume to supply the entire population with their needs. This is supported by the regional food production (vegetables, milk and meat) data shown on Tables 4.12-3 thru 4.12-8 where the total area production exceeds the amount that the same region's population could consume based on annual average usage factors for the general population (NRC, 1977b). Individual total effective dose equivalents were calculated for each age group by sector and then multiplied by the estimated age-dependent population for that sector to obtain the collective dose equivalent. The collective dose equivalents for each age group were then added to provide the total population collective dose equivalents. Table 4.12-9, Collective Population Effective Dose Equivalents to All Ages (Person-Sieverts), and Table 4.12-10, Collective Population Effective Dose Equivalents to All Ages (Person-Rem) summarize the total collective dose for the entire population within the 80 km (50 i) radius of the EREF site in units of Person-Sieverts and Person-rem, respectively. Table 4.12-11, Summary of 50 Mile Population for All Age Groups – All Airborne Pathways, provides a summary of the various organ dose equivalents to the same 80 km (50 mi) population from all airborne release pathways of exposure.

4.12.2.1.5 Mitigation Measures

Although routine operations at the EREF may create the potential for radiological and non-radiological impacts on the environment and members of the public, the plant design incorporates features to minimize gaseous and liquid effluent releases and to keep them well below regulatory limits. These features include:

- Process systems that handle UF_6 operate at sub-atmospheric pressure, which minimizes outward leakage of UF_6.
- UF_6 cylinders are moved only when cool and when UF_6 is in solid form, which minimizes the risk of inadvertent release due to mishandling.
- Process off-gas from UF_6 purification and other operations passes through desublimers to solidify and reclaim as much UF_6 as possible. Remaining gases pass through high-efficiency filters and chemical absorbers, which remove HF and uranium compounds.
- Wastes generated by decontamination of equipment and systems are subjected to processes that separate uranium compounds and various other heavy metals in the waste material.
- Liquid and solid waste handling systems and techniques are used to control wastes and effluent concentrations.
- Gaseous effluent passes through pre-filters, HEPA filters, and activated carbon filters, all of which greatly reduce the radioactive material in the final discharged effluent to very low concentrations.
- Liquid waste is routed to collection tanks, and treated through a combination of precipitation, filtration and evaporation to remove radioactive material prior to release of the distillate vapors to the atmosphere.
- Effluent paths are monitored and sampled to assure compliance with regulatory discharge limits.

During routine operations, the potential for radioactivity from the combined Northern Cylinder Storage Pads and the Full Product Cylinder Storage Pad impacting the public is low because all cylinders are surveyed for external contamination before they are placed on the storage pads. Therefore, runoff from the pads during rainfall is not expected to be a significant exposure pathway. Runoff water from the cylinder storage pads is directed to the Cylinder Storage Pads Stormwater Retention Basins for evaporation of the collected water. Periodic sampling of the soil from these basins is performed to identify the accumulation or buildup of residual uranic material due to surface contamination washed off by rainwater to the basins (see ER Section 6.1, Radiological Monitoring). No liquids from these retention basins are discharged directly off-site. In addition, direct radiation from all cylinder storage pads is monitored on a quarterly basis using thermoluminescent dosimeters (TLDs) or by pressurized ion chamber measurements.

Table 4.12-1 Direct Radiation Annual Dose Equivalent by Source
(Page 1 of 1)

Location	Annual Occupancy (hrs/yr)	Main+ & Product Cylinder Storage Pads mSv/yr	Main+ & Product Cylinder Storage Pads mrem/yr
Site Fence, N-NE* 762 m (2500 ft)	2,000	1.42E-02	1.42E+00
Nearest Actual Business, SW 4.0 km (2.5mi)**	2,000	<1E-12	<1E-10
Nearest Actual Residence, >8 km (>5 mi)***	8,766	<1E-12	<1E-10

Notes:

+ Main Cylinder Storage Pad refers to the Northern Cylinder Storage Pads located on the north side of the facility complex.

* Distance from the nearest edge of the Northern Cylinder Storage Pads.

** Nearest off-site location (potato storage facilities) from edge of facility footprint.

*** No resident within 5 miles (8 km) from edge of facility footprint.

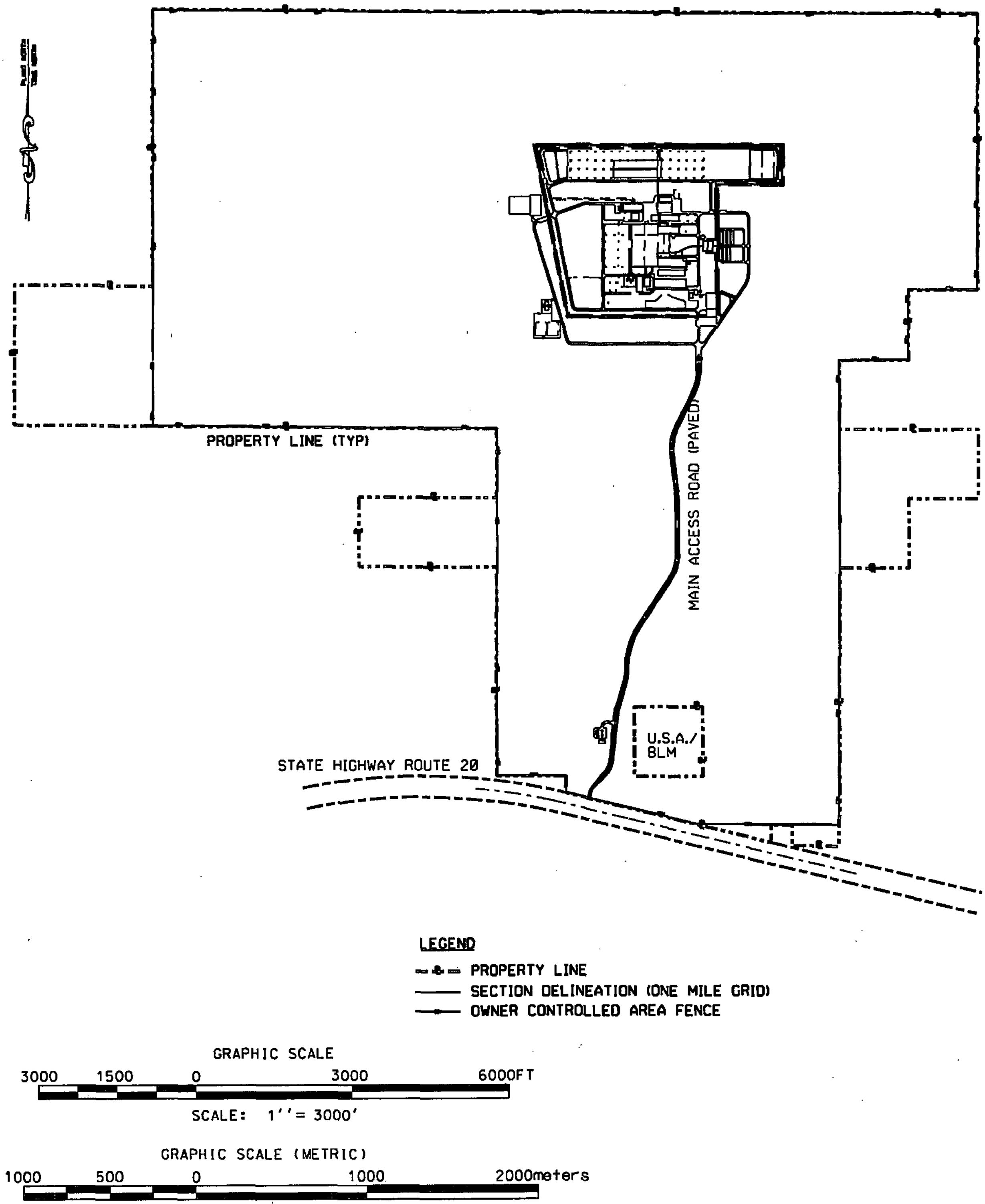
Table 4.12-25 Estimated Annual EREF Occupational (Individual) Exposures
(Page 1 of 1)

Position	Annual Dose Equivalent	Reported Experience at Urenco, Capenhurst, UK (averages 2003 -2007)*
General Office Staff	< 0.5 mSv (< 50 mrem)**	(Not reported)
Typical Operations & Maintenance Technician	1 mSv (100 mrem)	0.32 mSv (32 mrem)
Typical Cylinder Handler	3 mSv (300 mrem)	2.55 mSv (255 mrem)

* Average radiation worker dose values derived from the 2003 through 2007 annual Urenco (Capenhurst) Health, Safety and Environmental Reports.

** ALARA considerations will be implemented to limit the annual dose equivalent to general office staff, ensuring compliance with the dose limits to members of the public specified in 10 CFR 20.1301.

(Urenco, 2003) (Urenco, 2004) (Urenco, 2005) (Urenco, 2006) (Urenco, 2007)



NOTES:

1. SEE FIGURE 4.12-2 FOR ENLARGED FACILITY LAYOUT.

Figure 4.12-1 **Rev. 4**

Site Plan

EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT

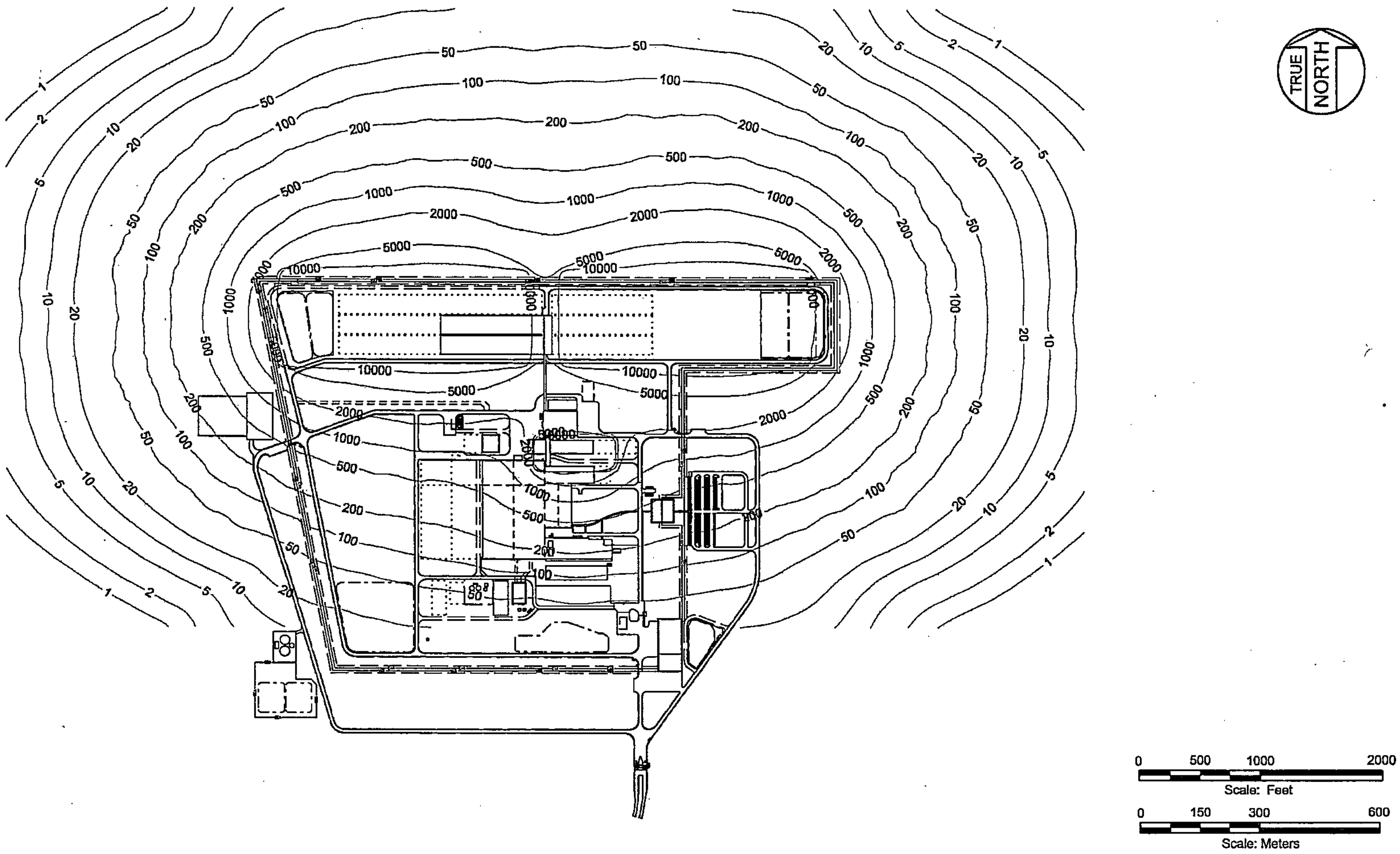


Figure 4.12-3 **Rev. 4**

Combined Cylinder Storage Pad Dose Equivalent Isopleths (micro Sv/2000 hrs)

EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT

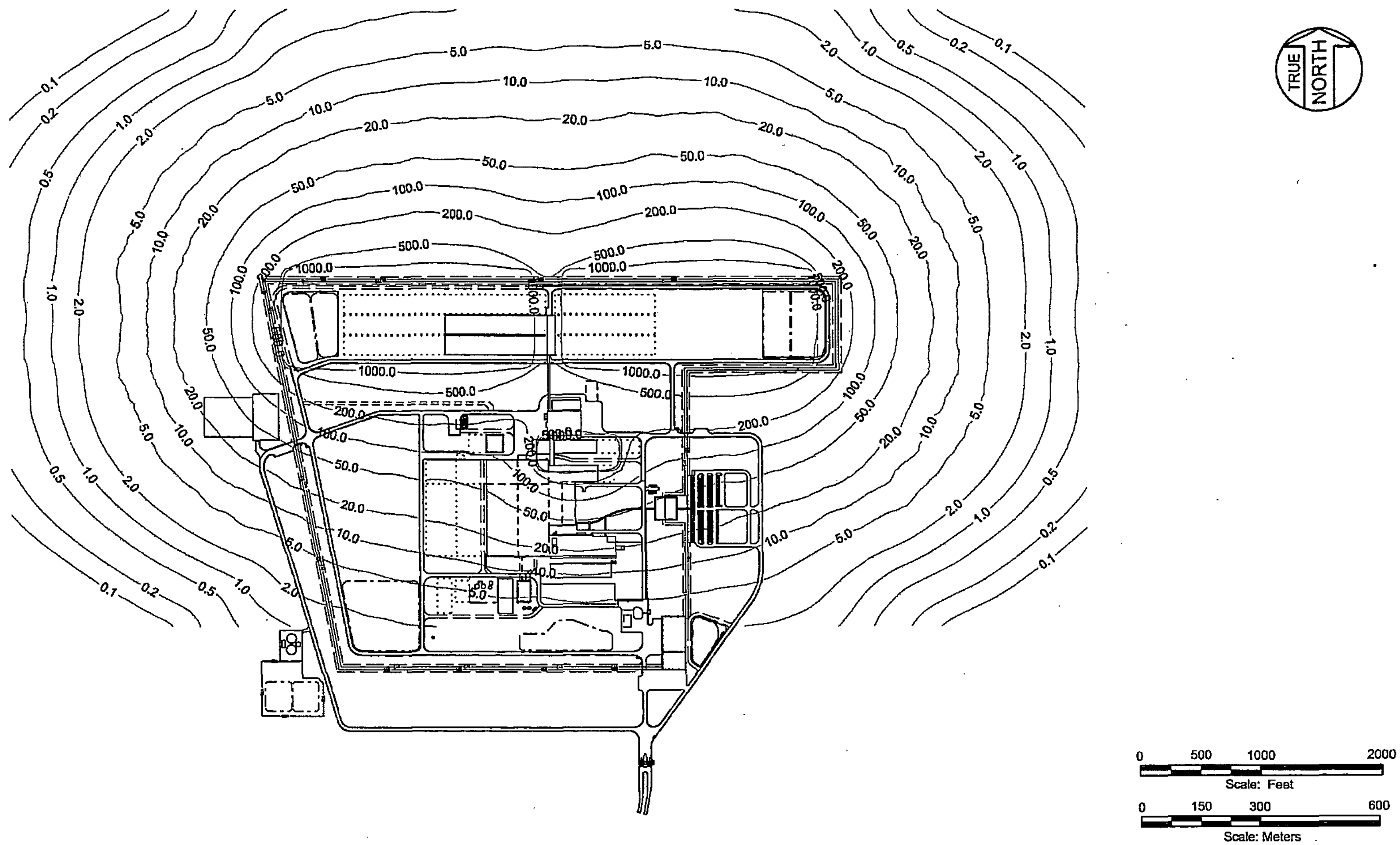


Figure 4.12-4 **Rev. 4**

Combined Cylinder Storage Pad
Dose Equivalent Isopleths (mrem/2000 hrs)

EAGLE ROCK ENRICHMENT FACILITY
ENVIRONMENTAL REPORT

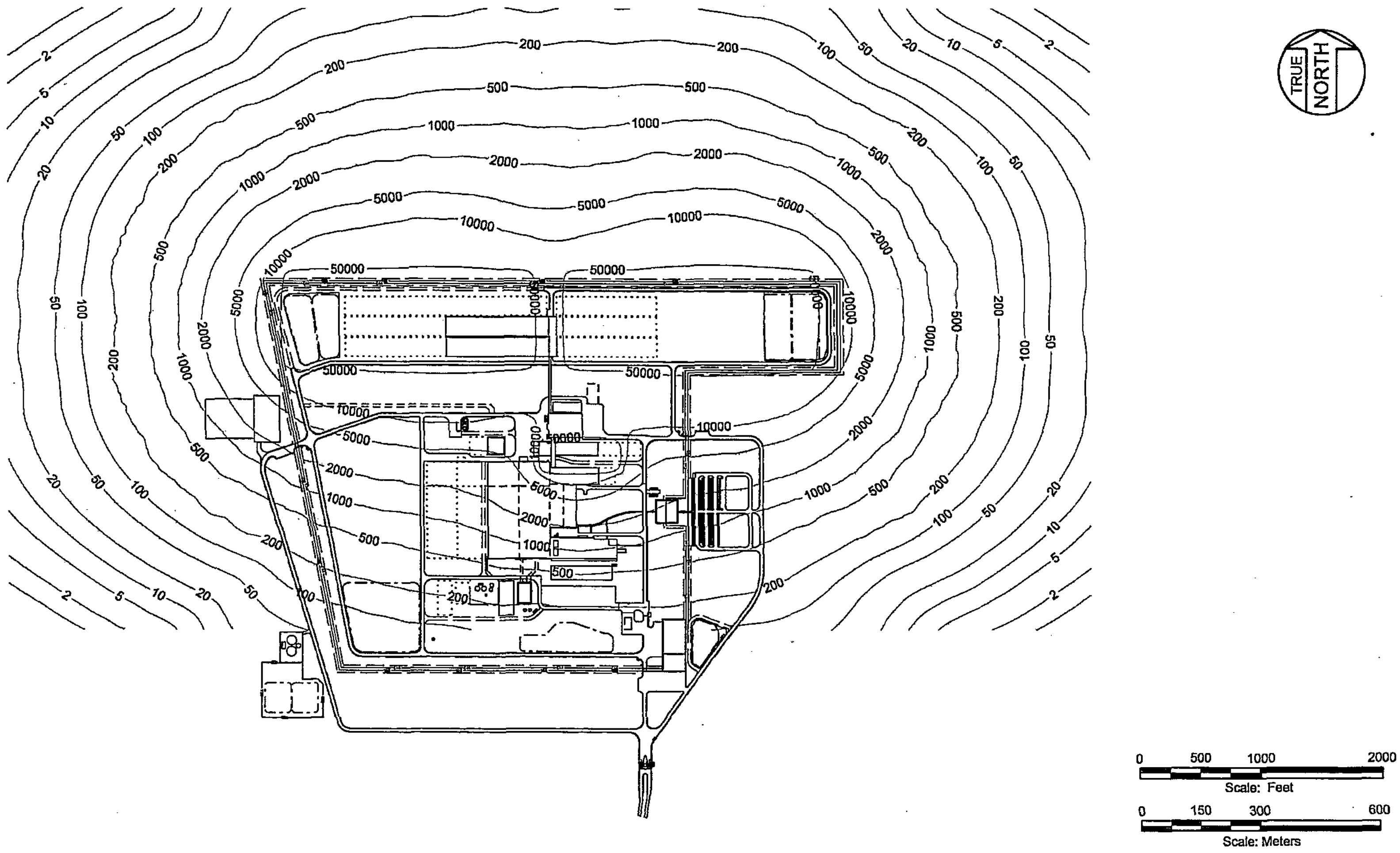


Figure 4.12-5 **Rev. 4**

Combined Cylinder Storage Pad Annual Dose Equivalent Isopleths (micro Sv/8766 hrs)

EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT

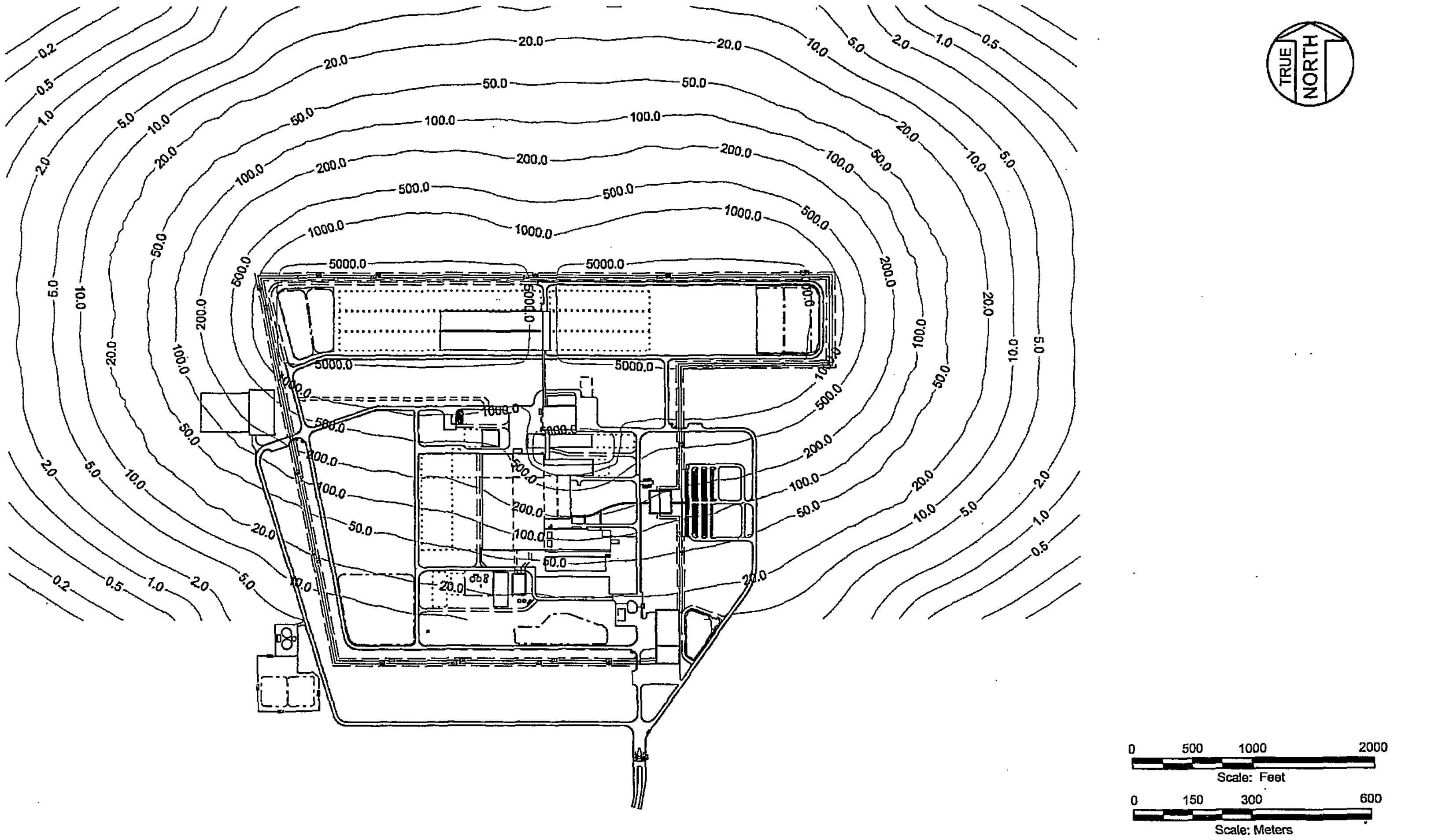


Figure 4.12-6 **Rev. 4**

Combined Cylinder Storage Pad Annual Dose Equivalent Isopleths (mrem/8766 hrs)

EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT

4.13 WASTE MANAGEMENT IMPACTS

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.

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 Northern 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.

Idaho is a member of the Northwest Interstate Compact on Low Level Radioactive Waste Management and, as such, is entitled to dispose of low level radioactive waste at the facility operated by U.S. Ecology, a subsidiary of American Ecology, near Richland, Washington. This site is licensed to accept Class A, B and C low level radioactive waste. It does not accept mixed waste. The disposal site is about 885 km (550 mi) from the EREF.

The Clive, Utah site is owned and operated privately by EnergySolutions of Utah. This low-level waste disposal site is licensed by the State of Utah pursuant to its authority as an agreement state to accept for disposal radioactive waste including byproduct material (Utah, 2008) and certain mixed waste (Utah, 2003). The disposal site is approximately 475 km (295 mi) from the EREF.

The EREF may send wastes that are candidates for volume reduction, recycling, or treatment to EnergySolutions facilities in Oak Ridge, Tennessee that have the ability to volume reduce most Class A low level wastes and to process contaminated oils and some mixed wastes. Other processing vendors may be used to process EREF waste depending on future availability. The Oak Ridge processing facilities are approximately 3,068 km (1,907 mi) from the EREF.

With regard to DUF_6 disposal, DOE has contracted with Uranium Disposition Services, LLC UDS for the construction and operation of DUF_6 conversion facilities in Paducah, Kentucky, and Portsmouth, Ohio. The deconversion facilities will convert the DUF_6 to a more stable and easily stored uranium oxide. This action was taken following the earlier enactment of Section 3113 of the USEC Privatization Act (USC, 2000) and related subsequent legislation, which require that the Secretary of Energy accept for disposal DUF_6 generated by an NRC-licensed facility such as the EREF for a fee. Per conversation with the Paducah, Kentucky Plant Manager on November 26, 2008, the Paducah, Kentucky and Portsmouth, Ohio deconversion facilities are scheduled to begin accepting DUF_6 in September 2010 and May 2010, respectively. Although other options will likely be available to the EREF, AREVA Enrichment Services' (AES's) intention is to transport its DUF_6 to the DOE facilities after temporary on-site storage for conversion and subsequent disposition by the U.S. Department of Energy. The environmental impacts of converting DUF_6 are addressed in Final Environmental Impact Statements for the Paducah and Portsmouth facilities (DOE, 2004c) (DOE, 2004d) (DOE, 2007c) (FR, 2007).

4.13.3.2 DUF_6 Cylinder Temporary Storage

The EREF yields a DUF_6 stream that will be temporarily stored on-site in cylinders before transfer to a DOE deconversion facility and subsequent disposition. The storage containers are referred to as Full Tails Cylinders although any partially filled tails cylinders will be maintained, controlled and dispositioned in the same manner as full tails cylinders. The storage locations are designated the Northern Cylinder Storage Pads.

from the pad is collected in Cylinder Storage Pad Stormwater Retention Basins, which have sampling capabilities. The entry/exit carriage and cylinder hauling trailer transfer cylinders from the Blending, Sampling and Preparation Building to the Northern Cylinder Storage Pads. DUF_6 cylinder transport between the Separations Building and the storage area is discussed in Integrated Safety Analysis Summary Section 3.4.11, Material Handling Processes.

The Material Handling Processes are designed to ensure that the storage and movement of DUF_6 cylinders is conducted safely in accordance with all applicable regulations to protect the environment. Although AES intends to transport DUF_6 cylinders to the DOE conversion facilities in a timely and efficient manner after generation and has committed not to extend storage beyond the lifetime of the plant, the ultimate size of the Northern Cylinder Storage Pads is based on a conservatively calculated lifetime generation of DUF_6. The concrete pad to be initially constructed on-site for the temporary storage of full DUF_6 cylinders will only be of a size necessary to hold a few years worth of cylinders. It will be expanded only if necessary. The EREF will establish and maintain an active cylinder management program that will address storage conditions, monitor cylinder integrity through routine inspections for breaches, and perform maintenance and repairs to cylinders and the Northern Cylinder Storage Pads, as needed.

The Northern Cylinder Storage Pads have also been sited to minimize the potential environmental impact from external radiation exposure to the public at the site boundary. The dose equivalent rate from the pad at the site boundary will be below the regulatory limits of 10 CFR 20 (CFR 2008x) and 40 CFR 190 (CFR, 2008f). The direct dose equivalent comes from the gamma-emitting progeny within the uranium decay chain. In addition, neutrons are produced by spontaneous fission in uranium and by the ${}_{9}^{19}F$ (alpha, n) ${}_{11}^{22}Na$ reaction. Thermoluminescent Dosimeters (TLDs) will be distributed along the Owner Controlled Area fence line and at other locations as described in Section 6.1.2, Radiological Environmental Monitoring, to monitor this impact due to photons and ensure that the estimated dose equivalent is not exceeded. Refer to Section 4.12.2, Radiological Impacts, for more detailed information on the impact of external dose equivalents from the Northern Cylinder Storage Pads.

Experience in Europe has shown that outdoor UF_6 cylinder storage will have little or no adverse environmental impact when it is coupled with an effective and protective cylinder management program. In 35 years of operation at three different enrichment plants, the European cylinder management program has not resulted in any significant releases of UF_6 to the environment (see ER Section 3.11.1.6, Historical Exposure to Radioactive Materials, for information of the types of releases that have occurred at Urenco plants).

4.13.3.3 Mitigation for Depleted UF_6 Temporary Storage

Since UF_6 is a solid at ambient temperatures and pressures, it is not readily released from a cylinder following a leak or breach. When a cylinder is breached, moist air reacts with the exposed UF_6 solid and iron, resulting in the formation of a dense plug of solid uranium and iron compounds and a small amount of HF gas. This "self-healing" plug limits the amount of material released from a breached cylinder. When a cylinder breach is identified, the cylinder is typically repaired or its contents are transferred to a new cylinder.

AES will maintain an active cylinder management program to maintain optimum storage conditions in the cylinder yard to monitor cylinder integrity by conducting routine inspections for breaches and to perform cylinder maintenance and repairs to cylinders and the storage pads, as needed. The following handling and storage procedures and practices shall be adopted at the EREF to mitigate adverse events, by either reducing the probability of an adverse event or reducing the consequence should an adverse event occur:

All filled DUF_6 cylinders will be stored in designated areas of the storage pad on concrete saddles (or saddles comprised of other suitable material) that do not cause cylinder corrosion. These saddles shall be placed on a stable concrete surface.

The storage array shall permit easy visual inspection of all cylinders.

The DUF_6 cylinders shall be surveyed for external contamination (wipe tested) prior to being placed on a Northern Cylinder Storage Pad or transported off-site. In accordance with 49 CFR 173.443, (CFR, 2008k) the maximum level of removable surface contamination allowed on the external surface of the cylinder shall be no greater than 0.4 Bq/cm^2 (22 dpm/cm^2) (beta, gamma, alpha) on accessible surfaces averaged over 300 cm^2.

Full DUF_6 cylinder valves shall be fitted with valve guards to protect the cylinder valve during transfer and storage.

Provisions are in place to ensure that full DUF_6 Cylinders do not have the defective valves identified in NRC Bulletin 2003-03, "Potentially Defective 1-Inch Valves for Uranium Hexafluoride Cylinders," (NRC, 2003d) installed.

All full DUF_6 cylinders shall be abrasive-blasted and coated with a minimum of one coat of zinc chromate primer plus one zinc-rich topcoat or equivalent anti-corrosion treatment.

Only designated vehicles, operated by trained and qualified personnel, will be allowed on the Full Product Cylinder Storage Pad and the Northern Cylinder Storage Pads.

Refer to the ISA Summary, Section 3.8, for controls associated with vehicle fires on or near the cylinder pads.

DUF_6 cylinders shall be inspected for damage prior to placing a filled cylinder on a Northern Cylinder Storage Pad.

DUF_6 cylinders shall be re-inspected annually for damage or surface coating defects. These inspections shall verify that:

- Lifting points are free from distortion and cracking.
- Cylinder skirts and stiffener rings are free from distortion and cracking.
- Cylinder surfaces are free from bulges, dents, gouges, cracks, or significant corrosion.
- Cylinder valves are fitted with the correct protector and cap, the valve is straight and not distorted, 2 to 6 threads are visible, and the square head of the valve stem is undamaged.
- Cylinder plugs are undamaged and not leaking.
- If inspection of a DUF_6 cylinder reveals significant deterioration (i.e., leakage, cracks, excessive, distortion, bent or broken valves or plugs, broken or torn stiffening rings or skirts, or other conditions that may affect the safe use of the cylinder), the contents of the affected cylinder shall be transferred to another undamaged cylinder and the defective cylinder shall be discarded. The root cause of any significant deterioration shall be determined and, if necessary, additional inspections of cylinders shall be made.
- Proper documentation on the status of each DUF_6 cylinder shall be available on site, including content and inspection dates.
- Cylinders containing liquid depleted UF_6 shall not be transported.

Site stormwater runoff from the Northern Cylinder Storage Pads is directed to lined retention basins, which will be included in the site environmental monitoring plan. (See ER Section 6.1, Radiological Monitoring)

4.13.3.4 Depleted UF_6 Disposition

As described above, AES is committed to safely and temporarily storing full DUF_6 Cylinders on the EREF site. The disposition of the full DUF_6 Cylinders will utilize the DOE deconversion and disposal facilities. Section 3113(a) of the USEC Privatization Act (PL, 1996) requires DOE, if requested by the operator of a uranium enrichment facility licensed by the NRC, to accept depleted uranium for disposal, for a fee, if it is determined to be low level radioactive waste. The Commission concluded that depleted uranium is, in fact, a form of low-level radioactive waste in a January 2005 Memorandum and Order (NRC, 2005a). In accordance with the Act, therefore, it is the responsibility of DOE to accept the DUF_6 generated by the operation of EREF for disposal.

AES requested DOE to provide an estimate (AREVA, 2008) for the cost of deconversion and disposal of DUF_6 generated by EREF (3.3M SWU/year) assuming it is initially generated in 2014 and that approximately 7,635 MT is provided annually when full production is achieved. In their response (DOE, 2008) DOE stated that they would accept, upon request, the DUF_6 generated by the proposed EREF contingent upon the negotiation of an agreement for deconversion and disposal that includes full cost recovery of DOE's expenses. DOE estimated that these costs would range from $3.89/kg to $5.78/kg (FY 2007 dollars) of DUF_6. Deconversion would take place at the two new conversion facilities under construction at the sites of the Paducah Gaseous Diffusion Plant (GDP) and the former Portsmouth GDP in Piketon, Ohio. AES confirmed that the DOE cost estimate (AES, 2009) is applicable to disposal of DUF_6 for an expanded EREF (6.6M SWU/year). It was noted by the DOE expert that while the total amount of DUF_6 generated will be larger than that used in the cost analysis, the cost of disposal of a kilogram of DUF_6 generated in the DOE cost estimate (DOE, 2008) would remain essentially the same, and could possibly be reduced by a small percentage. To be conservative, AES will utilize the highest disposal cost per kilogram established in the DOE cost estimated (DOE, 2008) to calculate the cost to dispose of DUF_6 for a 6.6M SWU/year facility.

4.13.3.5 Converted Depleted UF_6 Disposal

With respect to the disposal of the conversion products, DOE has been on record since 1999 that as much as possible of the depleted uranium oxide produced as a result of the deconversion process will be reused rather than disposed (DOE, 1999). In its 2004 Records of Decision related to the construction and operation of the conversion facilities (DOE, 2004a)(DOE, 2004b), DOE stated in part that the depleted uranium oxide (UO_2) conversion product will be reused to the extent possible or packaged for disposal in emptied cylinders at an appropriate disposal facility.

See also the site-specific Environmental Impact Statements for the two conversion facilities (DOE, 2004c) (DOE, 2004d).

4.13.3.6 Costs Associated with Depleted UF_6 Deconversion and Disposal

By statute, (USC, 2000) DOE must accept depleted uranium from enrichment facilities licensed by the NRC and the DOE must be reimbursed for its costs, including a pro rata share of its capital costs. DOE's estimate of $3.89 to $5.78 (2007 dollars) (DOE, 2008) per kilogram to convert and dispose of AES's projected DUF_6 inventory is based on AES's projection that the

EREF would, upon attainment of full production, generate approximately 7,635 MT of DUF_6 annually. This would amount to about 191,500 MT over the assumed operating life of the facility which, for purposes of conservatively calculating funding assurance for tails disposition, is assumed to be from 2014 to 2044. To be conservative, AES will utilize the highest disposal cost per kilogram in the DOE cost estimate (DOE, 2008) to calculate the cost to dispose of DUF_6 for a 6.6M SWU/year facility.

Transportation costs from the EREF to the conversion facilities are not included in DOE's estimate. Based on information provided to AES by Transportation Logistics International, a company that moves radioactive cargo including DUF_6, AES estimates that it will cost $8,600 (FY 2008 dollars) to transport one 48Y cylinder of DUF_6 from EREF to the DOE conversion facility at Paducah. AES projects that, taking into account a ramp-up and a ramp-down period. The EREF will generate 217,193 MT (239,414 tons) of uranium, equivalent to about 321,235 MT (354,101 tons) DUF_6 over the operating life of the facility. It is further assumed for purposes of calculating transportation costs, that the DUF_6 is stored and transported in thick-walled 48Y cylinders, each having a gross weight of about 14.9 MT and, when filled, each containing 12.5 MT DUF_6. This results in the need to transport 25,718 cylinders for the 30 year operation case from EREF to the DOE facility. The rate of $8,600 per cylinder, de-escalated to 2007 dollars using the GNP Implicit Price Deflator, is $8,290. Since each cylinder is assumed to contain 12.5 MT, this is equivalent to $0.66 per kilogram DUF_6.

The DOE deconversion facility will convert the DUF_6 into a more stable chemical form that will be loaded into the depleted uranium tails cylinders. This is assumed to be DUO_2. As a result, there will be EREF DUF_6 cylinders that are assumed to be unused and disposed of as Class 1 low-level radioactive waste. The cost of disposing these cylinders as Class A low-level radioactive waste is projected to be approximately $1.22 per Kg DUF_6 (2007 dollars).

The total expected cost for conversion and disposal of the DUF_6 for purposes of funding assurance is, therefore, calculated by conservatively assuming the high end of the DOE range of $5.78 per kilogram DUF_6, adding the transportation cost of $0.66 per kg DUF_6, and the cost for disposal of excess cylinders of $1.22 per kg DUF_6 for a total cost of $7.66 per kg DUF_6.

The total estimated costs for deconversion and disposal of DUF_6 is about $2.46 billion (2007 dollars). A summary of the cost components is provided in Table 4.13-2.

The financial assurance mechanisms that will be established to ensure that adequate funds are available are described in SAR Chapter 10, Decommissioning.

4.13.4 Water Quality Limits

Two single-lined Cylinder Storage Pads Stormwater Retention Basins, each having two cells, will be used specifically to retain runoff from the Cylinder Storage Pads during precipitation. A Domestic SSTP Basin will be utilized for the discharge of treated domestic sanitary effluents from the Domestic Sanitary Sewage Treatment Plant. The unlined Site Stormwater Detention Basins will receive rainfall runoff from the balance of the developed plant site. Liquid effluents include stormwater runoff and treated sanitary waste water. There will be no discharges to a Publicly Owned Treatment Works (POTW).

Refer to Section 4.4, Water Resources Impacts, for additional water quality standards and permits and to Section 3.12, Waste Management, for information on systems and procedures to ensure water quality.

expected normal water usage rate is expected to be well within the water appropriation value for the EREF.

- Hydrological system alterations or impacts.
- Withdrawals and returns of ground water.
- Cumulative effects on water resources.

The EREF will not obtain any water from on-site surface water resources. Daily treated domestic sanitary wastewater will be discharged to the Domestic SSTP Basin. Stormwater from the Cylinder Storage Pads will be discharged to the lined Cylinder Storage Pads Stormwater Retention Basins.

Stormwater from developed portions of the site, excluding the Cylinder Storage Pads, will be collected in the Site Stormwater Detention Basins, as described in Section 3.4, Water Resources. Minor impacts to water resources are discussed in Section 4.4, Water Resources Impacts. Mitigation measures associated with these potential impacts are listed in Section 5.2.4, Water Resources.

5.1.5 Ecological Resources

The potential impacts to the ecological resources have been characterized in Section 4.5, Ecological Resources Impacts. No substantive impacts will exist related to the following:

- Total area of land to be disturbed
- Area of disturbance for each habitat type
- Use of chemical herbicides, roadway maintenance, and mechanical clearing
- Areas to be used on a short-term basis during construction
- Communities or habitats that have been defined as rare or unique or that support threatened and endangered species
- Impacts of elevated construction equipment or structures on species (e.g., bird collisions, nesting areas)
- Impact on important biota.

Impacts to ecological resources will be minimal. Mitigation measures associated with these impacts are listed in Section 5.2.5, Ecological Resources.

5.1.6 Air Quality

The potential impacts to the air quality have been characterized in Section 4.6, Air Quality Impacts. No substantive impacts exist related to the following activities:

- Gaseous effluents
- Visibility impacts.

Impacts to air quality will be minimal. Construction activities will result in interim increases in carbon monoxide, nitrogen dioxide, sulfur dioxide and particulate matter due to vehicle emissions and dust. Impacts from plant operation will consist of emissions of small quantities of volatile organic compounds (VOCs) emissions and trace amounts of HF, UO_2F_2, and other uranic compound effluents remaining in treated air emissions from plant ventilation systems.

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

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

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

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

5.2.3 Geology and Soils

Mitigation measures will be in place to minimize potential impact on geology and soils. These include the following items:

- The use of BMPs will be used to reduce soil erosion (e.g., earth berms, dikes, and sediment fences).
- Prompt revegetation or covering of bare areas with natural materials will be used to mitigate impacts of erosion due to construction activities.
- Watering will be used to control potentially fugitive construction dust.
- Process water will be contained within enclosed systems and will not be disposed to the subsurface bedrock or local soils.
- BMPs will be used to manage stormwater runoff from paved and compacted surfaces to drainage ditches and basins.
- Grading plans will be designed to minimize overland flow of stormwater and direct stormwater to the Site Stormwater Detention Basins.
- Standard drilling and blasting techniques, if required, will be used to minimize impact to bedrock, reducing the potential for over-excavation thereby minimizing damage to the surrounding rock, and protecting adjacent surfaces that are intended to remain intact.
- Soil stockpiles generated during construction will be placed in a manner to reduce erosion.
- On-site excavated materials will be reused whenever possible.

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

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

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

The Domestic SSTP Basin will collect treated domestic sanitary waste water and rainwater that falls directly on the basin. The basin will be designed in accordance with applicable state requirements for a two cell system.

5.2.5 Ecological Resources

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

- The management of unused open areas (i.e., leave undisturbed), including areas of native grasses and shrubs for the benefit of wildlife.
- The use of native plant species (i.e., low-water consuming plants) to revegetate disturbed areas to enhance wildlife habitat.
- On-site stormwater basins and the Domestic SSTP Basin will be fenced to limit access by wildlife.
- Vehicle speeds onsite will be reduced.
- Best management practices will be used to minimize dust. Water will be applied at least twice daily (when needed) to control dust in construction areas in addition to other fugitive dust prevention and control methods.
- All lights will be focused downward.
- The existing boundary fence will be improved to ensure pronghorn access to the remaining habitat on the proposed site.
- Removal of livestock, when the plant becomes operational, to improve sagebrush habitat.
- To protect migratory birds during the construction and decommissioning of the EREF, the following measures will be taken:
    - Clearing or removal of habitat (e.g., sagebrush), including buffer zones, will be performed outside of the breeding and nesting season for migratory birds.

With mitigation, the dose consequences to the public for this accident sequence, has been reduced to a level below that considered "intermediate consequences," as that term is defined in (10 CFR 70.61(c)) (CFR, 2008oo).

5.2.13 Waste Management

Mitigation measures will be in place to minimize both the generation and impact of facility wastes. Solid and liquid wastes and gaseous effluents will be controlled in accordance with regulatory limits. There will be no radioactively contaminated liquid effluent discharges from facility operations. Mitigation measures include the following.

- System design features are in place to minimize the generation of solid waste, liquid waste, and gaseous effluent. Gaseous effluent design features were previously described in ER Section 5.2.12, Public and Occupational Health.
- There will be no onsite disposal of waste at the EREF. Waste will be stored in designated areas of the plant, until an administrative limit is reached. When the administrative limit is reached, the waste will then be shipped off site to a licensed disposal facility.
- All radioactive and mixed wastes will be disposed of at off-site, licensed facilities.

Mitigation measures associated with depleted uranium tails cylinder storage are as follows:

- AES will maintain a cylinder management program to monitor storage conditions on the Northern Cylinder Storage Pads, to monitor cylinder integrity by conducting routine inspections for breaches, and to perform cylinder maintenance and repairs as needed.
- All tails cylinders filled with depleted uranium hexafluoride (UF_6) will be stored on concrete (or other suitable material) saddles that do not cause corrosion of the cylinders. These saddles will be placed on a concrete pad.
- The storage pad areas will be segregated from the rest of the enrichment facility by barriers (e.g., vehicle guard rails).
- Depleted uranium tails cylinders will be double stacked on the storage pad. The storage array will permit easy visual inspection of all cylinders.
- Depleted uranium tails cylinders will be surveyed for external contamination (wipe tested), prior to being placed on a Northern Cylinder Storage Pad or transported off site.
- Depleted uranium tails cylinder valves will be fitted with valve guards to protect the cylinder valve during transfer and storage.
- Provisions will be in place to ensure that depleted uranium tails cylinders will not have defective valves (identified in NRC Bulletin 2003-03, "Potentially Defective 1-Inch Valves for Uranium Hexafluoride Cylinders") (NRC, 2003d) installed.
- All UF_6 cylinders will be abrasive blasted and coated with anti-corrosion primer/paint when manufactured (as required by specification). Touch-up application of coating will be performed on depleted uranium tails cylinders if coating damage is discovered during inspection.
- Only designated vehicles, operated by trained and qualified personnel, will be allowed on the Full Product Cylinder Storage Pad and the Northern Cylinder Storage Pads. Refer to the ISA Summary, Section 3.8 for controls associated with vehicle fires on or near the Cylinder Storage Pads.

Depleted uranium tails cylinders will be inspected for damage prior to placing a filled cylinder on a storage pad. Depleted uranium tails cylinders will be re-inspected annually for damage or surface coating defects. These inspections will verify that:

- Lifting points are free from distortion and cracking.
- Cylinder skirts and stiffener rings are free from distortion and cracking.
- Cylinder surfaces are free from bulges, dents, gouges, cracks, or significant corrosion.
- Cylinder valves are fitted with the correct protector and cap.
- Cylinders are inspected to confirm that the valve is straight and not distorted, two to six threads are visible, and the square head of the valve stem is undamaged.
- Cylinder plugs are undamaged and not leaking.
- If inspection of a depleted uranium tails cylinder reveals significant deterioration or other conditions that may affect the safe use of the cylinder, the contents of the affected cylinder will be transferred to another good condition cylinder and the defective cylinder will be discarded. The root cause of any significant deterioration will be determined, and if necessary, additional inspections of cylinders will be made.
- Proper documentation on the status of each depleted uranium tails cylinder will be available on site, including content and inspection dates.
- The lined Cylinder Storage Pads Stormwater Retention Basins will be used to capture stormwater runoff from the Northern Cylinder Storage Pads.

Other waste mitigation measures will include:

- Power usage will be minimized by efficient design of lighting systems, selection of high-efficiency motors, and use of proper insulation materials.
- Processes used to clean up wastes and effluents, create their own wastes and effluent as well. Control of these process effluents will be accomplished by liquid and solid waste handling systems and techniques as described below:
  - Careful applications of basic principles for waste handling will be followed in all of the systems and processes.
  - Different waste types will be collected in separate containers to minimize contamination of one waste type with another. Materials that can cause airborne contamination will be carefully packaged, and; ventilation and filtration of the air in the area will be provided as necessary. Liquid wastes will be confined to piping, tanks, and other containers; curbing, pits, and sumps will be used to collect and contain leaks and spills.
  - Hazardous wastes will be stored in designated areas in carefully labeled containers. Mixed wastes will also be contained and stored separately.
  - Strong acids and caustics will be neutralized before entering an effluent stream.
  - Radioactively contaminated wastes will be decontaminated and/or re-used in so far as possible to reduce waste volume.
  - Collected waste such as trash, compressible dry waste, scrap metals, and other candidate wastes, will be volume reduced at a centralized waste processing facility.
  - Waste management systems will include administrative procedures and practices that

6.1.1.2 Stormwater and Sewage Treatment Plant Liquid Effluent Monitoring

General site stormwater runoff is routed to the Site Stormwater Detention Basins. (See sections 3.4 and 4.4 for descriptions of the discharges from these basins.) The two Cylinder Storage Pads Stormwater Retention Basins collect stormwater runoff from the Cylinder Storage Pads (i.e., Full Product Cylinder Storage Pad and Northern Cylinder Storage Pads). Approximately 150,415 m^3 (39.7 million gal) of stormwater are expected to be collected each year (mean annual) by the detention and retention basins combined. Approximately 18,700 m^3 (4,927,500 gal) of Domestic Sanitary Sewage Treatment Plant (SSTP) effluent are expected to be discharged to the Domestic SSTP Basin each year. These basins will be included in the site Radiological Environmental Monitoring Program described below in ER Section 6.1.2.

6.1.2 Radiological Environmental Monitoring Program

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 primary objective of the REMP is to provide verification that the operations at the facility do not result in detrimental radiological impacts on the environment. Through its implementation, the REMP provides data to confirm the effectiveness of effluent controls and the effluent monitoring program. In order to meet program objectives, representative samples from various environmental media are collected and analyzed for the presence of plant-related radioactivity. The types and frequency of sampling and analyses are summarized in Table 6.1-3, Radiological Environmental Monitoring Program. Environmental media identified for sampling consist of ambient air, groundwater, soil/sediment, and vegetation. All environmental samples will be analyzed onsite. However, samples may also be shipped to a qualified independent laboratory for analyses. The MDCs for gross alpha (assumed to be uranium) in various environmental media are shown in Table 6.1-4, Required MDC for Environmental Sample Analysis. Monitoring and sampling activities, laboratory analyses, and reporting of facility-related radioactivity in the environment will be conducted in accordance with industry-accepted and regulatory-approved methodologies.

The Quality Control (QC) procedures used by the laboratories performing the plant's REMP 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).

Monitoring procedures will employ well-known acceptable analytical methods and instrumentation. The instrument maintenance and calibration program will be appropriate to the given instrumentation, in accordance with manufacturers' recommendations.

The EREF will ensure that the onsite laboratory and any contractor laboratory used to analyze EREF samples participates in third-party laboratory intercomparison programs appropriate to the media and analytes being measured. Examples of these third-party programs are: (1) Mixed Analyte Performance Evaluation Program (MAPEP) and the DOE Quality Assurance Program (DOEQAP) that are administered by the Department of Energy; and (2) Analytics, Inc. Environmental Radiochemistry Cross-Check Program. The EREF will require that all radiological and non-radiological laboratory vendors are certified by the National Environmental significant radiological source term. Refer to Sections 3.6, Meteorology, Climatology and Air Quality and 4.6, Air Quality Impacts, for information on meteorology and atmospheric dispersion. All environmental air samplers operate on a continuous basis with sample retrieval for a gross alpha and beta analysis occurring on a biweekly basis (or as required by dust loading).

Vegetation and soil samples from locations near the Owner Controlled Area fence line will be collected on a quarterly basis in each sector during the pre-operational REMP. This is to assure the development of a sound baseline. During the operational years, vegetation, and soil sampling will be performed semiannually in eight sectors, including three with the highest predicted atmospheric deposition. Vegetation samples may include vegetables and grass, depending on availability. Soil samples will be collected in the same vicinity as the vegetation samples. Vegetation and soil samples will also be collected from an off-site control location.

Groundwater samples from onsite monitoring wells will be collected semiannually for radiological analysis. The locations of the groundwater sampling (monitoring) wells are shown on Figure 6.1-2, Modified Site Features with Proposed Sampling Stations and Monitoring Locations. The rationale for the locations is based on the predominant groundwater flow under the EREF site and proximity to key site structures. Nine deep monitoring wells will be located as follows: one down-gradient (i.e., west-southwest) of the plant footprint, three near the down-gradient edge of the plant footprint, three cross-gradient, and two up-gradient of the site to serve as control locations. An additional shallow monitoring well will be located down-gradient of the site. Sediment samples will be collected semiannually from the two Cylinder Storage Pads Stormwater Retention Basins and the three Site Stormwater Detention Basins to look for any buildup of uranic material being deposited.

The site Domestic Sanitary Sewage Treatment Plant will receive only domestic sanitary wastes. No plant process-related effluents will be introduced. Samples will, however, be collected semiannually from the sanitary sewage treatment system and will be analyzed for isotopic Uranium.

Direct radiation in offsite areas from processes inside the facility building is expected to be minimal because the low-energy radiation associated with the uranium will be shielded by the process piping, equipment, and cylinders to be used at the EREF. However, the uranium cylinders stored on the Cylinder Storage Pads may have an impact in some offsite locations due to direct and scatter (skyshine) radiation. The offsite impact from the storage pads has been evaluated and is discussed in Section 4.12, Public and Occupational Health Impacts.

The conservative evaluation showed that an annual TEDE of < 0.1 mSv (≤10 mrem) is expected at the highest impacted area at the site boundary.

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.

Table 6.1-3 Radiological Environmental Monitoring Program
(Page 1 of 1)

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]
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]
Soil	9	1 to 2-kg (2.2 to 4.4-lb) samples collected semiannually	Isotopic analysis [a]
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

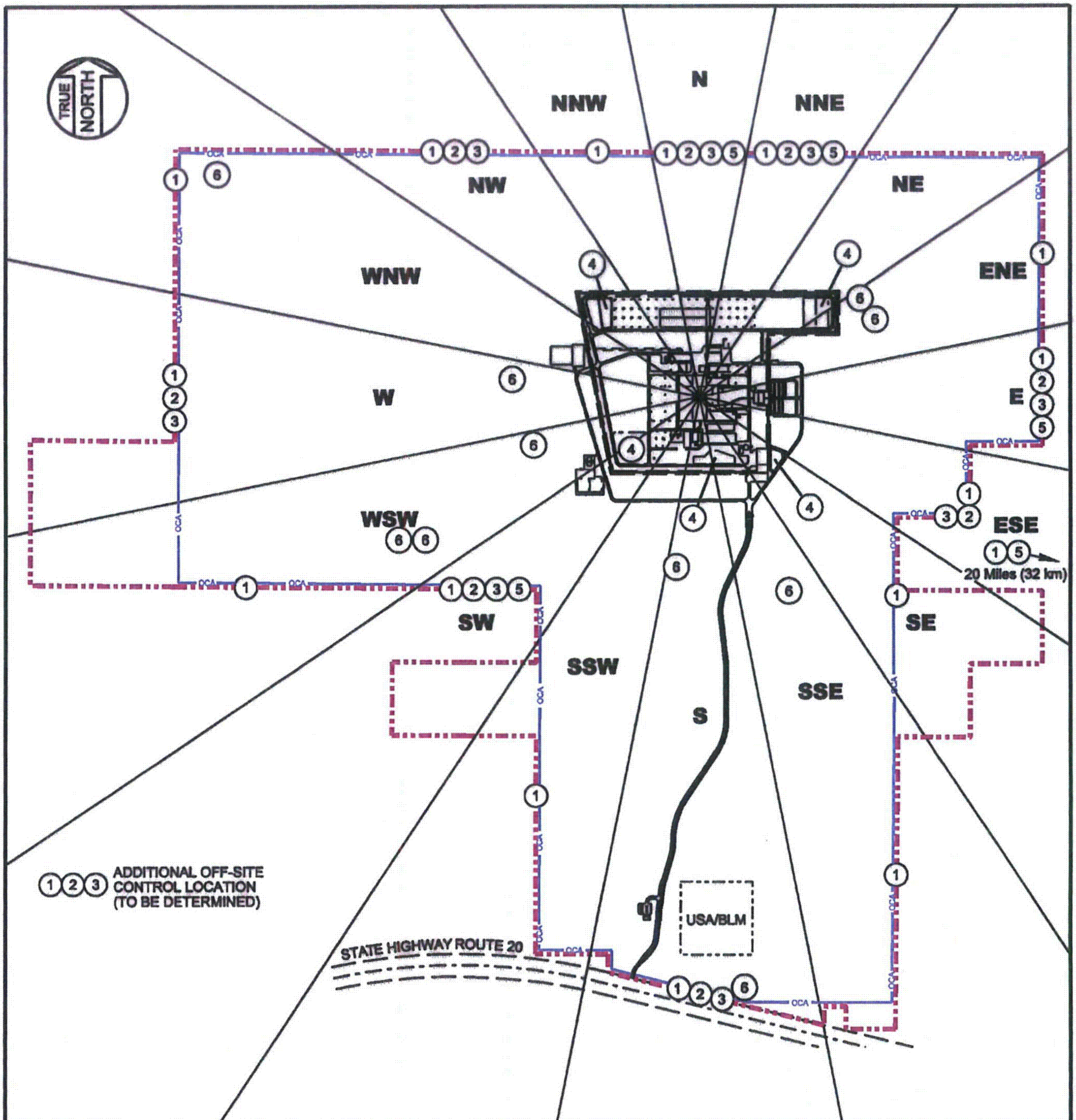
Notes:

[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.

Note: Physiochemical monitoring parameters are addressed separately in ER Section 6.2, Physiochemical Monitoring.



LEGEND:

- PROPERTY LINE
- OCA — OWNER CONTROLLED AREA FENCE (10 Feet (3 Meters) INSIDE OF PROPERTY LINE)
- (1) THERMOLUMINESCENT DOSIMETER
- (2) SOIL SAMPLE
- (3) VEGETATION SAMPLE
- (4) WATER SAMPLE / SEDIMENT SAMPLE
- (5) CONTINUOUS AIRBORNE PARTICULATE SAMPLE
- (6) GROUNDWATER WELL SAMPLE

0 1500 3000 6000
SCALE: FEET

0 500 1000 2000
SCALE: METERS

FIGURE 6.1-2 **Rev. 4**

Modified Site Features with Proposed Sampling Stations and Monitoring Locations

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Stormwater monitoring will continue with the same monitoring frequency upon initiation of facility operation. During plant operation, samples will be collected from the two Cylinder Storage Pads Stormwater Retention Basins and the three Site Stormwater Detention Basins in order to demonstrate that runoff does not contain any contaminants. A list of parameters to be monitored and monitoring frequencies for stormwater is presented in Table 6.2-2, Stormwater Monitoring Program for Detention and Retention Basins. This monitoring program will be refined to reflect applicable requirements as determined during the National Pollutant Discharge Elimination System (NPDES) process.

6.2.5 Environmental Monitoring

The purpose of this section is to describe the surveillance-monitoring program, which will be implemented to measure non-radiological chemical impacts upon the natural environment.

The ability to detect and contain any potentially adverse chemical releases from the facility to the environment will depend on chemistry data to be collected as part of the effluent and stormwater monitoring programs described in the preceding sections. Data acquisition from these programs encompasses both onsite and offsite sample collection locations and chemical element/compound analyses. Final constituent analysis requirements will be in accordance with permit mandates.

Sampling locations will be determined based on meteorological information and current land use. The sampling locations may be subject to change as determined from the results of any observed changes in land use.

The range of chemical surveillance incorporated into all the planned effluent monitoring programs for the facility are designed to be sufficient to predict any relevant chemical interactions in the environment related to facility operations.

Vegetation and soil sampling will be conducted. Vegetation samples will include grasses, and if available, vegetables. Soil will be collected in the same vicinity as the vegetation samples. The samples will be collected from both on site and off site locations in various sectors. Sectors are chosen based on air modeling. Onsite soil and vegetation sampling will include the outfalls at the Site Stormwater Detention Basins. The outfalls are further discussed in Section 4.4, Water Resources Impacts. Sediment samples will be collected from discharge points to the different collection basins onsite. Groundwater samples will be collected from a series of wells installed around the facility. The locations of the groundwater sampling (monitoring) wells are shown in Figure 6.2-1, Physiochemical Monitoring Locations.

If water is present, a surface water sample will be collected from the intermittent stream drainage in the southwest corner of the site.

6.2.6 Meteorological Monitoring

In order to monitor and characterize meteorological phenomena (e.g., wind speed, wind direction, air temperature and humidity) during plant operation as well as consider interaction of meteorology and local terrain, conditions will be monitored with a 40-m (132-ft) instrumented tower located onsite. These data will assist in evaluating the potential locales on and off property that could be influenced by any emissions. The instrumented tower will be located at a site approximately the same elevation as the finished facility grade and in an area where facility structures will have little or no influence on the meteorological measurements. An area approximately ten times the obstruction height around the tower towards the prevailing wind direction will be maintained in accordance with established standards for meteorological

Table 6.2-1 Physiochemical Sampling
(Page 1 of 1)

Media	Number of Locations	Monitoring Frequency	Sample Type	Analysis[a]
Groundwater	9 deep wells and 1 shallow well used for baseline monitoring.	Semiannually for deep wells; semiannually for shallow wells when water is present	Grab	Metals, organics and pesticides; water level elevations
Soil[b]/sediment	3 minimum soil samples at locations to be determined by environmental staff plus one at each of the three detention basin outfalls.	Quarterly, near vegetation sample locations; one sample at each location	Surface grab	Metals, organics, pesticides and fluoride uptake
	Retention and detention basin sediments at discharge points to the basins.	Quarterly for one sample at each location	Surface grab	Metals, organics, pesticides and fluoride uptake
Surface water[b]	Potential location in intermittent stream drainage on southwestern corner of site.	Quarterly if water present	Grab	Metals, organics and pesticides
Stormwater[b]	Retention and detention basins at locations to be determined by environmental staff.	Quarterly if water present	Grab	See Table 6.2-2
Vegetation[b]	6 minimum	Quarterly if present (i.e., during growing seasons); one sample at each location	Surface grab	Fluoride uptake
Meteorology	1 on-site station augmented by records from nearby meteorological stations	Daily	Continuous	Wind direction and wind speed, temperature, and humidity

Notes:

[a] Analyses will meet EPA Lower Limits of Detection (LLD), as applicable, and will be based on the baseline surveys and the type of matrix (sample type).

[b] Location to be established by Environmental, Health, Safety and Licensing (EHS&L) organization staff.

Table 6.2-2 Stormwater Monitoring Program for Detention and Retention Basins (see Figure 4.4-1)[a]
(Page 1 of 1)

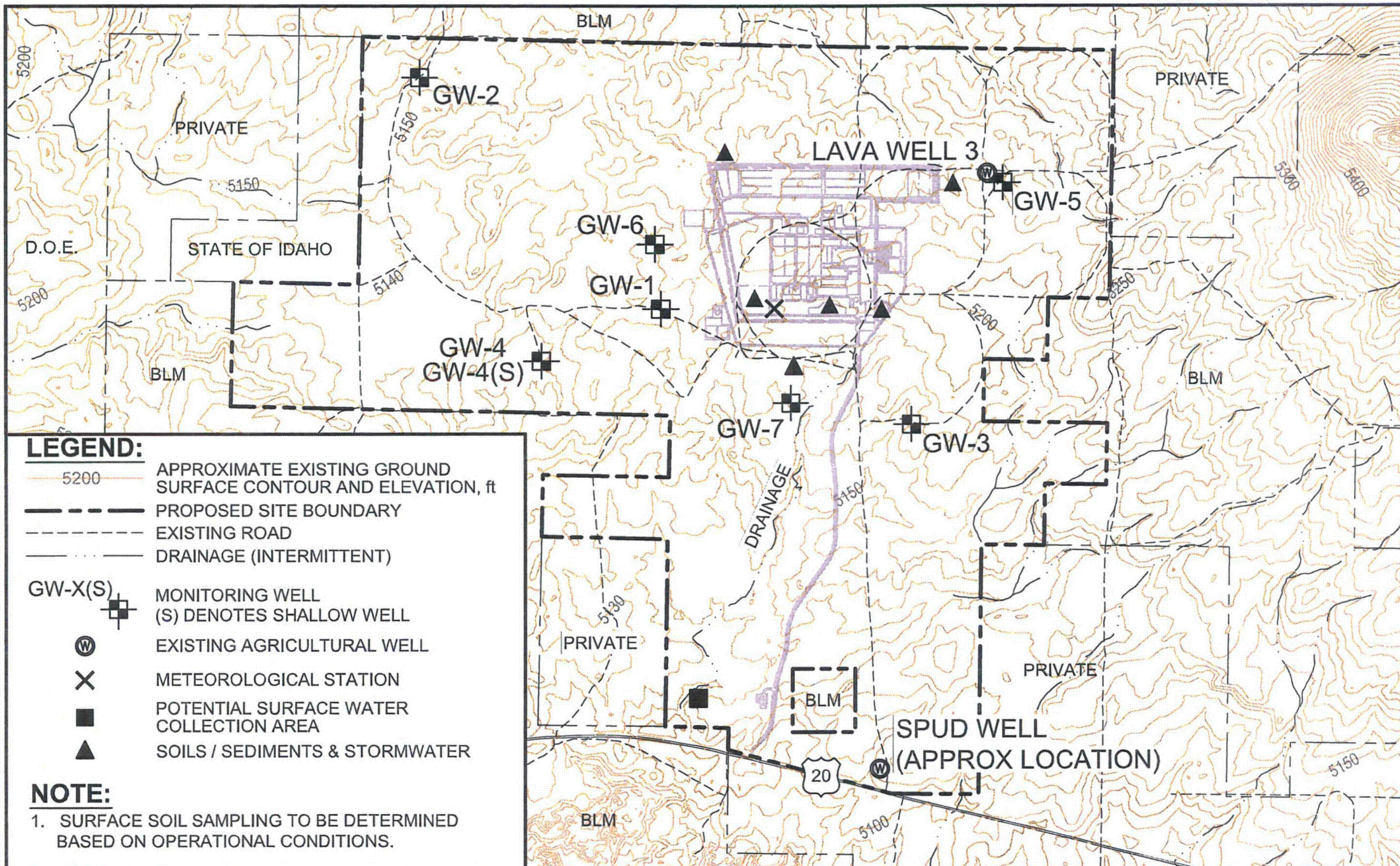
Monitored Parameter	Monitoring Frequency	Sample Type	LLD[b] (ppm)
Oil and Grease	Quarterly, if standing water exists	Grab	0.5
Total Suspended Solids	Quarterly, if standing water exists	Grab	0.5
Five-Day Biological Oxygen Demand	Quarterly, if standing water exists	Grab	2
Chemical Oxygen Demand	Quarterly, if standing water exists	Grab	1
Total Phosphorus	Quarterly, if standing water exists	Grab	0.1
Total Kjeldahl Nitrogen	Quarterly, if standing water exists	Grab	0.1
pH	Quarterly, if standing water exists	Grab	0.01 units
Nitrate plus Nitrite Nitrogen	Quarterly, if standing water exists	Grab	0.2
Metals	Quarterly, if standing water exists	Grab	Varies by metal

Notes:

[a] Site Stormwater Detention Basins, Cylinder Storage Pads Stormwater Retention Basins and any temporary basin(s) used during construction.

[b] Lower limit of detection; Analyses will meet EPA LLD, as applicable, and will be based on the baseline surveys and the type of matrix (sample type).

Note: Radiological monitoring parameters are addressed separately in ER Section 6.1, Radiological Monitoring.



LEGEND:

5200	APPROXIMATE EXISTING GROUND SURFACE CONTOUR AND ELEVATION, ft
— — —	PROPOSED SITE BOUNDARY
- - - -	EXISTING ROAD
— · · —	DRAINAGE (INTERMITTENT)
GW-X(S)	MONITORING WELL (S) DENOTES SHALLOW WELL
Ⓦ	EXISTING AGRICULTURAL WELL
✕	METEOROLOGICAL STATION
■	POTENTIAL SURFACE WATER COLLECTION AREA
▲	SOILS / SEDIMENTS & STORMWATER

NOTE:

1. SURFACE SOIL SAMPLING TO BE DETERMINED BASED ON OPERATIONAL CONDITIONS.
2. VEGETATION AND SOIL SAMPLING LOCATIONS NOT YET IDENTIFIED, EXCEPT AT THE DETENTION BASIN OUTFALLS.
3. GROUND SURFACE CONTOUR ELEVATIONS ARE SHOWN IN FEET. METRIC CONVERSION IS 1 m = 3.281 ft

SCALE
0 800 1600 m

SCALE
0 2500 5000 ft

N

Figure 6.2-1 **Rev. 4**

Physiochemical Monitoring Locations

EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT

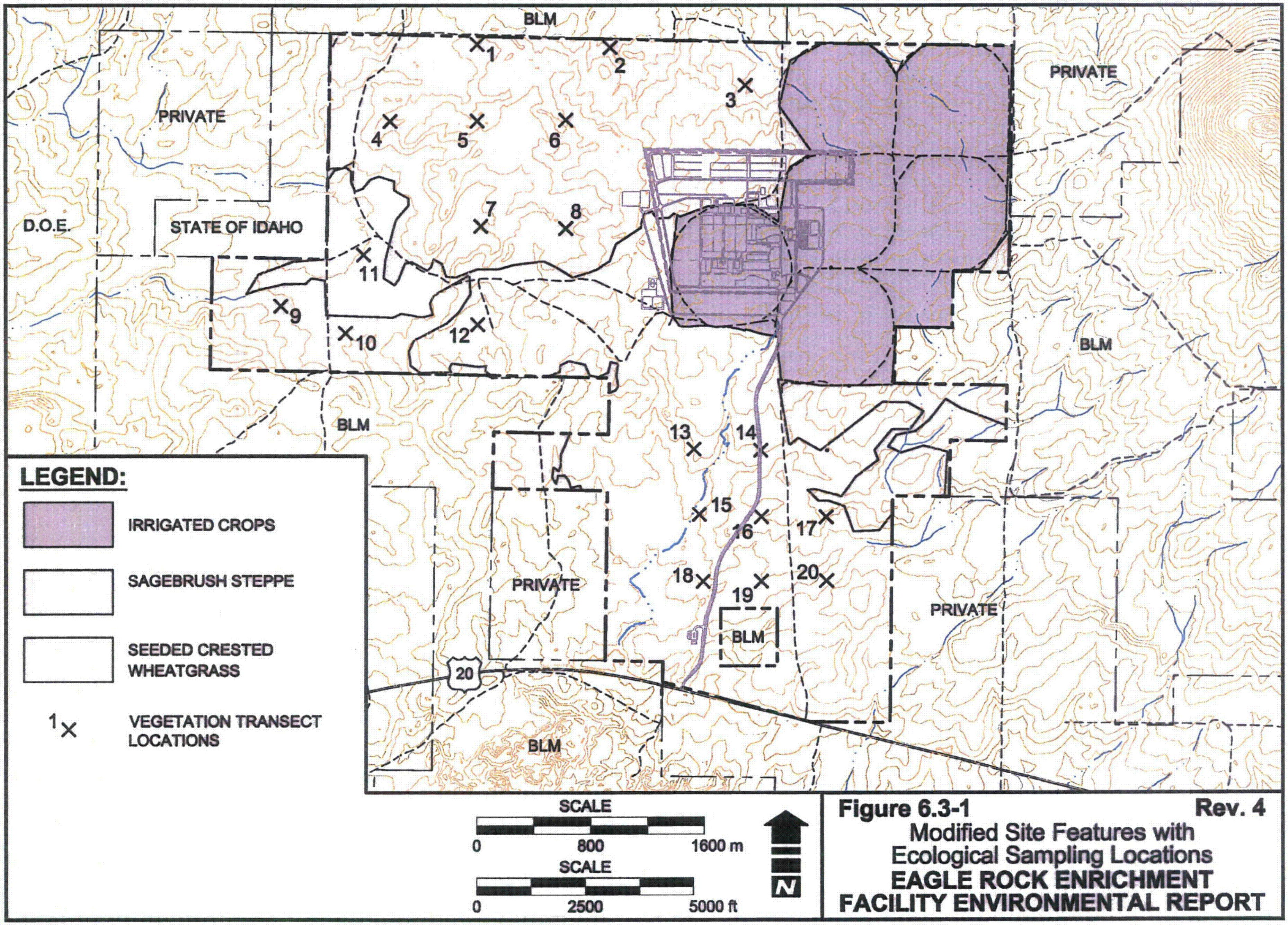


Figure 6.3-1 **Rev. 4**

Modified Site Features with Ecological Sampling Locations

EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT

7.2.1.9 Socioeconomic

Construction of the EREF is expected to have positive socioeconomic impacts on the region. The Regional Input-Output Modeling System (RIMS II) allows estimation of various indirect impacts associated with each of the expenditures associated with the EREF. According to the RIMS II analysis, the region's residents can anticipate an annual impact of [*] in increased economic activity for local businesses, [*] in increased earnings by households, and [*] new jobs during the 7-year heavy construction period and four-year assemblage and testing period. The temporary influx of labor is not expected to overload local services and facilities within the Bonneville-BinghamJefferson Idaho area.

* Proprietary Commercial Information withheld in accordance with 10 CFR 2.390

7.2.1.9.1 Yearly Purchases of Steel, Concrete, and Related Construction Materials

The initial construction period for EREF is approximately three years. This period will encompass site preparation and construction of most site structures. Due to the phased installation of centrifuge equipment, production will commence in the fourth year of the construction period (2014). The manpower and materials used during this phase of the project will vary depending on the construction plan. Table 7.2-2, Estimated Construction Material Yearly Purchases, provides the estimated total quantities of purchased construction materials and Table 7.2-3, Estimated Yearly Labor Costs for Construction, provides the estimated labor that will be required to install these materials. The scheduling of materials and labor expenditures is subject to the provisions of the project construction execution plan, which has not yet been developed.

Approximately [*] in local expenditures (e.g., buildings, equipment, and other materials) will be made in the local EREF site area. According to the labor survey conducted as part of the conceptual estimate, the major portion of the required craft labor forces will come from the eleven counties around the project area.

* Proprietary Commercial Information withheld in accordance with 10 CFR 2.390

7.2.2 Plant Operation

7.2.2.1 Surface and Groundwater Quality

Liquid effluents at the EREF will include stormwater runoff and sanitary wastewater. Any radiologically contaminated, potentially radiologically contaminated, or non-radiologically contaminated aqueous liquid effluents are collected for filtration and precipitation treatment to remove uranium and fluorine. Through repeat treatments, the contamination levels are reduced to acceptable levels, at which time the liquid is sent to an evaporator for vaporization and final discharge to the atmosphere. Any removed solids are shipped for off-site low-level radioactive waste disposal.

Stormwater runoff from the Cylinder Storage Pads will be collected in the Cylinder Storage Pads Stormwater Retention Basins. General site runoff will be routed to the Site Stormwater Detention Basins. During operation, stormwater discharges will be regulated, as required, by the National Pollutant Discharge Elimination System (NPDES) permit for the EREF. Approximately 65,240 m^3 (17,234,700 gal) of stormwater from the Cylinder Storage Pads are expected to be released, based on mean annual precipitation discharging to the Cylinder Storage Pads Stormwater Retention Basins. There is no infiltration in the site soils. Approximately 85,175 m^3 (22,501,000 gal) of stormwater from the site is expected to be released annually (mean) to the detention basins after taking into account infiltration into the area soils associated with landscaped areas, natural areas, and loose gravel areas of the developed portion of the site. The estimated annual release of treated sanitary effluents to the domestic SSTP Basin is 18,700 m^3 (4,927,500 gal).

7.2.2.2 Terrestrial and Aquatic Environments

No communities or habitats defined as rare or unique, or that support threatened or endangered species have been found or are known to occur on the proposed site. Operation of the EREF is therefore not expected to impact such communities or habitats.

7.2.2.3 Air Quality

No adverse air quality impacts to the environment, either on or off site, are anticipated to occur. Air emissions from the facility during normal facility operations will be limited to the plant ventilation air and gaseous effluent systems. All plant process/gaseous air effluents are to be filtered and monitored on a continuous basis for chemical and radiological contaminants, which could be derived from the UF_6 process system. If any UF_6 contaminants are detected in these systems' exhaust, the air is treated by appropriate filtration methods prior to its venting to the environment.

On-site diesel engines include four standby diesel generators for backup power supply, a security diesel generator, and a fire pump diesel. These engines will be used exclusively for emergency purposes. Their use will be administratively controlled and they will only run a limited number of hours per year. As a result, these engines will be exempt from air permitting requirements of the State of Idaho. Due to their limited use, the diesel generators will have negligible health and environmental impacts.

An on-site fueling facility consisting of two 2,000-gallon above ground storage tanks, dispenser pumps, and appurtenances will service the facility. One above ground tank will store unleaded gasoline. The other above ground tank will store diesel fuel. Because of the low estimated petroleum hydrocarbon emissions from the fueling facility and the associated estimated ambient air concentrations, the fueling facility is exempt from air permitting requirements of the State of Idaho and presents no significant impact to the environment.

7.2.2.4 Visual/Scenic

No impairments to local visual or scenic values will result due to the operation of the EREF. The facility and associated structures will be relatively compact, and located in a rural location. No offensive noises or odors will be produced as a result of facility operations.

7.2.2.5 Socioeconomics

AREVA Enrichment Services (AES) applied the Regional Input-Output Modeling System (RIMS) II to estimate the socioeconomic impact from operation of the EREF. The results of the analysis are presented below and are in 2007 dollars. The EREF is expected to employ up to 550 people in high paying jobs relative to the region. Its operation's payroll will generate $36.3 million annually in earnings for households and another $82.8 million in additional household earnings due to indirect impacts. Annual purchases for goods and services are expected to add another $8.9 million in household income for a total increase in household earnings of $128.0 million. An annual increase of 2,987 indirect new jobs (3,537 minus the 550 direct jobs at the EREF) is anticipated during operation.

In general, no significant impacts are expected to occur on population characteristics, economic trends, housing, community services and the tax structure and tax distribution in Bonneville and Bingham Counties.

7.2.2.6 Radiological Impacts

Potential radiological impacts from operation of the EREF would result from controlled releases of small quantities of UF_6 during normal operations and releases of UF_6 under hypothetical accident conditions. As described in ER 4.12.2, Radiological Impacts, the major sources of potential radiation exposure are the gaseous effluent from the Separations Buildings, Technical Support Building and direct radiation from the Cylinder Storage Pads. It is anticipated that the total amount of uranium released to the environment via airborne effluent discharges from the EREF will be less than 20 grams (13.7 µCi or 0.506 MBq) per year. Due to the anticipated low volume of contaminated liquid waste and the effectiveness of the treatment processes, no waste in the form of liquid effluent are expected.

The estimated maximum annual effective dose equivalent and maximum annual organ (lung) committed dose to transient individuals at the maximum site boundary for the ground plane (NNE sector at 1.1 km (0.67 mi)), cloud immersion (N sector at 1.1 km (0.67 mi)), and inhalation exposure (N sector at 1.1 km (0.67 mi)) pathways are 1.5 E-04 mSv/yr (1.5 E-02 mrem/yr) and 1.2 E-03 mSv/yr (1.2E-01 mrem/yr), respectively. Although there are no residences within 8 km (5 mi) from the center of the EREF structures, for a hypothetical residence at the site boundary, the maximum annual effective dose equivalent and maximum annual organ dose (lung) to an individual for all airborne exposure pathways are 8.8 E-04 mSv/yr (8.8E-02 mrem/yr) and 6.4 E-03 mSv/yr (6.4 E-01 mrem/yr), respectively.

The dose equivalent due to external radiation (direct and sky shine) from the Northern Cylinder Storage Pads and direct dose from product cylinders stored on the Full Product Cylinder Storage Pad, to an individual (2,000 hrs/yr) at the maximum impacted site boundary (North), is 0.0142 mSv/yr (1.42 mrem/yr). The annual dose equivalent (2000 hrs/yr) at the nearest actual off-site work location (Southwest at 4.0 km (2.5 mi)) is estimated to be <1E-12 mSv/yr (<1E-10 mrem/yr) and that to the nearest actual residence (8,766 hrs/yr) at over 8 km (5 mi) from facility structures, is less than 1E-12 mSv/yr (1E-10 mrem/yr).

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

7.2.2.7 Other Impacts of Plant Operation

The EREF water supply will be from on-site wells. The anticipated normal water usage rate for the EREF is 68.2 m^3/d (18,000 gal/d) and the peak water usage requirement is 42 L/sec (664 gpm). The normal annual water usage rate will be 24,870,000 L/yr (6,570,000 gal/yr), which is a very small fraction (i.e., about 4%) of the water appropriation value of 625,000,000 L/yr (165,000,000 gal/yr) for industrial use. The appropriation for seasonal irrigation use will be 147 m^3/d (38,800 gal/d). The peak water usage is developed based on the assumption that all water users are operating simultaneously. Furthermore, the peak water usage assumes that each water user is operating at maximum demand. This combination of assumptions is very unlikely to occur during the lifetime of the EREF. Nevertheless, the peak water usage is used to size the piping system and pumps. Given that the normal annual water usage rate for the EREF is a very small fraction of the appropriation value, momentary usages of water beyond the expected earthwork will likely be the period of highest emissions with the greatest number of construction vehicles operating on an unprepared surface. However, no more than 14% of the site, or about 240 ha (592 ac), will be involved in this type of work. Airborne dust will be controlled through the use of BMPs such as surface water sprays by ensuring trucks' loads and soil piles are covered, and by promptly removing construction wastes from the site. The application of water sprays for dust suppression will be applied at least twice daily (when needed). Other dust control BMPs will also be implemented.

Increased visual modifications to the landscape would be expected due to the addition of transmission poles (resulting in more contrast of form, line color, and texture). A number of existing transmission lines and telephone lines and the resulting visual impacts are present within the region and in the immediate vicinity of the eastern and western extents of the site. The proposed transmission line would not dominate the landscape and would meet the Bureau of Land Management Visual Resource Management objectives.

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

Pre-construction activities are those that are not considered construction activities under the definition of construction currently provided in 10 CFR 51.4. AES considers the following activities and facilities as pre-construction:

- Clearing the site
- Site grading and erosion control
- Excavating the site including rock blasting and removal
- Installing parking areas
- Constructing the storm water detention basins
- Constructing the highway access roadways and site roads
- Installing utilities (e.g., temporary and permanent power) and storage tanks
- Installing fences for investment protection (not used to implement the Physical Security Plan)
- Installing construction buildings, offices (including construction trailers), warehouses and guardhouses.

Table 8.5-1 provides estimates of the percentage of impacts attributable to pre-construction and construction activities as well as a summary of the basis for the estimates and a qualitative impact significance level.

The estimated pre-construction and construction related impacts presented in the table were based on the following factors:

- Construction Area – the area that will be impacted for pre-construction and construction activities is estimated to be approximately 240 ha (592 ac) which includes 37 ha (92 ac) used for temporary construction activities. It is assumed that pre-construction activities of clearing, grubbing, and site preparation will impact 95% of the land area to be occupied by both pre-construction and construction structures and activities.

Table 8.5-1 Summary of Pre-Construction and Construction Related Impacts
(Page 1 of 4)

Potential Impact (ER Section Reference)	Significance[(a)]	Estimated Impacts (%)		Basis of Estimate
		Pre-Construction[(b)]	Construction	
Land Use (Sections 4.1 and 5.1.1)	SMALL	95	5	Based on the proposed EREF site area of 240 ha (592 ac), including the temporary area of 37 ha (92 ac), being disturbed during pre-construction and construction activities. Greater than 80% of the property would remain undeveloped and current activities on nearby properties would not change.
Transportation (Sections 4.2 and 5.1.2)	MODERATE	60	40	Based on the percentage of pre-construction workers compared to the peak number of workers estimated on-site related to all phases of development for EREF, as listed in ER Tables 3.4-15 and 3.4-16, and the approximate number of truck deliveries and waste shipments per day as listed in ER Tables 4.2-3 and 4.2-4. Impact due to increased highway traffic associated with construction duration.
Geology and Soils (Sections 4.3 and 5.1.3)	SMALL	95	5	Geology impacts based on pre-construction land use, during which the majority of blasting may occur to develop foundations. Greater than 80% of the property would remain undeveloped and current activities on nearby properties would not change. Soils impacts based on the pre-construction area impacted as described previously in Land Use.

8.6 ENVIRONMENTAL IMPACTS OF OPERATION

Operation of the Eagle Rock Enrichment Facility (EREF) would result in the production of gaseous effluent, liquid effluent, and solid waste streams. Each stream could contain small amounts of hazardous and radioactive compounds, either alone or in a mixed form. Based on the experience gained from operation of European plants, the aggregate routine airborne uranium gaseous releases to the atmosphere are estimated to be less than 20 g (0.71 ounces) annually. Extremely minute amounts of uranium and hydrogen fluoride (all well below regulatory limits) could potentially be released at the roof-top through the gaseous effluent exhaust vents. The eight exhaust vents for the eight separate and independent Separations Building (SB) Gaseous Effluent Vent Systems (GEVS) (i.e., two GEVS in each Separations Building Module); the single exhaust vent for the Technical Support Building (TSB) GEVS; and the single exhaust vent for Centrifuge Test and Post Mortem Facilities GEVS are located atop the SBMs, TSB and Centrifuge Assembly Building (CAB), respectively. Three additional exhaust vents that discharge any gaseous effluent from the Centrifuge Test and Post Mortem Facilities Exhaust Filtration System; the Technical Support Building (TSB) Contaminated Area HVAC System; and the Ventilated Room HVAC System, are located atop the CAB, TSB, and Blending, Sampling, and Preparation Building (BSPB), respectively. Gaseous effluent discharges from each of the thirteen exhaust vents are filtered for particulates and hydrogen fluoride (HF), and are continuously monitored prior to release.

Liquid effluents consist of stormwater runoff and treated domestic sanitary wastewater. All liquid effluents are discharged to retention and detention basins and the Domestic SSTP Basin.

The three Site Stormwater Detention Basins are each designed with an outlet structure for drainage. Local terrain serves as the receiving area for these basins. During a rainfall event larger than the design basis, the potential exists to overflow the basins if the outfall capacity is insufficient to pass beyond design basis inflows to the basins. Overflow of the basins is an unlikely event. The additional impact to the surrounding land, over that which would occur during such a flood alone, is assumed to be small. Therefore, potential overflow of the Site Stormwater Detention Basins during an event beyond their design basis is expected to have a minimal impact to surrounding land.

The two Cylinder Storage Pad Stormwater Retention Basins collect stormwater runoff from the Cylinder Storage Pads. They are lined to prevent infiltration and designed to retain a volume more than twice that for the 24-hour, 100-year frequency storm. These lined basins have no flow outlet and all effluents are dispositioned through evaporation. Treated domestic sanitary effluent is discharged to a lined basin allowing for evaporation.

The EREF design precludes operational process discharges from the facility to the lined Cylinder Storage Pad basins. There are, therefore, no anticipated impacts on natural water systems quality due to facility water use. Control of surface water runoff will be required for EREF activities covered by the NPDES General Permit. As a result, no significant impacts are expected for either surface water bodies or groundwater.

Solid waste that would be generated at EREF is grouped into nonhazardous, radioactive, hazardous, and mixed waste categories. All these wastes will be collected and transferred to authorized offsite treatment or disposal facilities. All solid radioactive waste generated will be Class A low-level waste as defined in 10 CFR 61 (CFR, 2008oo). This waste consists of industrial waste, filters and filter material, resins, gloves, shoe covers, and laboratory waste. Approximately 146,500 kg (323,000 lbs) of low-level waste would be generated annually. In addition, annual hazardous and mixed wastes generated at EREF are expected to be about 5,062 kg (11,160 lbs) and 100 kg (220 lbs), respectively. These wastes will be collected,

8.7 RADIOLOGICAL IMPACTS

The assessment of potential impacts considers the entire population surrounding the proposed EREF within a distance of 80 km (50 mi).

Radiological impacts are regulated under 10 CFR 20 (CFR, 2008x), which specifies a total effective dose equivalent (TEDE) limit for members of the public of 1 mSv/yr (100 mrem/yr) from all sources and pathways from the EREF, excluding natural background sources. In addition, 10 CFR 20.1101(d) (CFR, 2008x) requires that constraints on atmospheric releases be established for the EREF such that no member of the public would be expected to receive a total effective dose equivalent in excess of 0.1 mSv/yr (10 mrem/yr) from these releases. Further, the EREF would be subject to the Environmental Protection Agency's (EPA) standards, including: standards contained in 40 CFR 190 (CFR, 2008f) that require that dose equivalents under routine operations not exceed 0.25 mSv (25 mrem) to the whole body, 0.75 mSv (75 mrem) to the thyroid, and 0.25 mSv (25 mrem) to any other organ from all pathways.

The general public and the environment may be impacted by radiation and radioactive material from the EREF as the result of discharges of gaseous and liquid effluent discharges, including controlled releases from the uranium enrichment process lines during decontamination and maintenance of equipment. In addition, radiation exposure to the public may result from the transportation and storage of uranium hexaflouride (UF_6) feed cylinders, UF_6 product cylinders, low-level radioactive waste, and depleted UF_6 cylinders.

Potential radiological impacts from operation of the EREF would result from controlled releases of small quantities of UF_6 during normal operations and releases of UF_6 under hypothetical accident conditions. Normal operational release rates to the atmosphere from both gaseous and liquid effluent streams are expected to be less than 19.5 MBq/yr (528 µCi/yr) and 9.0E-04 MBq/yr (0.243 µCi/yr), respectively. The estimated maximum annual effective dose equivalent and maximum annual organ (lung) committed dose equivalents to transient individuals at the maximum site boundary for the ground plane (in the north-northeast (NNE)) sector at 1.1 km (0.67 mi), cloud immersion (in the north (N)) sector at 1.1 km (0.67 mi) and inhalation exposure (in the north (N)) sector at 1.1 km (0.67 m) pathways are 1.5E-04 mSv/yr (1.5E-02 mrem/yr) and 1.2E-03 mSv/yr ((1.2E-01 mrem/yr), respectively. The estimated maximum annual effective dose equivalent and maximum annual organ (lung) committed dose equivalents from discharged atmospheric effluent (gaseous and liquid waste streams combined and released as airborne effluent) to a hypothetical resident (teen) located at the plant site North Northeast (NNE) boundary are 8.8E-04 mSv (8.8E-02 mrem) and 6.4E-03 mSv (6.4E-01 mrem), respectively. The maximum effective dose equivalent and maximum annual organ (lung) dose equivalent from gaseous effluent to the nearest resident (teenager) located at least 8 km (5 mi) in any sector are expected to be less than 3.5E-05 mSv (3.5E-03 mrem) and 2.6E-04 mSv (2.6E-02 mrem), respectively.

The dose equivalent due to external radiation (skyshine and direct) from the Northern Cylinder Storage Pads and direct dose from product cylinders on the Full Product Cylinder Storage Pad is estimated to be less than 1.5E-02 mSv (1.5 mrem) to the maximally exposed person on the site boundary (2,000 hrs/yr), and less than 1E-12 mSv (less than 1E-10 mrem) to the maximally exposed resident (8,766 hrs/yr) located at least 8 km (5 mi) in any direction from EREF.

With respect to the impact from the transportation of UF_6 as feed, product, or depleted material and solid low level waste, the cumulative dose impact has been found to be small. The cumulative dose equivalent to the general public (persons living near a highway route) from the combination of all transport material categories combined equaled 1.5E-01 person-Sv/year (15 person-rem/year). Similarly, the dose equivalent to the onlooker (persons driving the highway

8.8 NONRADIOLOGICAL IMPACTS

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

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

Land-Use Impacts

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

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

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

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

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

An electrical transmission line that will provide the source of electrical feed to the EREF will be constructed entirely along privately-owned lands. The transmission will originate at an existing substation and replace an existing line, and then continues a short distance to the EREF property. To the extent possible, the new structures will be placed in the same locations as the existing structures along the existing line. In locations where the transmission structures cross agricultural and grazing land, title for the land within the right-of-way will normally remain with the landowner and activities such as farming and grazing could be continued on the property by the landowner. Transmission line structures will not interfere with existing center-pivot agricultural systems on the agricultural lands. In this way, land use impacts will be minimized.

Overall land use impacts to the site and vicinity will be changing the use from agriculture to industrial. However, a majority of the site (approximately 86%) will remain undeveloped, and the placement of most utility installations will be along highway easements. Therefore, the impacts to land use would be small.

Transportation Impacts

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

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

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

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

Water Resources

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

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

The Site Stormwater Detention Basins will collect stormwater runoff from areas of the facility that do not involve cylinder storage activities. These areas include parking lots, roofs, roads, and diversions from unaltered areas around the facilities. The detention basins will be unlined and designed to contain runoff for a volume equal to a 24-hour, 100-year return frequency rain storm of 5.70 cm (2.24 inch) rainfall. The combined total design capacity of the three basins, maintaining a freeboard of 0.6 m (2 ft), is approximately 32,835 m^3 (26.6 acre-ft). The basins will have approximately 49,000 m^3 (40.2 acre-ft) of storage capacity available with 0.3 m (1.0 ft) of freeboard for unlikely extreme events. They will also be designed to discharge post-construction peak flow runoff rates from the outfalls that are equal to or less than the pre-construction runoff rates from the site area.

Stormwater from the Cylinder Storage Pads will be discharged onsite to the two single-lined Cylinder Storage Pad Retention Basins. The ultimate disposal of the liquid effluent will be through evaporation of water and impoundment of the residual dry solids, if any, after evaporation. They are designed to contain runoff from a volume equal to two times the 24-hour, 100-year return frequency rain storm.

Daily treated domestic sanitary effluent will be discharged to a Domestic SSTP Basin. This basin will be designed to meet applicable state requirements for a two cell system.

In summary, the runoff control and water treatment systems incorporated into the facility design are expected to prevent impacts to the qualities of surface water and groundwater.

Ecological Resources

No communities or habitats that have been defined as rare or unique, or that support threatened or endangered species have been identified as occurring on the 1700-ha (4200-acre) EREF site. Thus, no proposed activities are expected to impact communities or habitats defined as rare or unique or that support threatened and endangered species within the site area.

Several practices and procedures have been designed to minimize adverse impacts to the ecological resources of the EREF site. These practices and procedures include the use of BMPs, i.e., minimizing the construction footprint to the extent possible, channeling site stormwater to temporary detention basins during construction, the protection of all unused naturalized areas, and site stabilization practices to reduce the potential for erosion and sedimentation. No special maintenance practices would be required to construct or operate the proposed EREF.

Historic and Cultural Resources

A pedestrian cultural resource survey of the 381-ha (941-acre) EREF site identified 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 State Historic Preservation Officer (SHPO) to recover significant information.

Given the small number of archaeological sites located in the study area, and no other projects within 16 km (10 mi) of the proposed EREF site, there would be no significant impact on historic and cultural resources.

Environmental Noise

Noise generated during construction of the proposed EREF footprint would be audible on adjacent properties, primarily north, east, southeast, and southwest of the proposed EREF footprint. (Section 4.7.1.1, Construction Impacts) While heavy construction would continue for about seven years, the impacts would be small since nearby land use is limited to grazing and

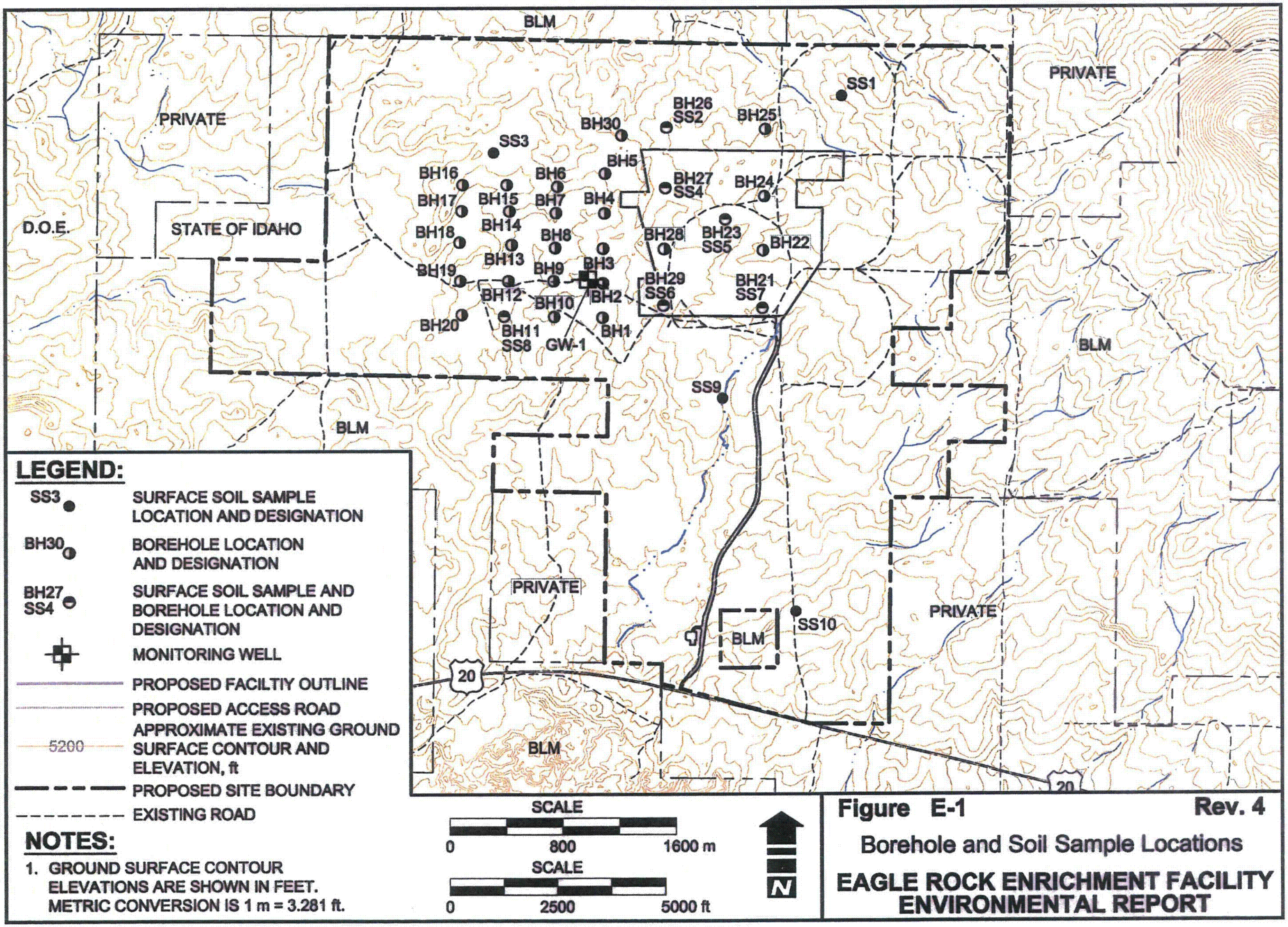


Figure E-1 Rev. 4

Borehole and Soil Sample Locations

EAGLE ROCK ENRICHMENT FACILITY ENVIRONMENTAL REPORT

the central post. Control valves, restrictor orifices, and controllers provide uniform flow of product and tails.

Depleted UF_6 exiting the cascades is transported from the high vacuum of the centrifuge for desublimation into cylinders at subatmospheric pressure. The primary equipment of the Tails Take-off System is the vacuum pumps and the Tails Low Temperature Take-off Stations (LTTS). Chilled air flows over cylinders in the Tails LTTS to effect the desublimation. Filling of the cylinders is monitored with a load cell system, and filled cylinders are transferred outdoors to the Northern Cylinder Storage Pad.

Enriched UF_6 from the cascades is desublimed in a Product Take-off System comprised of vacuum pumps, Product Low Temperature Take-off Stations (LTTS), UF_6 Cold Traps, and Vacuum Pump/Chemical Trap Sets. The pumps transport the UF_6 from the cascades to the Product LTTS at subatmospheric pressure. The heat of desublimation of the UF_6 is removed by cooling air routed through the LTTS. The product stream normally contains small amounts of light gases that may have passed through the centrifuges. Therefore, a UF_6 Cold Trap and Vacuum Pump/Trap Set are provided to vent these gases from the product cylinder. Any UF_6 captured in the cold trap is periodically transferred to another product cylinder for use as product or blending stock. Filling of the product cylinders is monitored with a load cell system, and filled cylinders are transferred to the Product Liquid Sampling System for sampling.

The Cylinder Preparation process includes the performance of certain tests and inspections on full or partially full cylinders and cylinders containing heels; evacuation of light gas in full, partially full, and empty cylinders; and reducing the heel quantities in cylinders using the Cylinder Evacuation System. The Cylinder Evacuation System provides conditioning through evacuation of 30B or 48Y cylinders that are new or cleaned empties, that contain a heel of UF_6, and less frequently, that are full or partially full of UF_6. A detailed description of these processes is provided in ISA Summary 3.5.18, Cylinder Preparation Processes.

Sampling is performed to verify product assay level ($^{w}/_{o}$ ^{235}U). The Product Liquid Sampling Autoclave is an electrically heated, closed pressure vessel used to liquefy the UF_6 and allow collection of a sample. The autoclave is fitted with a hydraulic tilting mechanism that elevates one end of the autoclave so that liquid UF_6 pours into a sampling manifold connected to the cylinder valve. After sampling, the autoclave is brought back to the horizontal position and the autoclave and cylinder are cooled down by a chiller unit mounted on the interior of the pressure vessel with the refrigerant compression and heat rejection components on the exterior.

AES customers may require product at enrichment levels other than that produced by a single Cascade Hall. Therefore, the plant has the capability to blend enriched UF_6 from donor cylinders of different assays into a product receiver cylinder. The Product Blending System is comprised of Blending Donor Stations for two donor cylinders and Blending Receiver Stations for the receiver cylinders. The Donor Stations are similar to the Solid Feed Stations described earlier. The Receiver Station is similar to the Low-Temperature Take-off Stations described earlier.

Support functions, including sample analysis, equipment decontamination and rebuild, liquid effluent treatment, and solid waste management are conducted in the Technical Support Building (TSB). Decontamination, primarily of pumps and valves, uses solutions of citric acid. Sampling includes a Mass Spectrometry Laboratory for verifying product UF_6 assay, and an Environmental Sampling, Storage, Preparation and Analysis Room. Liquid effluent is collected and treated using the Liquid Effluent Collection and Treatment System. There are no liquid discharges to the environment from this system.

- 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. 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 depleted uranium tails cylinders to the Northern Cylinder Storage Pad. The functions of the Cylinder Receipt and Shipping Building are:

- Loading and unloading of cylinders
- Preparation of cylinder overpack protective packaging, as required

Source material and SNM are used in this area.

Blending, Sampling and Preparation Building (BSPB)

The Blending, Sampling, and Preparation Building is adjacent to the UF_6 Handling Areas, Technical Support Building, and the Operation Support Building. The BSPB is shown in Figure 1.1-14.

The primary function of the BSPB is to provide means to fill ANSI N14.1 (ANSI, applicable version) 30B cylinders with UF_6 at a required ^{235}U enrichment level and to liquefy, homogenize and sample 30B cylinders prior to shipment to the customer. Sampling of 48Y cylinders for internal use are also sampled in the BSPB. The area contains the major components associated with the Product Liquid Sampling System and the Product Blending System. Cylinder activities including testing, weighing, conditioning, defrosting and inspection are performed in the BSPB. In addition, Cylinder Preparation and Cylinder Evacuation System processes are performed in the BSPB.

The Ventilated Room is also located within the BSPB. This room provides space for the maintenance of cylinders. The activities carried out within the Ventilated Room include contaminated cylinder pressure testing, cylinder pump out and valve maintenance. The Ventilated Room is under negative pressure. Therefore, any equipment or personnel entering this room must go through an air-lock.

Source material and SNM are used in this area.

Cylinder Storage Pads

The EREF uses several outside areas for storage of full cylinders containing UF_6 and for storage of empty cylinders. Cylinders containing UF_6 that is depleted in ^{235}U are temporarily stored on the Northern Cylinder Storage Pads which have the capacity to hold 25,718 full tail cylinders that are estimated to be generated during the facility's operating life. Full feed cylinders containing natural UF_6 will be temporarily stored on the Northern Cylinder Storage Pads prior to use in the facility. The pads are sized to store approximately 712 full feed cylinders. Full feed cylinders will not be stacked. Empty cylinders (feed, new and washed product, and tails) will be temporarily stored on the Northern Cylinder Storage Pads. The pads are sized to store approximately 1,840 empty cylinders. Empty cylinders can be stacked two high. The Northern Cylinder Storage Pads are at the north end of the facility and consist of multiple adjacent pads where cylinder types are arranged to provide the maximum flexibility from an operations perspective while still minimizing dose to operators from recently emptied cylinders. Full product cylinders containing enriched UF_6 will be temporarily stored on the Full Product Cylinder Storage Pad prior to shipment offsite to a fuel fabrication facility. Empty product cylinders containing UF_6 heels will be temporarily stored on the Full Product Cylinder Storage Pad prior to movement to the UF_6 Handling Area to be filled with product. The Full Product Cylinder Storage Pad is sized to store approximately 1,032 product cylinders. Full product cylinders and empty product cylinders containing UF_6 heels will not be stacked. The Full Product Cylinder Storage Pad is located near the Blending, Sampling, and Preparation Building adjacent to the Cylinder Receipt and Shipping Building.

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.

Visitor Center

A Visitor Center is located outside the security fence area near Highway 20.

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

Table 1.1-3 Estimated Annual Liquid Effluent
(Page 1 of 1)

Effluent	Typical Annual Quantities m^3 (gal)	Typical Uranic Content kg (lb)
Contaminated Liquid Process Effluents:		
Laboratory Effluent/Floor Washings/Miscellaneous Condensates	46.28 (12,226)	32 (70.5)[1]
Degreaser Water	7.42 (1,960)	37 (81.6)[1]
Spent Citric Acid	5.44 (1,437)	44 (98)[1]
Total Effluent Discharged[2] to Atmosphere by Evaporation via Liquid Effluent System Evaporator:	59.1(15,625)[2]	N/A[2]
Sanitary Waste:	18,653 (4,927,500)	None
Storm Water Discharge:		
Gross Discharge[3]	420,090 (110,976,000)	None

1. Uranic quantities are before treatment. Volumes for degreaser water and spent citric acid include process tank sludge.
2. Total annual effluents to atmosphere by evaporation via liquid effluent system evaporator is approximately 59,100 L (15,625 gal) with total uranic input approximately 114 kg (251 lb). Effluents are treated to remove uranic content by precipitation, filtration, and evaporation and discharged to atmosphere. The anticipated atmospheric distillate release is expected to be < 0.356 g/yr (1.26E-03 oz/yr) of total uranium. The EREF design precludes operational process discharges from the plant to surface or groundwater.
3. Maximum gross discharge is based on total annual mean precipitation falling on the developed site area associated with runoff to the Site Storm Water Detention Basins and the Cylinder Storage Pads Storm Water Retention Basins, neglecting infiltration into the site soil and evaporation.

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
4800 Hampden Lane
Bethesda, Maryland 20814

1.2.1.2 Organization and Management of Applicant

AREVA Enrichment Services (AES), LLC 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 NC Inc. AREVA NC Inc. is a wholly owned subsidiary of AREVA NC SA 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)	73.03%
• French State	10.17%
• Caisse des dépôts and et consignations	3.32%
• CA CIB	0.89%
• Electricité d 'France	2.24%
• Public	4.01%
• Framepargne	0.35%
• Kuwait Investment Authority	4.82%
• Group Total	0.95%
• AREVA Treasury Shares	0.22%
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. Jacques Besnainou
  President and Chief Executive Officer of AREVA NC Inc
  Chief Executive Officer of AREVA Inc
  4800 Hampden Lane, Bethesda MD 20814, USA

  Mr. Besnainou is a citizen of France and a citizen of the United States of America.

2.0 ORGANIZATION AND ADMINISTRATION

This chapter describes the management system and administrative procedures for the effective implementation of Health, Safety, and Environmental functions at the Eagle Rock Enrichment Facility (EREF). The chapter presents the organizations responsible for managing the design, construction, operation, and decommissioning of the facility. The key management and supervisory positions and functions are described including the personnel qualifications for each key position at the facility.

Areva Enrichment Services (AES), LLC, a wholly owned subsidiary of Areva NC Inc., has been formed to provide uranium enrichment services for nuclear power plants and to design, construct and operate EREF. The AES policy is to maintain a safe work place for its employees and to assure operational compliance within the terms and conditions of the license and applicable regulations. The AES President has overall responsibility for safety and compliance to this policy. In particular, AES employs the principle of keeping radiation and chemical exposures to employees and the general public as low as reasonably achievable (ALARA).

The facility organization, technical qualifications, procedures, and management controls in this license application are similar to those submitted for Nuclear Regulatory Commission (NRC) review in the LES license application for the National Enrichment Facility (NEF) (LES, 2005). The staff reviewed the NEF plans and commitments and concluded in the Safety Evaluation Report (SER) (NRC, 2005) that they provided reasonable assurance that an acceptable organization, administrative policies, and sufficient competent resources were established or committed, to satisfy the applicant's commitments for the design, construction, and operation of the facility per 10 CFR 30.33, 10 CFR 40.32, 10 CFR 70.22, 10 CFR 70.23, and 10 CFR 70.62(d). (NRC, 2005). The differences between the EREF and NEF organizations reflect AREVA's experience in operating fuel cycle facilities. Although some titles and scope of responsibility have been changed, the functions to be performed remain the same. The key differences in the EREF and NEF organization as described in the license application reviewed by the NRC in the referenced SER are as follows:

- Organization charts are provided in the Quality Assurance Program Description (QAPD) for the engineering, procurement and construction (EPC) phase and for the operations phase. During engineering, procurement and construction, the scope and size of the staff reporting to the Project Director will be consistent with his overall responsibility for the engineering, construction and startup of the facility. Engineering and construction personnel will be integrated into the Operations organization to provide technical support during initial startup of the facility and transition into the operational phase. As the facility nears completion, systems will undergo acceptance testing as required by procedure, followed by turnover from the construction organization to the operations organization. Once operational, the Project Manager will be responsible for the engineering, procurement, construction and startup of any facility modifications and expansion.
- The Quality Assurance Manager and the Safety Review Committee report directly to the AES President rather than the Plant Manager.
- The position of Radiation Protection/Chemistry Manager reporting to the Environmental, Health, Safety and Licensing Manager is established at the EREF with the overall responsibility for the implementation of EREF programs designed to ensure the protection of workers and the public from radiological and non-radiological chemical exposures.

- Divergent impacts of IROFS. Assurance must be provided that the negative impacts of an IROFS, if any, do not outweigh the positive impacts; i.e., to ensure that the application of an IROFS for one safety function does not degrade the defense-in-depth of an unrelated safety function.
- Other safety and mitigating factors that do not achieve the status of IROFS that could impact system performance.
- Identification of scenarios, events, or event sequences with multiple impacts, i.e. impacts on chemical safety, fire safety, criticality safety, and/or radiation safety. For example, a flood might cause both a loss of containment and moderation impacts.
- Potential interactions between processes, systems, areas, and buildings; any interdependence of systems, or potential transfer of energy or materials.
- Major hazards or events, which tend to be common cause situations leading to interactions between processes, systems, buildings, etc.

The potential for an external off-site wildland fire was dismissed as a non-credible threat to the facility. The topography as summarized from the facility Environmental Report is a mix of agricultural land, rangeland and barren. The agricultural vegetation consists of low grasses, predominantly crested wheatgrass and cheatgrass and the rangeland vegetation is dominated by Wyoming big sagebrush, dwarf goldenbush, and Sandberg bluegrass. All of these forms of vegetation are characterized by low density and low height with mean heights well below 1 m (3.3 ft).

The closest point of approach for any exterior UF_6 handling area is for the Northern Cylinder Storage Pads, which are approximately 30 m (100 ft) inside the controlled area boundary. The UF_6 cylinders that will be stored on these pads are protective against fires of a severity required for interstate transportation – an 800ºC (1,472ºF), 30-minute engulfing fire. All process structures are built of non-combustible materials with composite built-up roofing. The closest approach of a process structure to the security fence is about 213 m (700 ft). It is not credible for the rangeland or agricultural vegetation proximate to the EREF site to reach a fire severity that will threaten a process structure or cylinder storage area. On-site landscaping will be developed and maintained to ensure no fire hazardous configurations are introduced and any land use within the owner controlled property will similarly be managed to ensure no fire hazardous conditions are allowed to develop due to land use.

3.1.2 Process Hazard Analysis Method

As noted above, the HAZOP method was used to identify the process hazards. The HAZOP process hazard analysis (PHA) method is consistent with the guidance provided in NUREG-1513 (NRC, 2001a). Implementation of the HAZOP method was accomplished by either validating the Enrichment Technologies (ETC), the EREF process system vendor, HAZOPs for the EREF design or performing a new HAZOP for systems where there were no existing HAZOPs. In general, new HAZOPs were performed for the Technical Support Building (TSB) systems; Blending Sampling and Preparation Building (BSPB) systems; Cylinder Receipt and Shipping Building (CRSB) systems; and for UF_6 material handling systems. The new HAZOPs performed for the BSPB, CRSB, and UF_6 material handling systems represents an expansion of new HAZOPs performed compared with the NEF. In cases where there was an existing HAZOP, the ISA Team, through the validation process, developed a new HAZOP.

For the UF_6 process systems, this portion of the ISA was a validation of the HAZOPs provided by ETC. The validation process involved workshop meetings with the ISA Team. In the

- The BSPB is designed to meet the construction type, occupancy and exiting requirements of the IBC (ICC, 2006).
- Load bearing walls, columns, floors, and roof construction of the BSPB will have a fire-resistance rating consistent with Type I-B requirements.
- The Blending, Sampling, Preparation Building superstructure is designed to resist the normal load conditions as defined by the IBC (IBC, 2006) and the Extreme Environmental Loads as defined by the ISA Summary.
- The Northern Cylinder Storage Pads, the Full Product Cylinder Storage Pad, and the Cylinder Overpack Storage Pad are designed to resist the normal load conditions as defined by the IBC (ICC, 2006).
- The Electrical Services Building is designed to meet the construction type, occupance and exiting requirements of the IBC (ICC, 2006).
- The Electrical Services Building superstructure is designed to resist the normal load conditions as defined by the IBC (ICC, 2006), using structural steel framing.
- The Electrical Services Building for the Centrifuge Assembly Building is designed to meet the construction type, occupancy and exiting requirements of the IBC (ICC, 2006).
- The Electrical Services Building for the Centrifuge Assembly Building superstructure is designed to resist the normal load conditions as defined by the IBC (ICC, 2006) using structural steel framing.
- 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.
- The Visitor Center will be a commercial building constructed to the provisions of the local building code.

- Normal Snow Loads (S) on roofs and other exposed surfaces for all structures including snow drifts, sliding snow, unbalanced snow, and rain on snow loads, are determined in accordance with the IBC (ICC, 2006), Section 1603 which invokes the snow load design requirements in Chapter 7 of ASCE 7-05 (ASCE, 2005a).
- Extreme Environmental Snow Loads on roofs of buildings listed above is based on a Ground Snow Load (p_g) of 309 kg/m^2 (63.2 lb/ft^2).
- The roof drainage systems (including secondary roof drainage path) will be designed such that the amount of rainfall that can collect on the roof does not exceed the design load for the roof.
- Roofs will be designed so as to not pond water to a depth during the extreme local precipitation that could exceed the Extreme Environmental Rainfall which is equivalent to the 24-hour extreme local precipitation estimate of 112 mm (4.39 in).
- The following features apply to the SBM, TSB, CRSB and BSPB:
  - Since the sloped roof design precludes any significant ponding on the roofs, any leaks into the building through the roof liner would not be significant due to small hydrostatic driving heads of any water on the roof. The layouts in the SBMs, CRSB and BSPB are very open designs which would result in significant spreading out any precipitation leaking into the buildings. The layout in the TSB provides for smaller rooms spread over three floors. The individual rooms are interconnected through many doors. Any leaks into the building through the roof liner would disperse from room to room and floor to floor without any significant ponding in any of the individual rooms.
  - The facility floor levels will be set 0.15 m (6 in) above the finished outside adjacent grade. Finished grading will slope away from buildings preventing any accumulations/ponding of precipitation from roof run-off or sheet flow of storm water against the buildings. At roof access doors, the door threshold is set at least 0.15 m (6 in) above the top of the roofing material.
- The Northern Cylinder Storage Pads, and Full Product Cylinder Storage Pad are designed to drain excess precipitation, thereby precluding any significant ponding due to extreme precipitation.Load combinations for concrete structures are based on ASCE 7-05 (ASCE, 2005a) and ACI 318-05 (ACI, 2005a). Additional load combinations for concrete structures listed above are based on ACI 349-06 (ACI, 2006).
- All concrete structures are designed using ACI Strength Design Methods: ACI 349-06 (ACI, 2006) for concrete structures and components listed above and ACI 318-05 (ACI, 2005a) for all other concrete structures.
- Load combinations for steel structures for all buildings are based on ASCE 7-05 (ASCE, 2005a). Additional load combinations applicable to steel structures and components listed above are based on AISC N690-06 (AISC, 2006).
- All structural steel is designed using the AISC Methods (ADS or LRFD) provided in AISC 360-05 (AISC, 2005a). Structural steel for structures listed above is designed using the AISC Methods (ADS or LRFD) provided in AISC N690-06 (AISC, 2006).
- Load combinations for masonry walls are based on ASCE 7-05 (ASCE, 2005a) and ACI 530-05 (ACI, 2005b).
- Masonry walls are designed using either the Allowable Stress Method or Strength Design Method in ACI 530-05 (ACI, 2005b).

7.2 FIRE HAZARDS ANALYSIS

A Fire Hazards Analysis (FHA) has been conducted evaluating fires at the facility which, if uncontrolled, could cause a release of UF_6 in quantity and form that may result in an intermediate or high consequence, as defined in 10 CFR 70.61 (CFR, 2008d). UF_6 is present in sufficient quantity for this to occur in the following areas: Separations Building Modules (SBM), Cylinder Receipt and Shipping Building (CRSB), UF_6 Handling Areas, Technical Support Building (TSB), Blending, Sampling and Preparation Building (BSPB), Trailer Parking, Full Product Cylinder Storage Pad, and Northern Cylinder Storage Pads.

The FHA develops bounding credible fire scenarios and then assesses the consequences of unmitigated fire.

The FHA for the facility consists of the following:

- A description of the facility's use and function
- The boundaries of fire areas
- The specific fire hazards and potential fire scenarios within the fire areas
- The methods of consequence analysis
- The occupancy and construction requirements
- Life safety requirements
- IROFS required for postulated fire scenarios within the fire area
- Methodology for evaluating the impact of fire on IROFS
- The facility response to fires
- Defense or mitigation strategy for overall facility protection.

The results of the FHA are utilized in the Integrated Safety Analysis (ISA) to identify possible fire initiators and accident sequences leading to radiological or toxic chemical consequences resulting from fire interaction on UF_6 or UF_6 byproducts.

The FHA is updated and controlled by configuration management as discussed in Chapter 11, Management Measures, to ensure that the information and analysis presented in the FHA are consistent with the current state of the facility. The FHA is reviewed and updated as necessary to incorporate significant changes and modifications to the facility, its processes, or combustible inventories.

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)
- Visitor Center
- Guard House
- Administration Building
- Security and Secure Administration Building
- Long and Short-Term Warehouses
- 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 Visitor Center, Security Buildings, Administration Building, Warehouses, 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).

containment configuration will be addressed during the detailed design phase and the Safety Analysis Report will be revised, as appropriate. Water runoff from the Full Product Cylinder Storage Pad and Northern Cylinder Storage Pads will be collected in the Cylinder Storage Pads Stormwater Retention Basins. Liquid effluent monitoring associated with the Cylinder Storage Pads Stormwater Retention Basins is discussed in the Environmental Report.

7.3.7 Lightning Protection

Lightning protection for the facility is in accordance with NFPA 780 (NFPA, 2008d).

7.3.8 Criticality Concerns

Criticality controls will be provided by employing the basic principals of criticality safety. The premise of nuclear criticality prevention is that at least two, unlikely, independent, and concurrent changes in process conditions must occur before a criticality accident is possible. This double contingency principal is described in ANSI/ANS-8.1-1998 (ANSI, 1998). Controls or systems of controls are used to limit process variables in order to maintain safe operating conditions.

Moderation control is applied for criticality safety of UF_6 at the EREF. Automatic sprinkler systems will be provided in all process-related structures where required by the FHA. Credited fire resistance-rated barriers and 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. These systems are designed consistent with moderator control limitations to satisfy criticality safety criteria. The EREF FHA contains a methodology for the comparative evaluation of fire risk versus criticality risk for areas where moderator control is required. The methodology consists of decision-making hierarchy which systematically evaluates: 1) in-situ combustible quantities/configuration, 2) presence of transient combustibles, 3) presence of ignition sources, 4) presence of fissile materials, their quantity and configuration, 5) potential for water ingress in fissile containers, 6) potential to impact critically safe attributes (geometry, shapes, arrays, etc.), 7) reflection from external water spray, and 8) barriers that prevent inadvertent moderator introduction including their resilience under applicable design basis events. The completed analyses will be reviewed and approved by a criticality safety engineer.

Where double contingency principle cannot be satisfied (e.g., where fire might initiate a sprinkler activation concurrent with causing a leak in an enriched UF_6 vacuum piping system) or water is otherwise determined unacceptable by analysis, automatic sprinkler protection will be omitted or limited in coverage to ensure criticality safety is maintained or alternate fire protection measures will be taken. Figure 7.5-2 identifies those structures where sprinklers are proposed and moderator control is required. Nuclear Criticality Safety Analyses (NCSAs) will be performed to determine the specific moderator control attributes and sprinkler limitations.

With respect to fire hose streams, procedures and training for both onsite fire brigade and offsite fire department emphasize the need for moderator control in these areas. A criticality safety officer will be present anytime fire hose streams are to be deployed in a moderator control area. See Section 7.5 for additional information.

Fire protection concerns are also addressed in the moderation control areas by the fire protection program. The program includes administrative controls which limit the transient and in situ combustibles, controls ignition sources in these areas, and isolates these areas from other areas of the plant with appropriately rated fire barriers to preclude fire propagation to or from these areas. There are automatic detection and manual alarm systems located in these areas to ensure prompt response. Those elements of the fire protection program that are

7.3.11 Environmental Concerns

Radiological and chemical monitoring and sampling will be performed as specified in EREF Environmental Report, Chapter 6, Environmental Measurements and Monitoring Programs, on the contaminated and potentially contaminated facility liquid effluent discharge including water used for fire fighting purposes. Surface water runoff will be diverted into water collection basins. Water runoff from the Full Product Cylinder Storage Pad and Northern Cylinder Storage Pads will be collected in the Cylinder Storage Pads Stormwater Retention Basins. Water runoff from the remaining portions of the site will be collected in the Site Stormwater Detention Basins.

7.3.12 Physical Security Concerns

In no cases will security requirements prevent safe means of egress as required by the NFPA 101 (NFPA, 2006b) and the IBC (ICC, 2006).

The Physical Security Plan (PSP) addresses the establishment of permanent and temporary Controlled Areas. The PSP identifies the ingress and egress methodology during both normal and emergency conditions. This includes emergency response personnel both onsite and offsite. Two means of access to the site are provided, one via one of the two controlled gates continuously manned by Security and the other via designated emergency access gates (i.e., crash gates). Refer to the PSP for additional details.

7.3.13 Baseline Design and Defense-in-Depth

The FHA and the ISA demonstrate that the design and construction of the facility complies with the baseline design criteria (BDC) of 10 CFR 70.64(a) (CFR, 2008e), the defense-in-depth requirements of 10 CFR 70.64(b) (CFR, 2008e) and are consistent with the guidance provided in NFPA 801 (NFPA, 2008e). The design provides for adequate protection against fire and explosion by incorporating defense-in-depth concepts such that health and safety are not wholly dependent on any single element of the design, construction, maintenance or operation of the facility. This is accomplished by achieving a balance between preventing fires from starting, quickly detecting, controlling and promptly extinguishing those fires that do occur and protecting structures, systems and components such that a fire that is not promptly extinguished or suppressed will not lead to an unacceptable consequence.

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 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,

DEFINITIONS

ASME NQA-1: Use of American Society of Mechanical Engineers (ASME) NQA-1 in this QAPD is used as guidance and not as a commitment to ASME NQA-1.

Basic Component for QA Level 1 and QA Level 2 applications: As stated in the NRC exemption (Ref. 20.1), a Basic Component means a structure, system, or component or part thereof that affects their IROFS function that is directly procured by the licensee or activity subject to the regulations in Part 70; and in which a defect or failure to comply with any applicable regulation in this chapter, order, or license issued by the Commission could create a substantial safety hazard (i.e., exceed performance requirements of 10 CFR 70.61). In all cases, Basic Components include IROFS-related design, analysis, inspection, testing, fabrication, replacement parts, or consulting services that are associated with the component hardware; whether these services are performed by the component supplier or others.

Basic Component for QA Level FP applications: A Basic Component means a structure, system, or component or part thereof that affects their IROFS function may be procured by a Part 70 Licensee or a Licensee approved supplier directly from a commercial entity if: 1) the SSC is manufactured to an established, acceptable national code or standard that includes one or more independent product endorsements based on qualification testing or periodic testing of selected characteristics of the component except in cases where such listing/approval is not required by code/standard; and 2) the acceptability of the SSC safety function can be confirmed by the Licensee or Licensee approved supplier via performance of receipt inspections, in-process installation inspections and functional testing of active components prior to use as a basic component. Once the acceptability of the SSC has been determined and the SSC has been designated for use as a Basic Component, the licensee accepts responsibility for reporting under the requirements of 10CFR Part 21.

Commercial Grade Item: As stated in the NRC exemption (Ref. 20.1), a Commercial Grade Item means a structure, system, or component, or part thereof that affects its Items Relied on for Safety (IROFS) function that was not designed and manufactured as a basic component. Commercial grade items do not include items where the design and manufacturing process require in-process inspections and verifications to ensure that defects or failures to comply are identified and corrected (i.e., one or more critical characteristics of the item cannot be verified).

Critical Characteristics: As stated in the NRC exemption (Ref. 20.1), Critical characteristics are those important design, material, and performance characteristics of a commercial grade item that, once verified, will provide reasonable assurance that the item will perform its intended IROFS function.

Dedicating Entity: As stated in the NRC exemption (Ref. 20.1), Dedicating Entity means the organization that performs the dedication process. Dedication may be performed by the manufacturer of the item, a third party Dedicating Entity, or the licensee itself. The Dedicating Entity, pursuant to 10 CFR 21.21(c), is responsible for identifying and evaluating deviations, reporting defects and failure to comply for the dedicated item, and maintaining auditable records of the dedication process. In cases where the Licensee applies the Commercial Grade Item procurement strategy and performs the dedication process, the Licensee would assume full responsibility as the Dedicating Entity.

2.0 QUALITY ASSURANCE PROGRAM

2.1 QA elements of this section are applied to IROFS and SSCs that could interact with IROFS due to a seismic event, to assure they will be available and reliable in performing their safety functions when needed. Subcomponents of QA items may be classified, through engineering procedures, at different QA Levels based on their critical attributes. This classification QA Levels are established as follows:

Level	Description
QA Level 1	QA Level 1 items include those items whose failure or malfunction could directly result in a condition that adversely affects public, worker and the environment as described in 10 CFR 70.61. The failure of a single QA Level 1 item could result in a high or intermediate consequence. For IROFS that contain a Safe-by-Design attribute, only the attribute (diameter, volume, slab thickness or physical arrangement) is considered to be QA Level 1.
QA Level 2	QA Level 2 items include those items whose failure or malfunction could indirectly result in a condition that adversely affects public, worker and the environment as described in 10 CFR 70.61. The failure of a QA Level 2 item, in conjunction with the failure of an additional item, could result in a high or intermediate consequence. All building and structure IROFS associated with credible external events are QA Level 2. QA Level 2 items also include those attributes of items that could interact with IROFS due to a seismic event, and result in high or intermediate consequences as described in 10 CFR 70.61.
QA Level 3	QA Level 3 items include those items that are not classified as QA Level 1 or QA Level 2 or QA Level FP. QA Level 3 items are controlled in accordance with standard commercial practices.
QA Level FP	QA Level FP items include credited fire resistance-rated barriers and 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.

2.2 The following applicable requirements are associated with each of the QA Levels as described below:

2.2.1 QA Level 1:

- Design documentation to verify review and approval of new designs and modifications to existing designs.
- Results of reviews, audits, and monitoring of work performance.
- Documentation to verify review and approval of qualified vendors.

- Certification of procured items as meeting applicable NFPA code/standard requirements (i.e., listed and/or approved).

- Receipt inspection shall be conducted by qualified personnel using checklists prepared from the procurement documents governing QA Level FP Items and the associated NFPA codes and standards, as applicable.

- Components required to be UL listed and/or FM Approved will be confirmed at receipt against current UL Fire Protection Equipment Directory or FM Approval Guides, as appropriate.

- Components not required to be UL listed and/or FM Approved (e.g., piping) will be confirmed at receipt against the applicable design and/or manufacturing standard (i.e., applicable ASTM, ISO, or other standard).

- Post installation testing shall be performed, when needed, to verify specified performance requirements as defined in procurements documents have been satisfied. If post installation testing is required for final acceptance, receipt inspection will apply appropriate status indicators on the item as required by Section A.2.13 of this appendix to ensure the item is clearly identified as requiring "Post Installation Testing."

A.2.7 Section 8.0 Identification and Control of Items

Section 8.0 of the QAPD is applicable.

A.2.8 Section 9.0 Control of Special Processes

Section 9.0 of the QAPD is applicable.

It is not expected that Special Processes will be required. However, if any Special Processes become necessary, AES will develop qualified procedures consistent with NFPA Code requirements, approved by qualified QA and FP representatives prior to performance.

A.2.9 Section 10.0 Inspection

Section 10.0 of the QAPD is applicable.

Factory acceptance, installation, and field acceptance testing and/or commissioning of QA Level FP IROFS will be conducted using written, approved procedures and incorporating the requirements of the applicable NFPA Code/Standard, National Standard or International Building Code for the component(s) under test or being commissioned as described in Chapter 7 of the Safety Analysis Report.

Ongoing surveillance, inspection, test and maintenance of QA Level FP IROFS will be conducted using written, approved procedures following the requirements of the NFPA Code/Standard, National Standard or International Building Code for the respective component(s) and at the code specified frequencies as described in Chapter 7 of the Safety Analysis Report.