NUREG-1773

Environmental Impact Statement for the Proposed Idaho Spent Fuel Facility at the Idaho National Engineering and Environmental Laboratory in Butte County, Idaho

Final Report

U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards
Washington, DC 20555-0001

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AVAILABILITY NOTICE

ABSTRACT

The U.S. Department of Energy (DOE) has contracted with Foster Wheeler Environmental Corporation (FWENC) to design, construct, and operate the proposed Idaho Spent Fuel Storage Facility that would repackage and store spent nuclear fuel and associated radioactive material from the Peach Bottom Unit 1 High-Temperature Gas-Cooled Reactor, the Shippingport Atomic Power Station, and various Training, Research, and Isotope reactors built by General Atomics (TRIGA reactors). The proposed facility would be located at the DOE Idaho National Engineering and Environmental Laboratory (INEEL). The proposed facility is part of a Settlement Agreement, dated October 17, 1995, between the DOE, the U.S. Navy, and the State of Idaho regarding waste removal and environmental cleanup at the INEEL. Additionally, the proposed facility would be licensed as an independent spent fuel storage installation in accordance with U.S. Nuclear Regulatory Commission (NRC) regulations found at 10 CFR Part 72.

This environmental impact statement (EIS) was prepared in compliance with the National Environmental Policy Act (NEPA), the NRC regulations for implementing NEPA, and the guidance provided by the Council on Environmental Quality regulations implementing the procedural provisions of NEPA. This EIS evaluates the potential environmental impacts of the proposed action and its reasonable alternatives, describes the environment potentially affected by the proposal, presents and compares the potential environmental impacts resulting from the proposed action and its alternatives, and describes mitigation measures.

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EXECUTIVE SUMMARY

BACKGROUND

The U.S. Nuclear Regulatory Commission (NRC) is considering whether to issue a license, pursuant to 10 CFR Part 72, that would result in construction and operation of an independent spent nuclear fuel storage installation (ISFSI) at the Idaho National Engineering and Environmental Laboratory (INEEL) in southeast Idaho. This action would be taken in response to an application filed with the NRC by the Foster Wheeler Environmental Corporation (FWENC) on November 19, 2001. To support its licensing decision on the proposed Idaho Spent Fuel Facility, NRC determined that an environmental impact statement (EIS) is required by the NRC National Environmental Policy Act (NEPA)-implementing regulations in 10 CFR Part 51.

During the last 40 years, the U.S. Department of Energy (DOE) and its predecessor agencies have generated, transported, received, stored, and reprocessed spent nuclear fuel (SNF) at DOE facilities nationwide. Part of this SNF originated from non-DOE domestic licensed facilities, including training, research, and test reactors at universities; commercial reactors; and government-owned installations, including U.S. Navy reactors for which DOE has contractual obligations to accept SNF. Most of the SNF at INEEL, originally destined for reprocessing, is currently stored in conditions acceptable only for short-term storage. Current storage at INEEL consists of aging above-ground facilities, including wet storage pools, and dry underground storage facilities. The potential for deterioration and leakage of current SNF storage facilities is a concern due to their location over the Snake River Plain Aquifer, a major water source for the region.

A Settlement Agreement dated October 17, 1995, among the DOE, the U.S. Navy, and the State of Idaho established schedules for SNF and radioactive waste management activities at INEEL, including, among other things, the transfer and dry storage of SNF until it can be removed from Idaho. As part of the DOE effort to meet terms of this 1995 Settlement Agreement, DOE contracted with FWENC to design, license, construct, and operate the proposed ISFSI at INEEL to provide interim dry storage for portions of the SNF currently in storage. The SNF to be stored at the proposed ISFSI includes SNF resulting from operation of the Peach Bottom Unit 1 nuclear power reactor, which was licensed by the Atomic Energy Commission and operated between 1966 and 1974. SNF from the Shippingport Light Water Breeder Reactor, which ceased operation in 1982, and SNF from training, research, and isotope research reactors built by General Atomic (TRIGA reactors) are also to be stored at the proposed ISFSI.

In 1995, DOE published a record of decision based on NEPA analyses associated with its SNF management program. One project to manage SNF at INEEL is described in the record of decision as a dry fuel storage facility to accommodate receipt and storage of various fuel types currently in inventory at INEEL and the fuels projected to be received. The ISFSI proposed by FWENC is designed to meet these requirements for dry fuel storage. The proposed Idaho Spent Fuel Facility, which this EIS addresses, would be located on the INEEL property adjacent to the Idaho Nuclear Technology and Engineering Center (INTEC) facilities.

THE PROPOSED ACTION

The proposed action considered in this EIS is the construction, operation, and decommissioning of an ISFSI. On November 19, 2001, FWENC filed an application with NRC for a license to receive, package, transfer, and store SNF at an ISFSI at the INEEL in Butte County, Idaho. This new installation, if approved, will be situated on a 3.2-ha [8-acre] site located adjacent to the INTEC facility, about 4.8 km [3 mi] north of the INEEL Central Facilities Area. The proposed Idaho Spent Fuel Facility would be designed, constructed, and operated by FWENC per contract to DOE. DOE has leased the site to FWENC for the planned operating life of the installation.

The proposed Idaho Spent Fuel Facility would store SNF and process associated radioactive material such as steel and aluminum cylinders and other internal support structures from the Peach Bottom Unit 1 High-Temperature, Gas-Cooled Reactor; the Shippingport Light Water Breeder Reactor; and various TRIGA reactors. All the commercial SNF (Peach Bottom and Shippingport) and slightly more than two-thirds (1,100 of 1,600 elements) the TRIGA SNF is currently stored within INTEC. Potential locations for the remaining TRIGA fuel and potential environmental impacts of its transport to INEEL have previously been evaluated by DOE in an earlier programmatic EIS for SNF management and documented in the DOE records of decision.

If NRC approves the FWENC license application, DOE would transfer the SNF to the proposed Idaho Spent Fuel Facility when that facility becomes operational. These transfers would occur completely within the boundaries of the INEEL site and would comply with INEEL procedures and DOE requirements. On arrival at the proposed Idaho Spent Fuel Facility, the SNF would be (i) removed from the containers in which it is currently stored, (ii) visually inspected, (iii) inventoried, (iv) placed into new storage containers, and (v) placed into interim storage. The storage containers are intended to be packaged for transportation and shipped to a repository when it becomes available. The potential environmental impacts of onsite SNF transfers within INEEL have been documented by DOE in earlier NEPA documents, and the DOE Idaho Operations Office will use an environmental checklist to verify whether the actual impacts are within the expected range.

If approved, the proposed Idaho Spent Fuel Facility would receive, repackage, and provide interim dry storage for

- 1,601.5 elements of Peach Bottom reactor SNF;
- 2,971 rods of Shippingport reactor SNF; and
- About 1,600 elements of TRIGA SNF.

The Peach Bottom and Shippingport reactors ceased operations in 1974 and 1982. Because of the lengthy cooling period since final operation, these fuels produce relatively low decay heat compared to typical commercial SNF. The TRIGA SNF originated from TRIGA reactors worldwide. Although the age of the TRIGA SNF varies, the SNF generates low decay heat because of the design and operational characteristics of the TRIGA reactors.

PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose and need for the proposed Idaho Spent Fuel Facility are to implement, in part, that portion of the DOE SNF management and INEEL record of decision concerning construction of a dry SNF storage facility. This facility also would allow DOE to satisfy, in part, its commitments in the 1995 Settlement Agreement to procure dry storage facilities to replace wet storage, below-ground facilities, prepare SNF for disposal, and complete removal of all SNF from the state by 2035. These objectives would be accomplished at the proposed Idaho Spent Fuel Facility by

- Receiving SNF generated at the Peach Bottom Unit 1 High-Temperature Gas-Cooled Reactor; the Shippingport Light Water Breeder Reactor, and various TRIGA reactors;

- Transferring SNF from the current DOE storage facilities at INTEC into new storage containers; and

- Placing the storage containers into an ISFSI licensed by NRC per 10 CFR Part 72.

Additionally, DOE specified the canister dimensions in its original request for proposal for the construction of the proposed Idaho Spent Fuel Storage Facility to meet the anticipated criteria of a national high-level waste (HLW) geologic repository and facilitate eventual removal of the SNF from the proposed Idaho Spent Fuel Facility and INEEL.

ALTERNATIVES

The DOE effort to manage the national issue of SNF involved evaluation of many national alternatives: No Action, Decentralization, 1992/1993 Planning Basis for INEEL and the Savannah River site, Regionalization, and Centralization. The 1995 DOE programmatic SNF EIS identified Regionalization by Nuclear Fuel Type as the preferred national SNF management alternative. Consistent with these national alternatives, alternatives considered for the INEEL environmental restoration and waste management program included No Action; Ten-Year Plan; Minimum Treatment, Storage, and Disposal; and Maximum Treatment, Storage, and Disposal. In its record of decision, DOE designated Regionalization by Nuclear Fuel Type as the preferred programmatic alternative for management of SNF. The record of decision also announced the DOE decision to implement a modified version of the Ten-Year Plan, including construction of a dry fuel storage facility and other site-specific environmental restoration and waste management actions at INEEL. The proposed Idaho Spent Fuel Facility is considered by DOE to implement the dry fuel storage facility identified in the modified Ten-Year Plan.

In addition to the proposed action to construct the Idaho Spent Fuel Facility, this EIS includes analysis of the no-action alternative. Under the no-action alternative, NRC would not approve the FWENC license application, and the proposed Idaho Spent Fuel Facility would not be built. DOE would continue to store the SNF from the Peach Bottom Unit 1 High-Temperature, Gas-Cooled Reactor, the light water breeder reactor spent fuel from the Shippingport Light Water Breeder Reactor, and the TRIGA reactor SNF at their current locations within INTEC. Remaining TRIGA reactor fuel would continue to be shipped and stored at INEEL as identified in previous DOE records of decision. As necessary, the current storage facilities would be modified to accommodate the extended storage time. Other SNF activities would continue as described in the 1995 DOE programmatic SNF EIS. Other activities at the INTEC facility would continue as described in other DOE NEPA analyses.

Dry fuel storage is the alternative preferred by DOE for SNF consolidation and management at INEEL. In developing design criteria for the proposed dry storage facility at INEEL, DOE specified operational performance characteristics and specific design criteria such as container dimensions, year-round operation, storage containers that can be transported by truck or rail, personnel and public exposure limits, and minimization of decommissioning activities. In evaluating design approaches, DOE considered both cost and value to the government. Based on these objectives and criteria, DOE selected the FWENC design for the proposed Idaho Spent Fuel Facility. Other alternatives to dry storage considered in previous DOE NEPA analyses either did not meet programmatic objectives or did not meet terms of the 1995 Settlement Agreement. Based on previous DOE and NRC NEPA analyses and comments received during the public scoping period, the proposed action alternative and the no-action alternatives are likely to bound the impacts of dry fuel storage at INEEL, and only these alternatives are evaluated in this EIS.

POTENTIAL ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

Potential environmental impacts of the proposed action and the no-action alternatives are evaluated in this EIS and summarized in the following paragraphs. Detailed discussion of the potential impacts is included in Section 4 of this EIS. The environmental impacts from the proposed action are generally small and will be mitigated by methods described in Section 5. Monitoring methods are described in Section 6.

The NRC has established guidance for assessing environmental impacts at one of three significance levels:

<u>Small Impact</u>: The environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

<u>Moderate Impact</u>: The environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

<u>Large Impact</u>: The environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

Land Use

<u>Small Impact</u>. Construction activities associated with the proposed Idaho Spent Fuel Facility would occur on a 3.2-ha [8-acre] facility site and an adjoining 4.1-ha [10-acre] laydown area. The 7.3 ha [18 acres] are adjacent to INTEC, a large existing industrial facility at INEEL. The proposed site is currently in use as a laydown area and has been disturbed previously by other construction activities and land uses. Operational impacts include restricted access to the 3.2-ha [8-acre] facility site and the use of the site for SNF receiving, packaging, and storage.

Transportation

<u>Small Impact</u>. Operational impacts are related to transfer of the currently stored SNF at INTEC, distances of 800 m [2,600 ft] or less, to the proposed Idaho Spent Fuel Facility. Shipments would be made in DOE-supplied casks loaded on trailers. Movement of the SNF within INEEL and the proposed Idaho Spent Fuel Facility would be conducted in accordance with the DOE procedures and orders for SNF transfers within the INEEL complex.

Geology and Soils

Small Impact. Construction-related impacts to soil would occur on the 3.2-ha [8-acre] site and, to some extent, on the 4.1-ha [10-acre] laydown area. Excavation, earthmoving, and grading would occur on the 3.2-ha [8-acre] site. Preconstruction surveys conducted in 2001 indicate no contamination above regulatory limits at the site. No construction or operational impacts would occur on mineral deposits or unique geological resources.

Water Resources

Small Impact. Construction impacts would be small to the quality of both surface water and groundwater. An existing storm water pollution prevention plan is in effect at INEEL to minimize surface runoff impacts. Water used for construction-phase dust control would evaporate or seep into surface soils. The proposed site is 140 to 146 m [460 to 480 ft] above the Snake River Plain Aquifer. Facility water requirements would be met through the existing water supply at the INTEC facility. There are no planned liquid effluents for the proposed Idaho Spent Fuel Facility, and sanitary wastewater treatment requirements would be met via existing INTEC facilities. Because no new groundwater wells or percolation ponds would be developed for the proposed facility, groundwater contamination is unlikely. During the first year of construction, about 1.5 million L [396,000 gal] of water would be used for dust suppression, with an additional 1.91 million L [505,000 gal] estimated for concrete production at the site. During the second year of construction, it is estimated that water needs will be reduced by half. Routine water usage during operation would be about 141,950 L/mo [37,500 gal/mo]. Water usage for nonroutine operations such as emergency showers and decontamination is estimated to be less than 19,700 L [5,200 gal]. These amounts are a small fraction of the 7.4 billion L [2.0 billion gal] used annually at INEEL and the annual withdrawal of 43 billion L [11.4 billion gal] permitted by the DOE and State of Idaho Water Rights Agreement.

Ecological Resources

Small Impact. No significant impacts to ecological resources are anticipated from the construction and operation of the proposed facility. There are no wetlands or habitats for threatened or endangered plant or animal species at the 3.2-ha [8-acre] site or the 4.1-ha [10-acre] laydown area. Secondary impacts on wildlife from noise and various human activities associated with the proposed action are expected to be localized, temporary, and small. Consultations with the U.S. Fish and Wildlife Service have been completed.

Air Quality

Small Impact. Construction-related fugitive dusts and exhaust emissions would be temporary and highly localized. With construction phase watering, the fugitive dusts and particulates would be about 8.2 metric tons [9 tons]; this amount is small in relation to the INEEL emission inventory for particulates. No significant impacts to radiological air quality are anticipated from construction activities. During operation, there would be no chemical air discharges, and the vehicular exhausts would be small and within applicable regulatory limits. Therefore, no significant impacts to nonradiological air quality are anticipated. Facility operations are not expected to result in the atmospheric discharge of significant amounts of gaseous radioactive effluents. The proposed facility would be fully enclosed and would include a special ventilation system along with high efficiency particulate air filters. Monitoring of stack emissions for particulate radionuclides, iodine-129, and tritium (hydrogen-3) would be used to warn of any releases.

Noise

Small Impact. Construction-phase noise levels would be typical of industrial areas; further, they would be temporary and highly localized. Noise from construction and operational traffic would be small in relation to existing traffic noise levels in the INTEC area. Potential noise levels from operations would be less than those from construction. Hearing protection would be required for workers per Occupational Safety and Health Administration regulations. No unique noise receptors are in the vicinity of the proposed Idaho Spent Fuel Facility. Therefore, noise impacts are not expected to be significant.

Historical, Cultural, and Paleontological Resources

Small Impact. There are no known historical, cultural, or paleontological resources within the 3.2-ha [8-acre] site and the 4.1-ha [10-acre] laydown area. Consultations with the Idaho State Historic Preservation Officer have been completed. Thirty-eight buildings and structures within INTEC are potentially eligible for the National Register of Historic Places, however, only two of these structures are near the area that would be affected by the construction of the proposed facility and the transfer of SNF. The proposed facility would not introduce a built environment in a pristine natural setting. There are potential cumulative effects from withdrawal of access by the Shoshone–Bannock Tribes to the proposed 7.3-ha [18-acre] site, but these lands are already contained within the limited access buffer area around INTEC.

Visual/Scenic Resources

Small Impact. Because of its smaller scale in relation to the adjacent INTEC facilities, construction and operation of the proposed Idaho Spent Fuel Facility would not cause visual impacts to the Bureau of Land Management (BLM) Class IV rating for the INTEC area. Fugitive dusts and exhaust emissions from construction would not impair the BLM Class III rating of lands adjacent to INEEL, nor would the minimal releases of radioactive particulates and gases during operations. No significant visual or scenic impacts are anticipated.

Socioeconomic

Small Impact. Construction of the proposed Idaho Spent Fuel Facility would last about 2 years. This phase would employ a maximum of 250 workers, about 3 percent of the current INEEL workforce of 8,100. Because of the relatively small number of construction workers, and since most workers will likely come from the existing INEEL workforce, the construction phase would not have significant impacts on population growth, employment levels, housing, and infrastructure. For the first 3 years of operation, when fuel receipt and packaging occurs, nearly 60 employees would be required. Storage operations beyond the first 3 years would likely require fewer workers. Most operations staff will be from the local INEEL workforce. Again, no significant impacts are expected on the various features of the socioeconomic environment.

Environmental Justice

Small Impact. The minority population near INEEL is predominately Hispanic, American Indian, and Asian; these groups compose about 12 percent of the population within an 80-km [50-mi] radius. Based on 200 census data at the census tract level, the low-income population in this same area composes about 13 percent of the population. Special concerns related to the Shoshone–Bannock Tribes have been identified via numerous consultations between Tribal officials and INEEL officials. Two recent programmatic impact studies prepared by DOE for INEEL concluded that environmental justice impacts are not significant. Accordingly, because of the small socioeconomic impacts of the proposed Idaho Spent Fuel Facility, in general, and the lack of identified disproportionate impacts in the recent impact studies, it can be concluded that no disproportionately high and adverse human health or environmental effects will occur on minority and low-income populations.

Public and Occupational Health and Safety

Small Impact. Potential impacts were examined for normal, off-normal, and accident conditions. For normal operating conditions, no chemical discharges are planned, and a health and safety program would be in place for the workers. The primary pathway for offsite radiation exposure to the public is from atmospheric emissions of radioactive particulates, iodine-129, tritium, and a few other radionuclides. Iodine-129 and tritium would contribute nearly 80 percent of the total estimated dose. The estimated annual dose for the maximally exposed individual at the southern boundary of INEEL is 3×10^{-7} mSv [3×10^{-5} mrem] from the proposed Idaho Spent Fuel Facility; from all nearby facility operations, the estimated dose is less than 0.0032 mSv [0.32 mrem]. The regulatory annual dose limit is 0.1 mSv [10 mrem], and the natural background annual radiation is 3.6 mSv [360 mrem] in this general area. Therefore, there would be no significant public radiation impacts during normal operations of the proposed Idaho Spent Fuel Facility. Estimated occupational radiological doses from construction of the proposed Idaho Spent Fuel Facility are less than 0.0032 mSv [0.32 mrem] annually to construction workers. The NRC annual occupational limit is 50 mSv [5,000 mrem], and the annual natural background radiation dose is 3.6 mSv [360 mrem]. The estimated occupational dose to SNF-handling workers is 9.1 mSv [910 mrem] annually, with the NRC annual occupational limit at 50 mSv [5,000 mrem]. The estimated annual radiation dose to all workers within an 8-km [5-mi] radius is 6.68×10^{-5} mSv [6.68×10^{-3} mrem]. Further analyses were also made of the public and occupational health and safety impacts of external events such as flooding, aircraft impact, volcanic hazards, seismic hazards, extreme wind and wind-generated missiles, and wildfires. Design features and operational practices are expected to minimize the public and occupational health and safety impacts of these events and accidents.

Waste Management

Small Impact. Small quantities of gaseous, liquid, and solid low-level radioactive waste will be generated during the SNF receipt and repackaging operations planned for the first 3 years. Liquid radioactive waste would not be generated during normal operations of the proposed Idaho Spent Fuel Facility, however, such waste may be generated during nonroutine decontamination activities or as a result of sprinkler or firefighting water. FWENC estimates no more than 19,700 L [5,200 gal] of liquid low-level radioactive waste would be generated each year from nonroutine decontamination activities. A liquid waste processing system would be installed to collect and store such liquid wastes temporarily in two tanks {18,900L [5,000gal]} and 1,900 L [500 gal], prior to transfer to a licensed treatment facility by a commercial mobile waste processing contractor. Solid wastes will be disposed of either at the INEEL Radioactive Waste Management Complex or shipped to an offsite low-level radioactive waste disposal facility. After the SNF is repackaged and stored, no gaseous releases or liquid or solid radioactive wastes are anticipated on a regular basis. The INEEL Radioactive Waste Management Complex has the capacity to handle these small quantities of generated wastes during the storage period for the repackaged SNF. Overall, waste management activities associated with the proposed Idaho Spent Fuel Facility are designed to limit waste volumes and maintain exposures as low as reasonably achievable.

MITIGATION MEASURES

The types of impacts and potential mitigation measures are summarized in Section 5 of this EIS.

Mitigation Measures During Construction

Mitigation measures during construction of the proposed Idaho Spent Fuel Facility will include monitoring and best-management practices, such as using water to control fugitive dust and soil-retention methods to control erosion.

Mitigation Measures During Operation

Using the organizational structure for the proposed Idaho Spent Fuel Facility, FWENC would be responsible for operational programs within the proposed Idaho Spent Fuel Facility site and rely on the DOE Idaho Operations Office for services, environmental control and management, security, and emergency planning functions outside the boundaries of the proposed facility. As the operator of the proposed Idaho Spent Fuel Facility, FWENC would participate in the INEEL Monitoring and Surveillance Committee to help coordinate activities among organizations with a stake in operations at the INEEL facility and also share in the exchange of information related to monitoring, analytical methodologies, and quality assurance.

The existing environmental monitoring programs on INEEL include

- Effluent Monitoring Program;
- Drinking Water Program;
- Storm Water Monitoring Program;
- Site Environmental Surveillance Program;
- Offsite Environmental Surveillance Program;
- U.S. Geological Survey Groundwater Monitoring Program;
- Meteorological Monitoring Program; and
- State of Idaho INEEL Oversight Program.

The FWENC monitoring program for the proposed Idaho Spent Fuel Facility is discussed in more detail in Section 6 of this EIS. Preoperational sampling would be used to establish baselines for both radiological and nonradiological constituents at the proposed site. For radiological constituents, the operational program would measure direct radiation, airborne radionuclide concentrations within the proposed Idaho Spent Fuel Facility site boundaries, and radionuclide concentrations in the soil on the proposed site. The environmental sampling for radionuclides would include thermoluminescent dosimeters at the fence and particulate and gas sampling at the stack. Additional samplings and analyses would be performed if routine outdoor surveys show unexpected anomalies or after any incident involving a radioactive spill. The proposed Idaho Spent Fuel Facility, as part of INEEL, would become a part of the INEEL environmental surveillance program. NRC will prepare a safety evaluation report to provide a detailed evaluation of the compliance of the monitoring program with the applicable regulations.

SUMMARY OF THE COSTS AND BENEFITS OF THE PROPOSED ACTION

Costs and benefits of the proposed Idaho Spent Fuel Facility are estimated based on existing DOE NEPA analyses and cost information provided in the FWENC license application to NRC. Detailed analyses of these costs and benefits are included in Section 7 of this EIS.

Costs Associated with Construction Activities

FWENC would design, construct, and initially operate the proposed Idaho Spent Fuel Facility contract with DOE. FWENC estimates construction costs associated with the proposed Idaho Spent Fuel Facility will be about $119.6 million (2001 dollars).

Costs Associated with Operational Activities

After the proposed Idaho Spent Fuel Facility is operational, DOE would make payments to FWENC during the transfer and storage of the first 800 fuel-handling units of SNF. As defined in the contract, one fuel-handling unit is equal to one fuel element for intact SNF. These amortized capital costs total about $119.6 million (2001 dollars). In addition to the amortizing payments, DOE would also make payments for transfer and storage of the remaining SNF at specific unit prices for each SNF type. Total payments, inclusive of all fuel types, would be about $32.5 million (2001 dollars).

Poststorage operation and maintenance of the facility by FWENC would be at the option of DOE. Pending necessary transfer of the NRC license from FWENC, DOE would have the contractual option to assume responsibility for the facility after the initial fuel-handling, packaging, and storage operations. Should DOE desire that FWENC continue as the licensee during the poststorage operations phase of the project, DOE would pay FWENC about $1.94 million (2001 dollars) per year.

Costs Associated with Decontamination and Decommissioning

DOE would retain ownership of the SNF and remain financially responsible for the eventual decontamination and decommissioning of the proposed Idaho Spent Fuel Facility. As part of its license application to NRC, FWENC provided a proposed decommissioning plan that presents the estimated cost of dismantling, decontaminating, and decommissioning the site at $22.6 million (2001 dollars) for radiological decommissioning activities and about $13.2 million (2001 dollars) for the nonradiological activities associated with site restoration. The radiological decommissioning cost estimate considers only those costs associated with normal decommissioning activities necessary for release of the site for unrestricted use in accordance with the NRC radiological criteria for license termination in 10 CFR Part 20, Subpart E. The radiological decommissioning cost estimate does not include those costs associated with SNF management or the disposal of nonradioactive structures and materials. Cost estimates for nonradiological decommissioning consider those costs associated with site remediation and demolition and removal of uncontaminated structures.

Impact of the Proposed Idaho Spent Fuel Facility on the Programmatic Costs of SNF Management at INEEL

DOE estimated the programmatic costs of SNF management both with and without the construction and operation of the proposed Idaho Spent Fuel Facility. The current life-cycle cost estimate for sending all SNF managed by DOE at INEEL to a national HLW repository is $2.815 billion (2001 dollars). This life-cycle cost considers the costs for construction and operation of the proposed Idaho Spent Fuel Facility, plus the predicted cost of implementing any future modifications or enhancements to the facility necessary to prepare the SNF for shipment to a national HLW repository.

If the proposed Idaho Spent Fuel Facility is not built, the life-cycle cost estimate for sending all DOE-managed SNF from INEEL to a national HLW repository is estimated to be $3.069 billion (2001 dollars). This estimate assumes alternative facility approaches (essentially making major modifications to extend the life of existing facilities) in lieu of the proposed Idaho Spent Fuel Facility. Based on these two estimates, the programmatic benefit to the Federal government of the proposed Idaho Spent Fuel Facility is, at a minimum, $251 million (2001 dollars).

Benefits Associated with the Proposed Idaho Spent Fuel Facility

Construction and operation of the proposed Idaho Spent Fuel Facility would have a minor positive effect on the regional economy. Socioeconomic benefits include using regional workers for construction and increased sales for regional suppliers for the duration of construction. Because the work force would be small relative to the number of employees at INEEL, the proposed action would not result in a regional growth spurt, and the infrastructure of public services and transportation systems would not be adversely affected.

The proposed action is designed to support the INEEL mission and comply with agreements and commitments negotiated by DOE. Currently, most SNF to be received by the proposed Idaho Spent Fuel Facility is stored at INTEC. The 1995 Settlement Agreement among DOE, the State of Idaho, and the U.S. Navy established specific activities required to remove SNF from Idaho by 2035. Although the current storage configuration has worked well, it does not prepare the SNF for shipment from INEEL to a national HLW repository. The proposed Idaho Spent Fuel Facility would provide the ability to remove the SNF from existing storage locations, place it in specially designed storage containers, then seal and place the loaded containers in interim storage. The new containers would be designed for compatibility with transportation systems and with the eventual permanent disposal systems. After the SNF is placed in the containers, it would not need to be repackaged for shipment to a national HLW repository that becomes available.

COMPARISON OF ALTERNATIVES

For the no-action alternative, NRC would not grant the license, and the proposed facility would not be constructed. In this case, DOE would maintain current storage activities as described in the 1995 DOE programmatic SNF EIS. According to the no-action alternative, SNF stored at INEEL would be transferred and consolidated at existing facilities at INTEC. During a 3-year transition period, Naval SNF would continue to be received and stored at INTEC based on terms of the 1995 Settlement Agreement. Existing procedures and site-wide plans such as the INEEL Storm Water Pollution Protection Plan and the INEEL Long-Term Stewardship Strategic Plan would continue to be implemented by DOE and its contractors. In the short term, no major upgrades or new facilities would be installed, and minor fuel conditioning would be necessary to maintain safe operation. Because no new facility would be constructed, short-term impacts to geological resources; land use; water resources; and ecological, visual/scenic, and cultural resources would be unchanged from current operations and SNF management activities. Transportation and storage of the remaining TRIGA reactor fuel would continue per an existing DOE record of decision.

In the short term, differences between the proposed action and the no-action alternative are negligible. In the longer term, however, current storage and fuel-handling facilities at INTEC would be open and operational longer than planned. Ultimately, existing facilities would need to be modified or facilities similar to those described in the proposed action would need to be built. For example, the current storage location of Shippingport SNF at the INTEC Irradiated Spent Fuel Storage Facility would be modified to expand the hot cell and add a load-out facility in lieu of the availability of the proposed Idaho Spent Fuel Facility. Long-term impacts would be similar to the proposed Idaho Spent Fuel Facility, because the SNF must be repackaged before shipment can occur from INEEL to a national geologic HLW repository.

FINAL RECOMMENDATION REGARDING THE PROPOSED ACTION

After weighing the costs and benefits of the proposed action and comparing alternatives, the NRC staff recommends that, unless safety issues mandate otherwise, the action called for is the issuance of the proposed license to FWENC. In this regard, NRC has evaluated the environmental impacts of the proposed action and concluded the anticipated overall benefits of the proposed Idaho Spent Fuel Facility outweigh the potential impacts and costs, based on consideration of the following:

- The proposed Idaho Spent Fuel Facility will have small impacts on the physical environment and human communities in the vicinity; environmental monitoring and proposed mitigation measures would eliminate or substantially lessen any potential adverse environmental impacts associated with the proposed action. In addition, long-term impacts of the no-action alternative are likely to be similar to the impacts of the proposed action.

- The proposed action is designed to meet the programmatic needs of INEEL and DOE for compliance with negotiated agreements and commitments, including the 1995 Settlement Agreement among DOE, the State of Idaho, and the U.S. Navy to remove SNF from Idaho by 2035.

- Currently, most SNF to be received by the proposed Idaho Spent Fuel Facility is stored at INTEC. Transfer distances from current storage locations to the proposed facility are relatively short.

- The current storage configuration does not prepare the SNF for shipment from INEEL to a national HLW repository. The proposed Idaho Spent Fuel Facility will provide the ability to remove the SNF from existing canisters, place it in specially designed storage containers, then seal and place the loaded containers in interim storage. The new containers are designed to be compatible with transportation systems and with the eventual permanent disposal systems. Hence, once the SNF is placed in the canisters, it would not need to be repackaged for shipment to a national HLW repository when one becomes available.

ACRONYMS

ALARA	as low as is reasonably achievable
ANS	American Nuclear Society
ANSI	American National Standards Institute
BLM	Bureau of Land Management
CNWRA	Center for Nuclear Waste Regulatory Analyses
DOE	U.S. Department of Energy
EBSLs	ecologically based screening levels
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
FWENC	Foster Wheeler Environmental Corporation
HEPA	high efficiency particulate air
HLW	high-level waste
HVAC	heating, ventilation, and air conditioning
IMPROVE	Interagency Monitoring of Protected Visual Environments
INEEL	Idaho National Engineering and Environmental Laboratory (formerly INEL)
INTEC	Idaho Nuclear Technology and Engineering Center
ISFSI	independent spent fuel storage installation
LMITCO	Lockheed Martin Idaho Technologies Company
MEI	maximally exposed individual
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
PM	particulate matter
PRGs	U.S. Environmental Protection Agency Preliminary Remediation Goals
PSD	prevention of significant deterioration
PSHA	probabilistic seismic hazard analysis
RCRA	Resource Conservation and Recovery Act
SNF	spent nuclear fuel
SSCs	structures, systems, and components
TRIGA	training, research, and isotope reactors built by General Atomics

1 INTRODUCTION

1.1 Background

The U.S. Nuclear Regulatory Commission (NRC) is considering whether to issue a license, pursuant to 10 CFR Part 72, for construction and operation of an independent spent nuclear fuel storage installation (ISFSI) at the Idaho National Engineering and Environmental Laboratory (INEEL) (formerly the Idaho National Engineering Laboratory), which is located in southeast Idaho. This action would be taken in response to an application filed with NRC by the Foster Wheeler Environmental Corporation (FWENC) on November 19, 2001 (NRC, 2002a). To support its licensing decision, NRC determined that an environmental impact statement (EIS) is required by the NRC National Environmental Policy Act (NEPA)-implementing regulations in 10 CFR Part 51.

During the last 40 years, the U.S. Department of Energy (DOE) and its predecessor agencies have generated, transported, received, stored, and reprocessed spent nuclear fuel (SNF) at the DOE facilities nationwide. Part of this SNF originated from non-DOE domestic licensed facilities, including training, research, and test reactors at universities; commercial reactors; and government-owned installations for which DOE has contractual obligations to accept SNF. Most of the SNF at INEEL, originally destined for reprocessing, is currently stored in conditions only acceptable for short-term storage. Current storage at INEEL consists of aging aboveground facilities, including wet storage pools, and dry underground storage facilities. Deterioration of these SNF facilities is a potential concern because of their location over the Snake River Plain Aquifer, a major water source for the region.

A Settlement Agreement dated October 17, 1995, among DOE, the U.S. Navy, and the State of Idaho requires, among other things, the transfer and dry storage of SNF until it can be removed from Idaho. As part of the DOE effort to meet terms of this 1995 Settlement Agreement, the DOE contracted with FWENC to design, license, construct, and operate the proposed ISFSI at INEEL to provide interim dry storage for portions of the SNF currently in storage. The SNF to be stored at the proposed ISFSI includes SNF resulting from operation of the Peach Bottom Unit 1 nuclear power reactor, which was licensed by the Atomic Energy Commission and operated between 1966 and 1974. SNF from the Shippingport Light Water Breeder Reactor, which ceased operation in 1982, and SNF from training, research, and isotope research reactors built by General Atomic (TRIGA reactors) are also to be stored at the proposed ISFSI.

> On October 17, 1995, DOE, the U.S. Navy, and the State of Idaho entered into **The 1995 Settlement Agreement.** This agreement ended years of litigation between the Federal government and the state regarding waste removal and environmental cleanup of INEEL in the cases of *Public Service Company of Colorado v. Batt*, CV–91–0035–S–EJL (D. Idaho) and *United States v. Batt*, CV–91–0065–S–EJL (D. Idaho). According to terms of The 1995 Settlement Agreement, Idaho agreed to allow shipments of specified amounts of certain types of SNF to be received at INEEL and to process DOE permit applications in a timely manner. DOE agreed, among other things, to initiate procurement of dry storage facilities to replace wet storage and below-ground facilities, employ multipurpose canisters to prepare SNF for disposal, and complete removal of all SNF from the state by 2035.

DOE previously issued a record of decision (DOE, 1995a) pertaining to its SNF management program, later amended to reflect the Settlement Agreement (DOE, 1996a). The record of decision documents the DOE programmatic decision to pursue the "regionalization by fuel type" and the INEEL site-specific decision to pursue the "modified Ten-Year plan." One project to manage SNF is described in the record of decision as a dry fuel storage facility that "will accommodate receipt and storage of various fuel types currently in inventory at the [Idaho National Engineering and Environmental Laboratory] and the fuels projected to be received at the [INEEL]" (DOE, 1995a). The ISFSI proposed by FWENC, which this EIS addresses, will be located on the INEEL property adjacent to the Idaho Nuclear Technology and Engineering Center (INTEC) facilities.

The DOE decisions were based, in part, on the information and analyses contained in the final programmatic SNF EIS (DOE, 1995b). Volume 2 of the DOE programmatic SNF EIS evaluates potential impacts of the SNF management program at INEEL with additional information on foreseeable projects, including a generic analysis of a facility similar to the proposed Idaho Spent Fuel Facility.

1.2 The Proposed Action

The proposed action considered in this EIS is the construction, operation, and decommissioning of an ISFSI. On November 19, 2001, FWENC filed an application with NRC for a license to receive, package, transfer, and store SNF and other radioactive materials associated with SNF at an ISFSI at INEEL in Butte County, Idaho. NRC accepted the license application for docketing in June 2002 (NRC, 2002a). As part of its license application, FWENC submitted an environmental report and a safety analysis report. These reports and the license application have been subsequently updated and reissued in response to the NRC requests for additional information (FWENC, 2003a,b,c). This new installation, if approved, will be on a 3.2-ha [8-acre] site located adjacent to the INTEC facility, about 4.8 km [3 mi] north of the INEEL Central Facilities Area (Figure 1-1). The proposed Idaho Spent Fuel Facility would be designed, constructed, and operated by FWENC per contract to DOE. DOE has leased the site to FWENC for the planned operating life of the installation.

The proposed ISFSI, which is referred to herein as the proposed Idaho Spent Fuel Facility, would store SNF and associated radioactive material from the Peach Bottom Unit 1 High-Temperature, Gas-Cooled Reactor; the Shippingport Light Water Breeder Reactor, and various TRIGA reactors. All the SNF (Peach Bottom and Shippingport) and slightly more than two thirds (about 1,100 of 1,600 elements) of the TRIGA SNF is currently stored within INTEC. Potential locations of the remaining TRIGA fuel and potential environmental impacts of its transport to INEEL have previously been evaluated by DOE in earlier NEPA documents (DOE, 1995b, Volume 1, Appendix E; 1996b, Volume 1, Section 2) and the associated records of decision (DOE, 1995a, 1996a,c).

If NRC approves the FWENC license application, DOE plans to transfer the SNF to the proposed Idaho Spent Fuel Facility when that facility becomes operational. These transfers would occur completely within the boundaries of the INEEL site and would comply with INEEL procedures and DOE requirements. On arrival at the proposed Idaho Spent Fuel Facility, the SNF would be (i) removed from the containers in which it is currently stored, (ii) visually inspected, (iii) inventoried, (iv) placed into new storage containers, and (v) placed into interim storage. The storage containers are intended to be packaged for transportation and shipped to a national high-level waste (HLW) repository when it becomes available. The potential

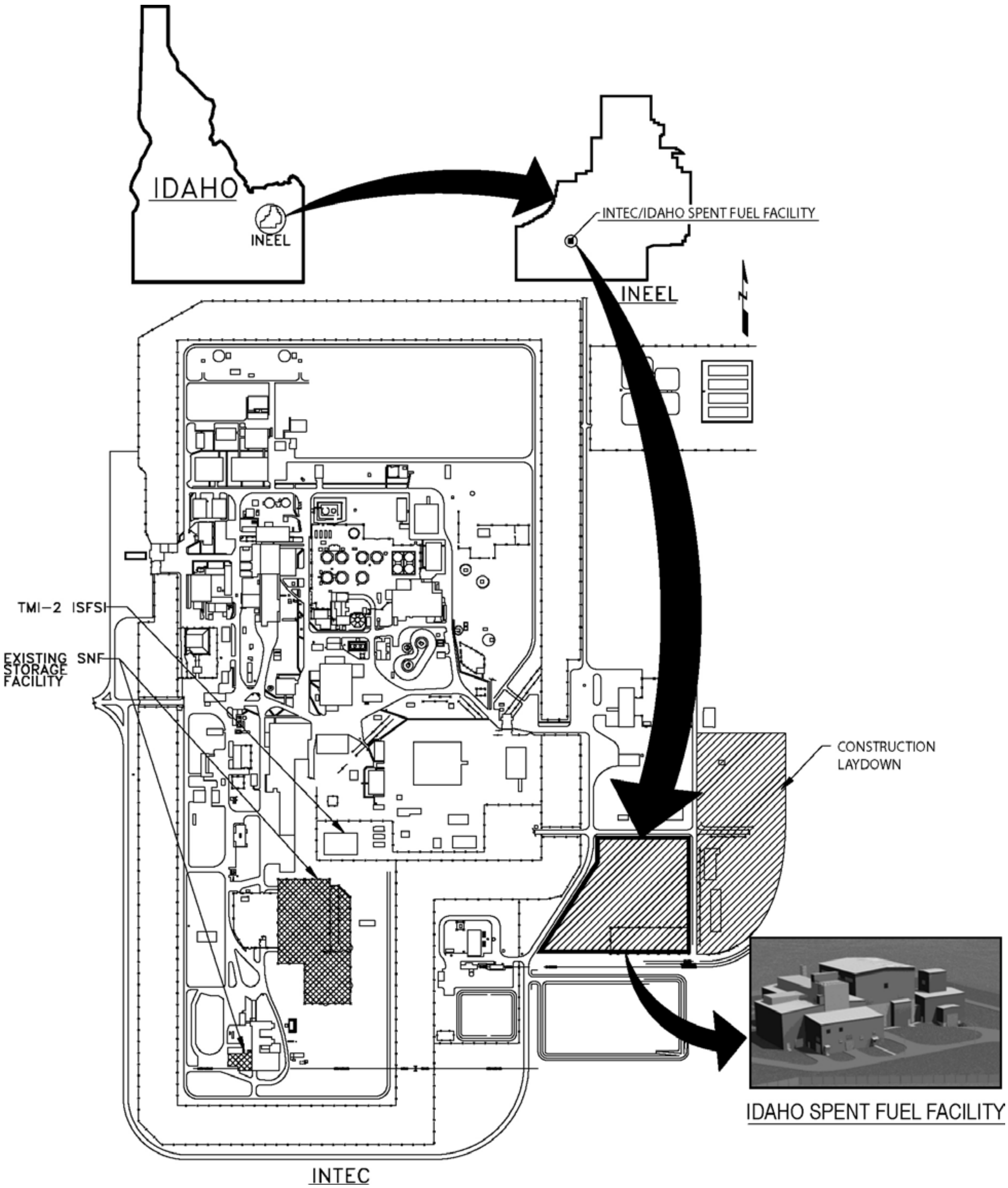

Figure 1-1. Location of the Proposed Idaho Spent Fuel Facility (FWENC, 2003b)

environmental impacts of onsite SNF transfers within INEEL have been documented by DOE in earlier NEPA documents (DOE, 1995a,b). The DOE Idaho Operations Office will use an environmental checklist to verify if the actual impacts are within the expected range (FWENC, 2003d).

If approved, the proposed Idaho Spent Fuel Facility will receive, repackage, and provide interim dry storage for

- 1,601.5 elements of Peach Bottom reactor SNF;
- 2,971 rods of Shippingport reactor SNF; and
- About 1,600 elements of TRIGA SNF.

The Peach Bottom and Shippingport reactors ceased operations in 1974 and 1982. Because of the lengthy cooling period since final operation, these fuels produce relatively low decay heat compared with typical commercial SNF. The TRIGA SNF originated from TRIGA reactors worldwide. Although the age of the TRIGA SNF varies, it also generates low decay heat because of the design and operational characteristics of the TRIGA reactors.

As defined in 10 CFR 72.3, ***High-level radioactive waste*** or ***HLW*** means (1) the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and (2) other highly radioactive material that the Commission, consistent with existing law, determines by rule requires permanent isolation.

Spent Nuclear Fuel or ***Spent Fuel (SNF)*** means fuel that has been withdrawn from a nuclear reactor following irradiation, has undergone at least one year's decay since being used as a source of energy in a power reactor, and has not been chemically separated into its constituent elements by reprocessing. SNF includes the special nuclear material, byproduct material, source material, and other radioactive materials associated with fuel assemblies.

Both HLW and SNF will be disposed of in a HLW geologic repository (10 CFR Part 63).

1.3 Purpose and Need for the Proposed Action

The purpose and need for the proposed Idaho Spent Fuel Facility is to implement, in part, the portion of the DOE SNF management program and INEEL record of decision (DOE, 1995a, 1996a) concerning construction of a dry SNF storage facility. Implementation also would allow DOE to satisfy, in part, its commitments in the 1995 Settlement Agreement to procure dry storage facilities to replace wet storage and below-ground facilities, employ multipurpose canisters to prepare SNF for disposal, and complete removal of all SNF from Idaho by 2035. These objectives would be accomplished at the proposed Idaho Spent Fuel Facility by

- Receiving SNF generated at the Peach Bottom Unit 1 High-Temperature, Gas-Cooled Reactor; the Shippingport Light Water Breeder Reactor; and various TRIGA reactors;

- Transferring SNF from the DOE storage containers in which it is currently stored at INTEC into new storage containers; and

- Placing the storage containers into an ISFSI licensed by NRC per 10 CFR Part 72.

Additionally, DOE specified the canister dimensions in its original request for proposal for the construction of the Idaho Spent Fuel Storage Facility to meet the anticipated criteria of a national HLW geologic repository and facilitate eventual removal of the SNF from the proposed Idaho Spent Fuel Facility and INEEL.

1.4 NRC Regulation of the Proposed Idaho Spent Fuel Facility

On November 19, 2001, FWENC filed an application with NRC for a license per 10 CFR Part 72 to receive, transfer, package, and store SNF and operate an ISFSI at INEEL in Butte County, Idaho. If approved, the initial term of the license would be for 20 years, with the option for additional renewals (10 CFR 72.42) (FWENC, 2003c, Appendix A). The NRC decisionmaking process includes an environmental and safety review of the construction and operation of the proposed Idaho Spent Fuel Facility. On completion of both reviews, NRC will decide whether to grant a license with or without conditions, or deny the FWENC request.

As required in 10 CFR 51.102(a), any NRC decision on this action will be accompanied by a public record of decision. The record of decision may be integrated into any other record prepared by NRC in connection with the action [10 CFR 51.103(b)].

Background Information on the NRC Safety Review Process

The NRC safety review of an ISFSI includes the preparation of a detailed report published as a Safety Evaluation Report. This publicly available report is based, in part, on the Safety Analysis Report submitted by the applicant (i.e., FWENC). The Safety Evaluation Report also includes the NRC review of technical issues such as adequacy of the facility design to withstand external events (e.g., earthquakes, floods, and tornadoes); radiological safety of facility operation, including doses from normal operations and accidents; emergency response plans; physical security of the facility; fire protection; maintenance and operating procedures; and decommissioning. NRC also performs a detailed safety review of the storage containers against design criteria contained in 10 CFR Part 72. The NRC standards for protection against radiation are contained in 10 CFR Part 20.

The NRC regulations for an ISFSI are contained in 10 CFR Part 72. Compliance with these regulations will provide reasonable assurance that the design and operation of the proposed Idaho Spent Fuel Facility will provide adequate protection for public health and safety. The NRC regulations for compliance with NEPA are contained in 10 CFR Part 51. Consistent with NEPA, the NRC regulations require an EIS be completed for Federal actions that significantly affect the quality of the human environment. The NRC previously determined that licensing an away-from-reactor ISFSI requires the preparation of an EIS [10 CFR 51.20(b)(9)]. Because the proposed location for the Idaho Spent Fuel Facility is at a site not occupied by a nuclear power reactor, NRC is, therefore, preparing an EIS for the environmental review associated with this licensing action.

1.5 Scope of This Environmental Analysis

As required by NEPA, NRC used the scoping process to solicit public involvement and comment, and to identify, in general, the issues that need to be addressed in an EIS. The scoping process has also helped NRC to identify significant issues requiring indepth analysis. Such information has been used by NRC in preparing this EIS to support the decision whether to issue a license to FWENC for the proposed Idaho Spent Fuel Facility. During the scoping process, commenters noted that previous NEPA analyses have been prepared by DOE for INEEL (DOE, 1995b; 2002a) and by NRC for the Three-Mile Island Unit 2 ISFSI situated within the INTEC facility (NRC, 1998). Based on the scoping process, NRC reviewed the relevant sections of these previous EISs in preparing this EIS. Adequacy of the existing NEPA analyses prepared by DOE and NRC for actions at the INEEL facility (DOE, 1995b, 2002a; NRC, 1998) has been examined within the context of the proposed action and supplemented and updated as necessary. Because the scope of the proposed Idaho Spent Fuel Facility EIS is limited to the licensing action now being reviewed by NRC, issues related to decisions already made by DOE or NRC will be addressed by referencing the appropriate existing NEPA analysis and by summarizing the information, as appropriate. Development of this EIS has also been closely coordinated with development of the safety evaluation report prepared by NRC to evaluate the health and safety impacts of the proposed action.

1.5.1 Issues Studied in Detail

The notice of intent (NRC, 2002b) proposed several areas for detailed discussion in this EIS as they relate to the proposed action.

- Health and Safety: potential public and occupational consequences from construction, routine operation, transportation, and credible accident scenarios;
- Waste Management: types of wastes expected to be generated, handled, and stored and the potential consequences to public safety and the environment;
- Water Resources: surface and groundwater hydrology, water use and quality, and the potential impacts of the proposed action;
- Air Quality: meteorological conditions, ambient background levels, pollutant sources, and the potential impacts of the proposed action;
- Earth Resources: physical geography, topography, geology, and soil characteristics;
- Ecological Resources: wetlands, aquatic and terrestrial resources, economically and recreationally important species, and threatened and endangered species;
- Socioeconomic: demography, economic base, labor pool, housing, transportation, utilities, public services/facilities, education, recreation, and cultural resources;
- Natural Disasters: floods, tornadoes, volcanic activity, and seismic events;
- Cumulative Effects: impacts from past, present, and reasonably foreseeable actions at and near the site;
- Indirect Effects: transportation to the Idaho Spent Fuel Facility;
- Unavoidable Adverse Impacts: negative impacts of the proposed action and any mitigative measures; and
- Environmental Justice: any potential disproportionately high and adverse impacts to minority and low-income populations.

No additional issues were raised during the public scoping process (Appendix A). Detailed analysis of the effects of operation of the proposed facility on human health and safety are considered in the safety evaluation report prepared by NRC.

1.5.2 Issues Eliminated from Detailed Study

Issues not directly related to the assessment of potential impacts from the proposed action now being considered were eliminated from detailed study in this EIS. The lack of indepth discussion in the EIS, however, does not mean that an issue lacks value. Issues beyond the scope of this EIS may not yet be ripe for resolution, have already been decided, or are more appropriately discussed and decided in other venues. Examples of items not analyzed in detail include health and safety issues that will be considered in detail in the safety evaluation report prepared by NRC and summarized in this EIS, past DOE decisions related to the management of SNF at INEEL, and terrorist activities. Other issues that will not be addressed in detail are

- Land Use: The area that would be used for the proposed Idaho Spent Fuel Facility is adjacent to the INTEC industrial facility. The area is currently used for construction laydown and is disturbed from its natural state with only about 5-percent vegetative cover (FWENC, 2003a). The land is outside areas on INEEL used for grazing and will not prevent access to areas not already restricted. Only 3.2 ha [8 acres] are to be committed to the proposed facility, with an additional 4.1 ha [10 acres] to be disturbed as a construction laydown area. These two areas represent a small percentage of the 2,305-km^2 [890-mi^2] INEEL.

- Noise: The proposed Idaho Spent Fuel Facility would be adjacent to an industrial facility already regulated by INEEL procedures that establish workplace noise limits in compliance with Occupational Safety and Health Administration standards. The site is at least 5 mi [8 km] away from public areas, and noise associated with the construction and operation of the proposed facility is not expected to exceed current noise levels at INTEC.

- Scenic and Visual Resources: The proposed Idaho Spent Fuel Facility would be adjacent to INTEC, an industrial facility similar in structure and appearance. The site is at least 8 km [5 mi] away from public areas, and neither air emissions associated with the construction and operation of the proposed facility nor the facility itself are expected to alter the current visual/aesthetic resources surrounding INTEC.

These issues will be summarized in this EIS, however, detailed analyses will not be conducted, and readers are referred to existing studies (DOE, 1995b; 2002a).

1.5.3 Scoping Process

1.5.3.1 Scoping for the Draft EIS

On July 26, 2002, NRC published a notice of intent to prepare an EIS for the proposed Idaho Spent Fuel Facility (NRC, 2002b). In this notice of intent, NRC announced the public scoping period would extend until September 16, 2002. Announcements of the scoping process were provided on the NRC Idaho Spent Fuel Facility web page (http://www.nrc.gov/waste/spent-fuel-storage/idaho-spent-fuel.html) and in the following local newspapers:

- *The Idaho News*, Idaho Falls, Idaho (Sunday, August 4, and Wednesday, August 7, 2002); and

- *The Idaho Statesman*, Boise, Idaho (Sunday, August 4, and Wednesday, August 7, 2002).

During the public comment period, NRC received about 15 written comments from two organizations. The public comments, discussed in the scoping summary report (Appendix A), were categorized under the following issue headings:

- NEPA Issues;
- Policy Issues;
- Ecology, Air, and Water;
- Cumulative Impacts;
- Human Health Impacts;
- Waste Management;
- Security and Terrorism; and
- INEEL Infrastructure and Existing Conditions.

The scoping process was used to help identify those issues to be discussed in detail in this EIS (see Section 1.5.1) and those issues that are either beyond the scope of this EIS or are not directly related to the assessment of potential impacts from the proposed action (see Section 1.5.2). Additional issues, beyond those identified in the scoping process, will be discussed in this EIS.

1.5.3.2 Comments on the Draft EIS

NRC issued a draft EIS for the proposed Idaho Spent Fuel Facility for public review and comment on June 26, 2003, in accordance with 10 CFR 51.74 and 40 CFR 1503.1 (NRC, 2003). A 45-day public comment period began at that time as specified in 10 CFR 51.73. The public comment period ended on August 18, 2003, and NRC received more than 90 written comments.

Each comment letter was carefully reviewed and considered. Comments relating to similar issues and topics were grouped together and summarized. This type of categorization is permitted by NRC implementing regulations at 10 CFR 51.91 and Council on Environmental Quality National Environmental Policy Act regulations at 40 CFR 1503.4(b). The grouping, including editorial comments, follows the general outline of the draft EIS, and includes

- Editorial comments,
- Introduction,
- Alternatives,
- Description of the Affected Environment,
- Environmental Impacts, and
- Mitigation.

After grouping similar comments, responses were prepared to each of the comments or summaries of comments.

The grouped comments and the responses are contained in Appendix D of this EIS. When comments resulted in modifying or supplementing the information presented in the draft EIS, those changes are noted. In each case, NRC responded to all comments received during the public comment period.

1.6 Applicable Regulatory Requirements, Permits, and Regional Consultations

There are numerous applicable regulations, Federal and State licenses, permits, and other approvals required for the protection of the environment in connection with construction and operation of the Idaho Spent Fuel Facility. The NRC consultations are documented in Appendix B. Status of the negotiations between FWENC and the responsible regulatory agencies is provided in Section 12 of FWENC (2003a).

1.6.1 Applicable Statutes, Regulations, and Permits

1.6.1.1 Federal Statutes and Regulatory Requirements

The following Federal statutes are applicable to the proposed action:

- The Atomic Energy Act of 1954, as amended (42 USC §2011 et seq.), gives NRC authority to license and regulate the possession, use, storage and transfer of byproduct and special nuclear materials to protect public health and safety and the common defense and security. Section 202(3) of the Energy Reorganization Act of 1974, as amended (42 USC §5801 et seq.), permits NRC to license and regulate the DOE facilities used primarily for the receipt and storage of HLW resulting from activities licensed by the Atomic Energy Act. If the license application for the proposed Idaho Spent Fuel Facility is approved, it will be operated per an NRC license.

- The American Indian Religious Freedom Act of 1978 (42 USC §1996 et seq.) reaffirms Native American religious freedom in the First Amendment and ensures the protection to Native Americans to believe, express, and exercise their religious traditions. According to this law, sacred locations and traditional resources integral to the practice of their religions, as well as access to those locations, are protected.

- The Archaeological Resources Protection Act, as amended (16 USC §470aa et seq.), requires a permit for excavation or removal of archaeological resources from publicly held or Native American lands. If archaeological resources are discovered and removed, they are to remain the property of the United States. If a resource is found on land owned by a Native American tribe, the tribe must give its consent before a permit is issued, and the permit must contain terms or conditions requested by the tribe. Because the proposed construction area for the Idaho Spent Fuel Facility is on government-owned property and has been thoroughly surveyed, it is unlikely that any unknown sites will be discovered. If any resources are found, however, requirements of the Archaeological Resources Protection Act will be followed.

- The Clean Air Act, as amended (42 USC §7506 et seq.), establishes regulations to ensure air quality and authorizes individual states to manage permits. Compliance with the Idaho Administrative Procedures Act 58.01.01 and Rules for the Control of Air Pollution in Idaho meets Clean Air Act requirements (40 CFR Part 52) for nonradiological emissions. Radiological emissions to the air are regulated directly through the U.S. Environmental Protection Agency (EPA) National Emission Standards for Hazardous Air Pollutants requirements in 40 CFR Part 61.

- Section 402(a) of the Clean Water Act, as amended (33 USC §344 et seq.), establishes water quality standards for contaminants in surface waters. The Clean Water Act requires a National Pollutant Discharge Elimination System (NPDES) permit before discharging any point source pollutant into U.S. waters. Although the EPA can delegate permission, administration, and enforcement of the NPDES program to individual states, the State of Idaho does not have this delegation. There are no anticipated process discharges from the proposed facility, however, storm water and snow melt runoff from the proposed Idaho Spent Fuel Facility must be considered as part of the NPDES permitting process. DOE filed for a Construction General Permit in accordance with 40 CFR Part 122. By its provisions, FWENC is required to submit a notice of intent (EPA Form 3510-9) at least 2 days prior to the start of construction. The INEEL facility maintains storm water pollution prevention plans for industrial and Construction activities (DOE, 2001, 1998). A site-specific Construction Storm Water Pollution Prevention Plan will be developed, but does not need to be submitted to EPA. The proposed Idaho Spent Fuel Facility is exempt from the industrial activities storm water permit, because it is not included in EPA-identified sectors or subsectors requiring this permitting process (EPA, 2000).

- The Endangered Species Act, as amended (16 USC §1531 et seq.), is intended to prevent the further decline of endangered and threatened species and to restore these species and their habitats. The Act is jointly administered by the U.S. Departments of Commerce and the Interior. Section 7 of the Act requires consultation with the U.S. Fish and Wildlife Service to determine whether endangered and threatened species or their critical habitats are known to be in the vicinity of the proposed action. The NRC has completed the consultation process with the U.S. Fish and Wildlife Service (see Section 1.6.2 and Appendix B).

- The Native American Graves Protection and Repatriation Act of 1990 (25 USC §3001 et seq.) directs the Secretary of the Interior to administer the development of procedures and monitor unexpected discoveries of graves or grave-related artifacts that may be unearthed during ground disturbing activities on Federal or Tribal owned lands. The proposed location for the Idaho Spent Fuel Facility is on heavily disturbed land that has been surveyed for archeological resources. Although it is unlikely that an undiscovered site will be found, construction activities will be monitored to ensure that requirements of this Act will be followed in the event that resources are discovered.

- Section 106 of the National Historic Preservation Act of 1966, as amended (16 USC §470 et seq.), and its implementing regulations in 36 CFR Part 800 protect cultural and historic resources. If a particular Federal activity may affect historic properties, consultations with the State Historic Preservation Officer are required to ensure that potentially significant sites are properly identified and appropriate mitigative actions implemented. In 2001, the Idaho State Historic Preservation Officer was contacted by the Cultural Resources Management Office at INEEL regarding the potential construction activities of the proposed Idaho Spent Fuel Facility. A letter was sent by the INEEL Cultural Resources Management Office to the Idaho State Historic

Preservation Officer seeking concurrence that the proposed construction activities would not affect any historic properties. The Idaho State Historic Preservation Officer replied in a letter dated May 4, 2001, that the project could be completed with no effect to historic properties (Idaho State Historical Society, 2001). The NRC has completed its consultation process with the Idaho State Historic Preservation Officer (see Section 1.6.2 and Appendix B).

A Memorandum of Agreement was negotiated in 1998 between DOE, Idaho Field Office, and Idaho State Historic Preservation Officer for the Fuel Receiving and Storage building (CPP–603) within the INTEC boundaries and was submitted to the Advisory Council on Historic Preservation pursuant to 36 CFR 800.6 (A). The Memorandum of Agreement recognizes that the Fuel Receiving and Storage building will be “fully or partially decontaminated and dismantled (D&D) for reasons of environmental concern, human health and safety, security, and economy.” Although the construction of the proposed Idaho Spent Fuel Facility is not the impetus for the removal of the Fuel Receiving and Storage building, once the fuel has been transferred from that building to the proposed Idaho Spent Fuel Facility, the building will be in a more ready state for removal as referenced in the Memorandum of Agreement. The Memorandum of Agreement states the stipulations and requirements to be followed before and after the removal of the Fuel Receiving and Storage building.

- The Nuclear Waste Policy Act of 1982, as amended (42 USC §10101 et seq.), authorizes Federal agencies to develop a geologic repository for the permanent disposal of SNF and HLW. The Act specifies the process for selecting a repository site and constructing, operating, closing, and decommissioning the repository. DOE would apply for an NRC license according to regulations in 10 CFR Part 63. SNF that would be stored at the proposed Idaho Spent Fuel Facility would eventually be transported to a repository that becomes available, in accordance with the DOE shipment schedules.

- The Occupational Safety and Health Act of 1970, as amended (29 USC §651 et seq.), establishes standards to enhance safe and healthy working conditions in places of employment throughout the United States. The Act is administered and enforced by the Occupational Safety and Health Administration, a U.S. Department of Labor agency. The Occupational Safety and Health Administration jurisdiction is limited to safety and health conditions that exist in the workplace environment. In general, per the Act, it is the duty of each employer to furnish all employees with a place of employment free of recognized hazard likely to cause death or serious physical harm. Employees have a duty to comply with the occupational safety and health standards and all rules, regulations, and orders issued according to the Act. Occupational Safety and Health Administration regulations (published in Title 29 of the U.S. Code of Federal Regulations) establish specific standards for a safe and healthful working environment. DOE places emphasis on compliance with these regulations at DOE facilities and prescribes through DOE orders the Occupational Safety and Health Act standards that contracts shall meet, as applicable to the work at government-owned, contractor-operated facilities. DOE keeps and makes available the various records of minor illnesses, injuries, and work-related deaths required by Occupational Safety and Health Administration regulations.

- The Resource Conservation and Recovery Act (RCRA), as amended (42 USC §692 et seq.), requires EPA to establish standards for hazardous waste generators. As identified in 40 CFR Part 272, compliance with the requirements of the Idaho Hazardous Waste Management Program (Idaho Administrative Procedures Act 58.01.05) will meet requirements for permission, administration, and enforcement of RCRA.

- The Safe Drinking Water Act, as amended [42 USC §300 (F) et seq.], is intended to protect the quality of the public water supplies and sources of drinking water. The implementing regulations, administered by the EPA unless delegated to the states, establish standards applicable to public water systems. Other programs established by the Safe Drinking Water Act include the Sole Source Aquifer Program, the Wellhead Protection Program, and the Underground Injection Control Program. The Snake River Plain Aquifer below INEEL and the proposed Idaho Spent Fuel Facility is classified as a sole source aquifer.

- Executive Order 11988 (Floodplain Management) directs Federal agencies to establish procedures to ensure that the potential effects of flood hazards and floodplain management are considered for any action undertaken in a floodplain and that floodplain impacts be avoided to the extent practicable.

- Executive Order 12898 (Environmental Justice) directs Federal agencies to achieve environmental justice by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions. The Order creates an Interagency Working Group on Environmental Justice and directs each Federal agency to develop strategies within prescribed time limits to identify and address environmental justice concerns. The Order further directs each Federal agency to collect, maintain, and analyze information on the race, national origin, income level, and other readily accessible and appropriate information for areas surrounding facilities or sites expected to have a substantial environmental, human health, or economic effect on the surrounding populations, when such facilities or sites become the subject of a substantial Federal environmental administrative or judicial action, and to make such information publicly available.

- Executive Order 13007 (Indian Sacred Sites) directs Federal agencies, to the extent permitted by law and not inconsistent with agency missions, to avoid adverse effects to sacred sites and to provide access to those sites to Native Americans for traditional religious practices.

- Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments) directs Federal agencies to establish consistent consultation and collaboration with tribal governments in the development of Federal policies that are relative to tribal interests, to strengthen relationships between Federal and tribal governments, and to maintain significant communications.

1.6.1.2 State Licenses and Permits

Prior to submitting the November 2001 license application to NRC, FWENC consulted with the Idaho Department of Environmental Quality–Idaho Falls Regional Office, which is responsible for the geographic area that includes INEEL. The Idaho regional administrator is responsible for approving the Permit to Construct. As part of these consultations, FWENC committed to submit a Permit to Construct Categorical Exemption request at least 1 year prior to beginning construction at the proposed facility. FWENC also consulted with the Idaho Department of Environmental Quality INEEL Oversight Committee on August 15, 2001.

State permits include

- The State of Idaho regulates pollutant emissions through the Idaho Administrative Procedures Act 58.01.01, Rules for the Control of Air Pollution in Idaho. Because the proposed Idaho Spent Fuel Facility is not a major facility as defined by the Idaho Administrative Procedures Act 58.01.01, Part 006.55, and expected radionuclide emissions are less than 1 percent of the site boundary dose limit of 10 mrem/yr [0.1 mSv/yr], the proposed Idaho Spent Fuel Facility will be exempt from the need for a National Emission Standards for Hazardous Air Pollutants application. As appropriate, FWENC will provide documentation of the calculated emissions to the Idaho Department of Environmental Quality and the EPA to demonstrate compliance and to address requirements of the INEEL operations permit according to Title V of the Clean Air Act (FWENC, 2003, Section 12.2).

- The State of Idaho regulates hazardous waste through the Idaho Administrative Procedures Act 58.01.05, Rules and Standards for Hazardous Waste and incorporates the EPA RCRA requirements. Although the proposed Idaho Spent Fuel Facility will generate only small quantities of waste subject to the RCRA, and would, on its own, meet small quantity generator requirements, the proposed facility will be considered part of INEEL for RCRA waste accountability purposes. As a result, applicable sections of 40 CFR Part 270 for large quantity generators will be implemented in compliance with the existing INEEL RCRA permitting and in coordination with the DOE Idaho Operations Office and its management and operations contractor.

1.6.2 Consultations

The INEEL Cultural Resource Management Office consulted with the State Historic Preservation Officer for information on the historic, scenic, archaeological, architectural, and cultural aspects of the site of the proposed Idaho Spent Fuel Facility (Idaho State Historical Society, 2001). A supplemental report was prepared and provided as an appendix to the FWENC environmental report (FWENC, 2003a). In preparing this EIS, NRC consulted with the Idaho State Historic Preservation Officer (see Appendix B) to identify other parties to the proposed action and to confirm previous findings of no adverse impacts to historic properties. The Idaho State Historic Preservation Officer responded in a June 4, 2003, letter (Appendix B) agreeing with the NRC determination of “no effect” (Idaho State Historical Society, 2003). DOE currently maintains an INEEL Architectural Properties Management Plan and is party to a Memorandum of Agreement with the Idaho State Historic Preservation Officer (Braun, 2002; DOE, 2002a).

NRC consulted with the U.S. Fish and Wildlife Service (see Appendix B) to determine the status of endangered and threatened species that may be present at the site of the proposed Idaho Spent Fuel Facility and to evaluate the proposed action for compliance with the Endangered Species Act. The U.S. Fish and Wildlife Service responded in a June 10, 2003, letter agreeing with the NRC determination of “no effect” on Federally listed species or their critical habitat (U.S. Fish and Wildlife Service, 2003).

As part of the INEEL Long-Term Stewardship Strategic Plan (DOE, 2002b), DOE has committed to keep the Shoshone–Bannock Tribes informed of activities on INEEL. At the INEEL facility, DOE and the Shoshone–Bannock Tribes of the Fort Hall Reservation entered into an agreement in principle to govern formal communication.

1.6.3 Cooperating Agencies

During the scoping process, no Federal, state, or local agencies were identified as potential cooperating agencies in the preparation of this EIS.

1.6.4 Organizations Involved in the Proposed Action

Three organizations have specific roles in the proposed action:

DOE and its contractors operate and manage the activities at INEEL through the DOE Idaho Operations Office. These activities include managing SNF storage in accordance with the terms of the 1995 Settlement Agreement. With regard to the proposed action, DOE is responsible for moving the SNF from its current location at INTEC to the proposed Idaho Spent Fuel Facility adjacent to INTEC. SNF transfer activities will be performed in compliance with applicable DOE orders and procedures. DOE will retain ownership of the SNF stored in the proposed Idaho Spent Fuel Facility and will remain financially responsible for the eventual decontamination and decommissioning of the facility. According to terms of the 1995 Settlement Agreement, DOE is responsible for removing the SNF from Idaho prior to 2035.

FWENC is the license applicant. An indirect wholly owned subsidiary of Foster Wheeler Ltd., FWENC would design, construct, and initially operate the proposed Idaho Spent Fuel Facility per contract with DOE. According to terms of the contract, the specific fuel to be stored at the applicant facility consists of Cores 1 and 2 from the Peach Bottom Unit 1, High-Temperature, Gas-Cooled Reactor that operated from March 1966 until October 1974; various reflector modules and rods from Shippingport, an experimental light water breeder reactor that ceased operation in 1982; and SNF assemblies from various TRIGA reactors. As the holder of the NRC license, FWENC will be responsible for operating the proposed facility in compliance with applicable NRC regulations.

NRC is the licensing agency. NRC has the responsibility to evaluate the license application for compliance with the NRC regulations associated with dry storage installations. These include standards for protection against radiation in 10 CFR Part 20 and requirements for independent storage of SNF in 10 CFR Part 72. NRC is responsible for regulating activities performed within the proposed facility through its licensing review process and subsequent inspection program. To fulfill the NRC responsibilities under NEPA, the environmental impacts of the proposed action will be evaluated in accordance with the requirements of 10 CFR Part 51 and documented in this EIS.

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2 ALTERNATIVES

During the past 40 years, the U.S. Department of Energy (DOE) and its predecessor agencies have stored spent nuclear fuel (SNF) at the DOE facilities around the country, including the Idaho National Engineering and Environmental Laboratory (INEEL). The SNF has been stored in wet (in SNF pools/canals) or dry (in casks, vaults, or dry wells) facilities. In 1991, the State of Idaho initiated litigation against DOE related to the environmental impacts of SNF storage and transportation. During this litigation, DOE issued a record of decision (DOE, 1995a, 1996a) based on the Programmatic Spent Nuclear Fuel Management and INEEL Environmental Restoration and Waste Management Programs Final Environmental Impact Statement [referred to herein as the DOE programmatic SNF environmental impact statement (EIS)]. Volume 2 of the DOE programmatic SNF EIS dealt with the INEEL environmental restoration and waste management program (DOE, 1995b).

The DOE effort to manage the national issue of SNF involved evaluation of many national alternatives: No Action, Decentralization, 1992/1993 Planning Basis for INEEL and the Savannah River site, Regionalization, and Centralization. The detailed information on each alternative is provided in DOE programmatic SNF EIS (DOE, 1995b). The DOE programmatic SNF EIS identified Regionalization by Nuclear Fuel Type as the preferred national SNF management alternative. Consistent with these national alternatives, alternatives considered for the INEEL environmental restoration and waste management program, found in Volume 2 of the DOE programmatic EIS, included No Action; Ten-Year Plan; Minimum Treatment, Storage, and Disposal; and Maximum Treatment, Storage, and Disposal. The Ten-Year Plan was identified as the preferred alternative for SNF management at the INEEL site.

The record of decision (DOE, 1995a, 1996a) also designated Regionalization by Fuel Type as the chosen programmatic alternative for management of SNF. And, this record of decision announced the DOE decision to implement a modified version of the Ten-Year Plan, including construction of a dry fuel storage facility and other site-specific environmental restoration and waste management actions at INEEL.

In accordance with the DOE programmatic SNF EIS and the record of decision and as part of the implementation of the 1995 Settlement Agreement, DOE requested proposals from the private sector to design, license, construct, and operate an SNF dry storage facility. On May 19, 2000, DOE awarded a contract to Foster Wheeler Environmental Corporation (FWENC) (hereinafter, the applicant). One contract requirement was that FWENC obtain a U.S. Nuclear Regulatory Commission (NRC) license to receive, transfer, package, and store SNF at the proposed SNF dry storage facility.

2.1 Process Used to Formulate Alternatives

During the scoping process conducted to prepare this EIS, NRC solicited public input to help define alternatives to the proposed action by placing announcements in the *Federal Register* and local newspapers. Announcements and additional information on the proposed action were also posted on the NRC Idaho Spent Fuel Facility web page. During the public comment period, NRC received about 15 written comments from 2 organizations, none of which provided suggestions for alternatives beyond the proposed action and the no-action alternatives.

NRC reviewed the alternatives documented in the DOE programmatic SNF EIS (DOE, 1995b) and in the accompanying records of decision (DOE, 1995a, 1996a). NRC also examined alternatives proposed for construction and operation of the Three-Mile Island Unit-2 independent spent fuel storage installation (ISFSI) (NRC, 1998) which is located within the Idaho Nuclear Technology and Engineering Center (INTEC), as alternatives to the proposed Idaho Spent Fuel Facility. These alternatives were evaluated by NRC against the programmatic needs of the DOE SNF management program at INEEL and against the terms of the 1995 Settlement Agreement. The alternatives evaluated or eliminated are discussed in the following sections.

2.2 No-Action Alternative

The no-action alternative would be to not build the proposed Idaho Spent Fuel Facility. According to the no-action alternative, NRC would not approve the license application to receive, transfer, package, and store SNF at the proposed Idaho Spent Fuel Facility. Hence, DOE would continue to store the SNF from the Peach Bottom Unit 1 High-Temperature, Gas-Cooled Reactor, the Shippingport Light Water Breeder Reactor, and the training, research, and isotope reactors built by General Atomics (TRIGA reactor) SNF at their current locations within INTEC (see Figure 1-1). Remaining TRIGA reactor fuel will continue to be shipped and stored at INEEL as identified in the previous DOE records of decision (DOE, 1996a,b). Other SNF activities would continue as described in DOE (1995a,b). Other activities at the INTEC facility will continue as described in DOE (2002).

Short-term impacts of not constructing the proposed Idaho Spent Fuel Facility would be small. Current storage and fuel-handling facilities at INTEC, however, would be open and operational longer than planned. Ultimately, existing facilities would need to be modified or similar facilities to those described in the proposed action would need to be built. For example, the current storage location of Shippingport SNF at the INTEC Irradiated Spent Fuel Storage Facility (CPP–603) would be modified to expand the hot cell and add a load-out facility in lieu of the availability of the proposed Idaho Spent Fuel Facility. Long-term impacts would be similar to the proposed Idaho Spent Fuel Facility, because the SNF must be repackaged before shipment from INEEL to a geologic repository can occur.

2.3 Applicant's Proposed Action Alternative

The applicant's proposed action is to (i) receive SNF generated at Peach Bottom Unit 1, the Shippingport Light Water Breeder Reactor, and various TRIGA reactors from DOE; (ii) transfer SNF from the existing DOE storage facilities into new storage containers; and (iii) place the storage containers in a redundant confinement storage tube system consisting of a vault structure that provides radiological shielding and passive natural convection air cooling (FWENC, 2003a,b,c). The tallest structures would be about 24 m [80 ft]. DOE would transfer the SNF from its existing storage locations in INEEL to the proposed Idaho Spent Fuel Facility. Most of the SNF transfer would occur within the boundaries of INTEC over distances of 800 m [2,600 ft] or less (Figure 2-1), and all transfers would be conducted in accordance with INEEL procedures and DOE orders. Movement and transfer of SNF within the proposed Idaho Spent Fuel Facility site would be conducted according to the provisions of 10 CFR Part 72. As described by FWENC, the proposed action can be divided into four major activities: (i) facility construction, (ii) fuel-handling operations, (iii) storage operations, and (iv) decontamination and decommissioning. Additional aspects of the proposed action include monitoring, emergency planning, and quality assurance.

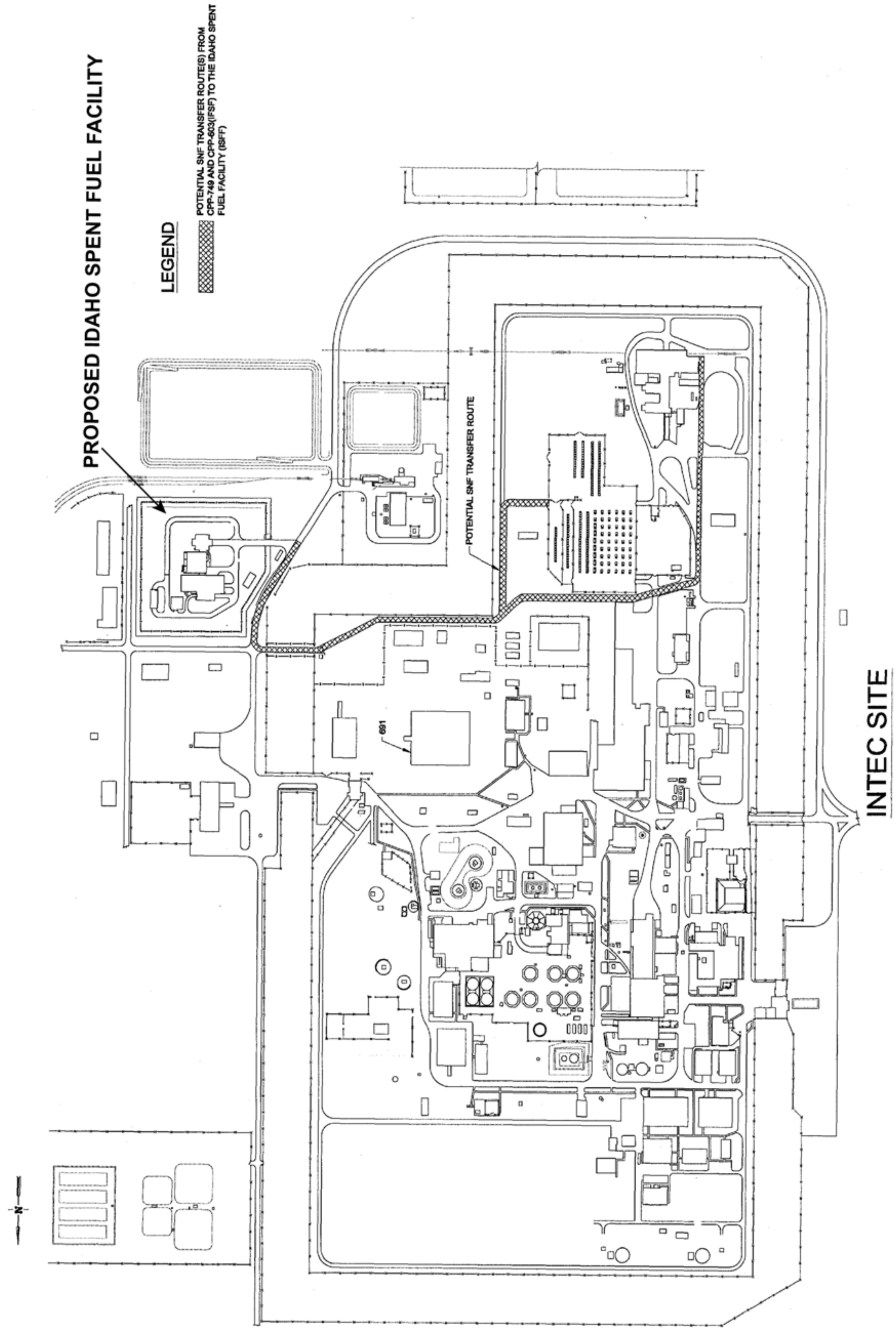


Figure 2-1. Location of the Proposed Idaho Spent Fuel Facility (Modified from FWENC, 2003d)

2.3.1 Facility Construction

If constructed, the proposed Idaho Spent Fuel Facility will be located on a previously disturbed site adjacent to INTEC (Figure 2-1). INTEC occupies about 101 ha [250 acres] of the south-central portion of INEEL and is 68 km [42 mi] west of Idaho Falls, Idaho. The proposed Idaho Spent Fuel Facility site would occupy 3.2 ha [8 acres] adjacent to the southeast boundary of INTEC. In addition to the site, about 4.1 ha [10 acres] east of the site would be disturbed to provide a laydown area during construction. Mobile construction equipment will excavate the foundation and establish the facility grade. Explosives would not be used to establish below-grade areas. The facility would consist of a fully enclosed two-story building with three principal areas for cask receipt, fuel transfer operations, and fuel storage (Figure 2-2). The principal areas are connected by a below-grade tunnel designed to transfer fuel throughout the facility via shielded, rail-mounted trolleys. Support structures such as a warehouse, administrative offices, a guard house, a visitor center, and a parking area are also planned for the facility. During construction, equipment delivering cement and other construction materials would access the site. Construction is anticipated to last nearly 2 years (FWENC, 2003c).

2.3.2 Fuel-Handling Operations

The proposed Idaho Spent Fuel Facility would be fully enclosed to allow year-round operations for receipt, packaging, and storage of SNF.

The Cask Receipt Area (Figure 2-2) would provide for transfer of incoming DOE transport casks from truck-mounted transporters to the rail-mounted trolley for movement into other areas within the proposed Idaho Spent Fuel Facility. The two-story Cask Receipt Area would use a single-failure-proof crane to lift the transport cask from its transport vehicle and place it on a rail-mounted trolley for transfer within the proposed facility. The rail-mounted trolley would move in an enclosed Transfer Tunnel that connects the Cask Receipt Area with the Transfer and Storage Areas.

The Transfer Area (Figure 2-2) comprises the Fuel Packaging Area and the Canister Closure Area. These areas would provide the facilities for remote-controlled unloading of the DOE transport cask. After removal from the DOE transfer cask, the SNF would be inspected, inventoried, and repackaged into new storage containers designed to be compatible with future transportation and disposal requirements. The containers would be welded closed, vacuum dried, and backfilled with helium to provide an inert storage environment for the SNF. SNF handling would be performed entirely by remote manipulation using a fuel-handling machine and master/slave manipulators. The Transfer Area would be equipped with shielded windows and a closed-circuit television system to aid in remote operations. Fuel-handling operations are anticipated to last about 3 years.

2.3.3 Storage Operations

The Storage Area (Figure 2-2) would provide for the interim dry storage of the SNF. The Storage Area would include reinforced concrete storage vaults covering an area 24 × 15 m [79 × 49 ft]. The storage vaults would provide passively cooled housing for 246 below-grade storage tubes in which the containers would be placed (Figure 2-3). The area above the concrete vault would be enclosed in a two-story, metal-sided building to facilitate year-round

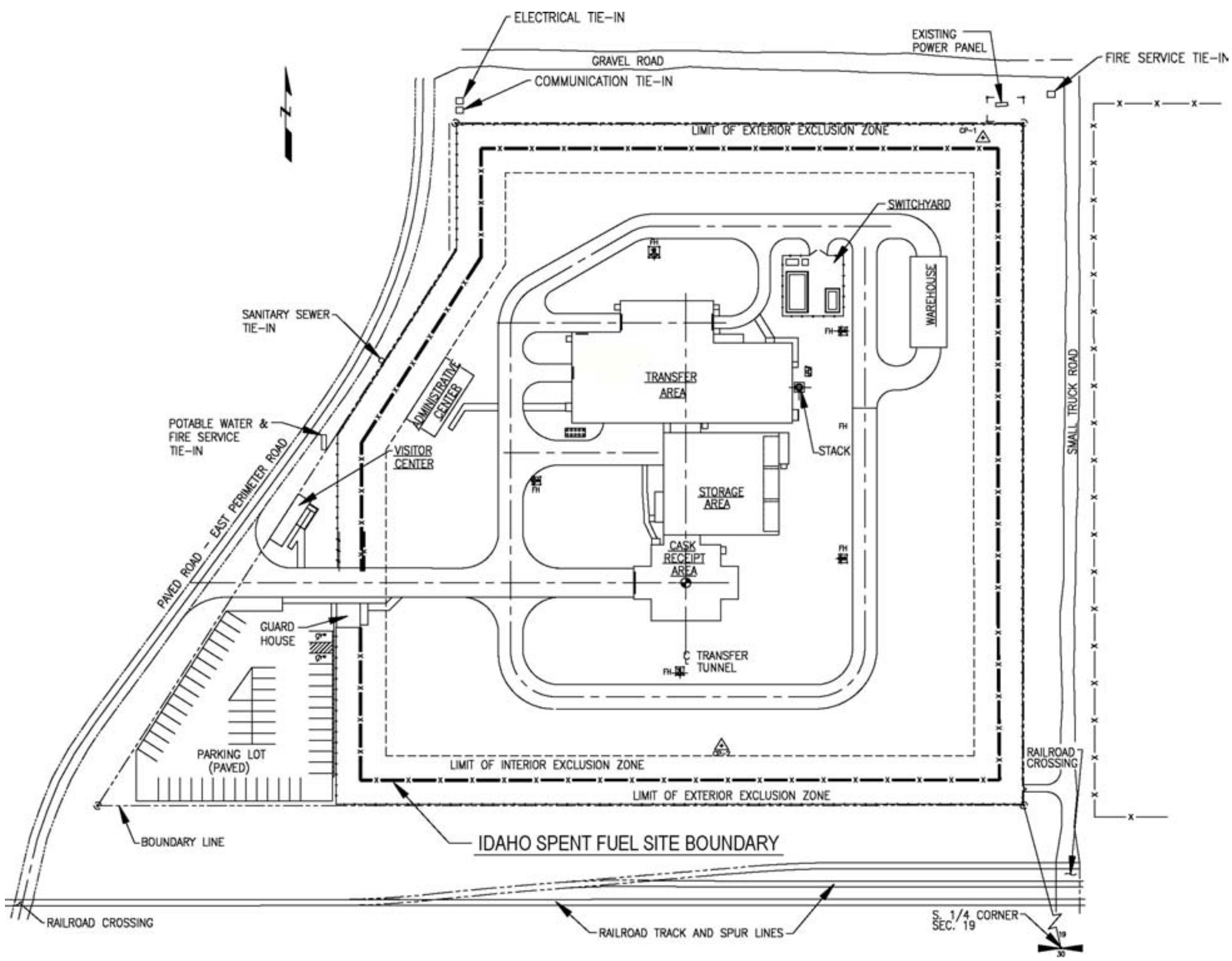


Figure 2-2. Site Plan for the Proposed Idaho Spent Fuel Facility (Modified from FWENC, 2003b)

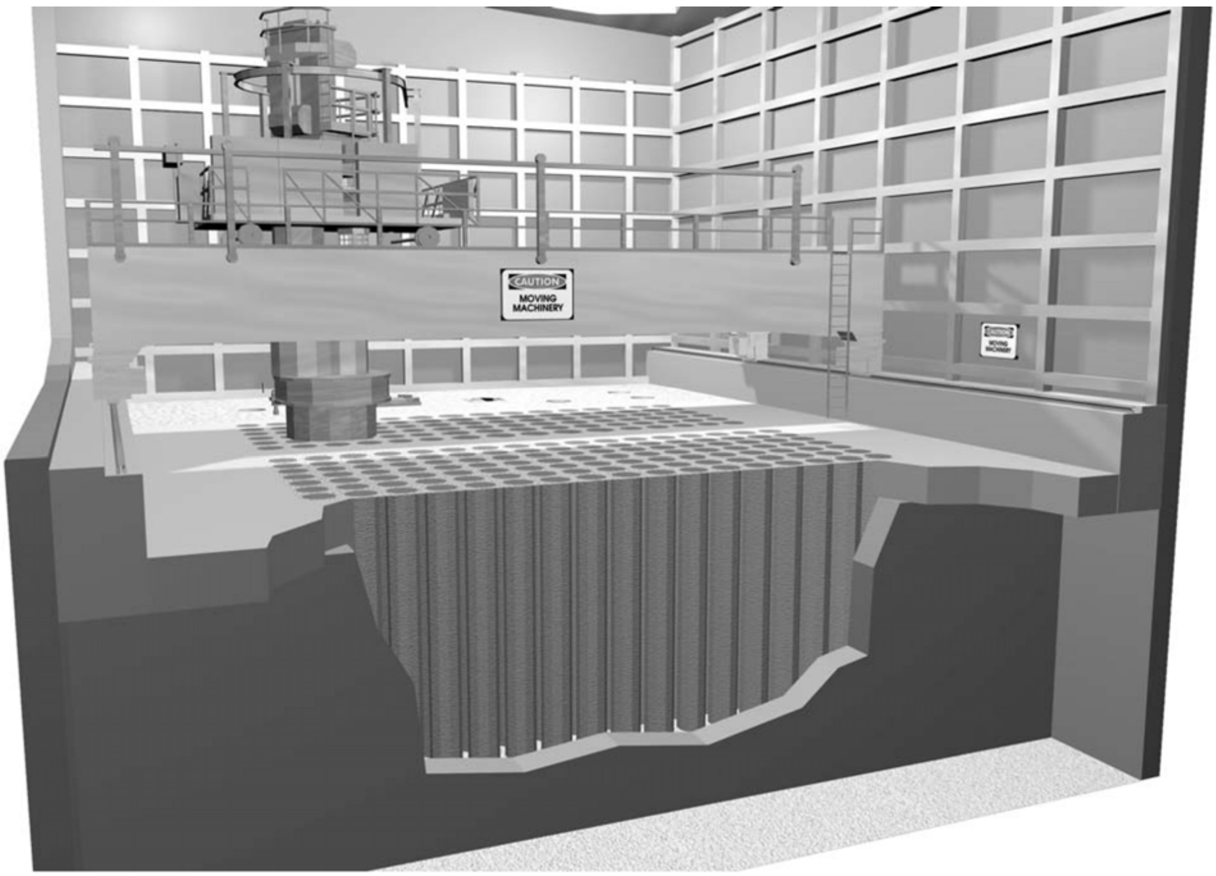


Figure 2-3. Schematic Storage Vault Configuration for the Proposed Idaho Spent Fuel Facility (Modified from FWENC, 2003b)

SNF loading operations. Each storage tube would provide interim storage for a single container. A canister-handling machine would move the individual containers from the Transfer Tunnel to the storage tube location. After the container is lowered into a storage tube, the storage tube would be sealed with a cover plate with dual metallic seals, and the air would be evacuated. The storage tubes would then be filled with an inert gas to further reduce the potential of corrosion during storage.

Material balances and SNF inventories at the proposed Idaho Spent Fuel Facility would be used to ensure safe container storage. Each container would be labeled with a unique identifier. Information, including location, on all storage containers would be documented and kept with other proposed Idaho Spent Fuel Facility records. Prior to any movement of a container, established procedures would require a review of the documentation to help ensure the proper container is being moved. In addition, a physical inventory of the containers at the proposed Idaho Spent Fuel Facility would be performed in accordance with NRC requirements to ensure all containers are untampered with and are in their assigned locations. Records of the results of the current inventory, material control, and accounting procedures would be maintained in accordance with requirements of 10 CFR Part 72 and retained until termination of the NRC license.

The SNF would remain in storage at the proposed Idaho Spent Fuel Facility until a high-level waste (HLW) geologic repository becomes available. The storage containers would then be removed from the facility, loaded into a transportation cask (to be licensed in accordance with 10 CFR Part 71), and transported offsite by DOE. Because of uncertainties in scheduling fuel shipment to a geologic repository, it is difficult to place a time limit on the duration of fuel storage at the proposed facility. The terms of the 1995 Settlement Agreement call for shipment of fuel by 2035, so storage may be as long as about 27 years. After removal, the facility would be decontaminated and decommissioned in accordance with the NRC regulations.

2.3.4 Monitoring and Emergency Response

Process and effluent radiation monitoring for the proposed Idaho Spent Fuel Facility would include criticality monitoring, area radiation monitoring, radiation signature monitoring, continuous air monitoring, and record sample air monitoring. Because there would be no liquid releases, the only effluent radioactive release point would be the exhaust stack. Continuous air monitors would be used to monitor the general level of airborne material in work areas and to detect breakthrough of the high efficiency particulate air filters downstream of the Fuel Packaging Area. Effluent monitoring would consist of exhaust stack sampling for particulate radionuclides, iodine-129, and tritium. Any undue rise in radiation levels would trigger an alarm to signal a prompt evacuation of the immediate area. All monitoring would be conducted in accordance with radiation protection standards in 10 CFR Part 20 (FWENC, 2003a, Section 6).

Primary emergency response at the proposed Idaho Spent Fuel Facility would be provided by DOE and its qualified management and operating contractor staff located at INEEL. In accordance with the requirements of 10 CFR Part 72, FWENC must have an approved emergency plan. FWENC has submitted an emergency plan that will be reviewed by NRC in preparing the safety evaluation report for the proposed Idaho Spent Fuel Facility (FWENC, 2003e).

2.3.5 Quality Assurance

In compliance with the requirements of 10 CFR Part 72, Subpart G, activities associated with design, fabrication, construction, testing, operation, modification, and decommissioning of the structures, systems, and components of the proposed Idaho Spent Fuel Facility would be conducted in accordance with an approved quality assurance program. FWENC would ensure the provisions of the Quality Program Plan and its implementation are understood by the personnel involved in their execution (FWENC, 2003b, Section 11). FWENC also would maintain an adequate complement of trained and certified personnel prior to receipt of the SNF for storage and throughout the different phases of the project.

2.4 Other Reasonable Alternatives

The proposed action is consistent with both the programmatic objectives and the preferred alternative identified in earlier DOE National Environmental Policy Act (NEPA) analyses (DOE, 1995a,b). Also, no additional alternatives to the proposed action were identified during the public scoping process. The proposed action and the no-action alternatives are considered to bound the impacts of storing the designated SNF. Based on these considerations, other alternatives to meet the DOE programmatic obligations from the 1995 Settlement Agreement are reasonably likely to result in equal or larger environmental impacts.

2.5 Alternatives Considered but Eliminated

In preparing its programmatic EIS for SNF management at the INEEL (DOE, 1995b), DOE considered numerous alternatives to dry SNF storage at INEEL:

- No Action;
- The Ten-Year Plan;
- Minimum Treatment, Storage, and Disposal; and
- Maximum Treatment, Storage, and Disposal.

Based on these considerations, the DOE record of decision (DOE, 1995a, 1996a) selected a modified Ten-Year Plan for SNF management at the INEEL as the preferred alternative for meeting programmatic objectives. The modified Ten-Year Plan was considered to be consistent with the terms of the 1995 Settlement Agreement and included the construction of dry interim storage facilities similar to the proposed action (DOE, 1995b, Volume 2, Part B, Appendix C). The proposed action considered in this EIS is a part of the modified Ten-Year Plan alternative documented in that DOE 1995 record of decision.

In 1998, DOE obtained an NRC license to construct and operate an ISFSI at the INTEC facility for fuel debris from Three-Mile Island Unit 2. In fulfilling NEPA requirements of 10 CFR Part 51, NRC developed an EIS (NRC, 1998). That EIS was prepared by adopting previous DOE NEPA analyses (DOE, 1995b, 1997). Several alternatives to dry-cask storage were considered that are relevant to the proposed action:

- Construct New Wet Storage;
- Store Three-Mile Island Unit 2 Fuel in Existing INTEC Storage Systems;

- Construct an ISFSI Test Area North; and
- Construct an ISFSI at a Point Removed from Above the Snake River Plain Aquifer.

These alternatives were eliminated from consideration on the basis of not meeting the programmatic objectives for fuel consolidation at INTEC documented in the DOE record of decision (DOE, 1995a, 1996a).

Similar to the Three-Mile Island Unit 2 ISFSI, the proposed Idaho Spent Fuel Facility is part of the DOE effort to meet the terms of the 1995 Settlement Agreement. In developing design criteria for a dry ISFSI at INEEL, DOE specified operational performance characteristics and specific design criteria such as container dimensions, year-round operation, storage containers that can be transported by truck or rail, personnel and public exposure limits, and minimization of decommissioning activities (FWENC, 2003a). In evaluating design approaches, DOE considered cost and value to the government. Based on these objectives and criteria, DOE selected the FWENC design for the proposed Idaho Spent Fuel Facility.

Dry fuel storage is the alternative preferred by DOE for SNF consolidation and management at INEEL. Other alternatives either do not meet programmatic objectives or do not meet the terms of the 1995 Settlement Agreement. Based on previous DOE and NRC NEPA analyses (DOE, 1995b; NRC, 1998) and comments received during the public scoping period, the proposed action alternative and the no-action alternatives are likely to bound the impacts of dry fuel storage at INEEL, and only these alternatives are evaluated in this EIS.

2.6 Comparison of the Predicted Environmental Impacts

A more detailed evaluation of the environmental impacts of the proposed action and the no-action alternative is presented in Section 4 of this EIS. The impacts are summarized in Table 2-1.

2.7 Final Recommendation Regarding the Proposed Action

After weighing the small impacts, costs, and benefits of the proposed action and comparing alternatives (see Sections 2.6, 4.15, and 7 of this EIS), the NRC staff, in accordance with 10 CFR 51.91(d), set forth their final NEPA recommendation regarding the proposed action. The NRC staff recommend that, unless safety issues mandate otherwise, the action called for is the issuance of the proposed license to FWENC. In this regard, the NRC staff conclude (i) the applicable environmental monitoring program described in Section 6 and (ii) the proposed mitigation measures discussed in Section 5 would eliminate or substantially lessen any potential adverse environmental impacts associated with the proposed action.

Environmental Impacts

NRC has established guidance for assessing environmental impacts. Each impact should be assigned one of three significance levels:

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

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

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

Table 2-1. Summary of Environmental Impacts for the Proposed Idaho Spent Fuel Facility and the No-Action Alternative		
	Impacts	
Affected Environment	**Proposed Idaho Spent Fuel Facility**	**No-Action Alternative[a]**
Land Use	SMALL. Construction activities to occur on a 3.2-ha [8-acre] facility site and an adjoining 4.1-ha [10-acre] laydown area. The 7.3 ha [18 acres] are adjacent to the southeast corner of INTEC and have been previously disturbed by other construction activities and land uses. Operational impacts include restricted access to the 3.2-ha [8-acre] facility site and use of the site for SNF receiving, processing, and storage.	SMALL. No additional short-term impacts would occur because SNF would continue to be stored at existing facilities. There would be no construction or operational activities, and the land would continue to be used as a restricted access construction laydown area. In the longer term, additional facilities may be necessary to prepare SNF for shipment to a HLW repository, with a likely impact on land use similar to the proposed action.
Transportation	SMALL. Operational impacts are related to transfer of the SNF from current storage facilities at INTEC, a distance of 800 m [2,600 ft] or less to the proposed Idaho Spent Fuel Facility, and shipment of the remaining TRIGA fuel to INEEL for storage at the proposed Idaho Spent Fuel Facility. Onsite transfers will be made in DOE-supplied casks loaded on trailers and managed in accordance with DOE orders and procedures.	SMALL. No additional short-term impacts would occur because SNF would continue to be stored at existing facilities. No fuel transfers would occur. TRIGA fuel would continue to be shipped to INEEL for storage in existing facilities. In the longer term, additional facilities may be necessary to prepare SNF for shipment to a HLW repository, with a likely impact on transportation similar to the proposed action.
Geology and Soil	SMALL. Construction-related impacts to soil will occur on the 3.2-ha [8-acre] site and, to some extent, on the 4.1-ha [10-acre] laydown area. Excavation, earthmoving, and grading will occur on the 3.2-ha [8-acre] site. There is no soil contamination at the site above regulatory limits. No construction or operational impacts will occur on known mineral deposits or unique geological resources.	SMALL. No additional short-term impacts would occur because SNF would continue to be stored at existing facilities. There would be no construction or operational activities, and the land would continue to be used as a restricted access construction laydown area. In the longer term, additional facilities may be necessary to prepare SNF for shipment to a HLW repository. If the same area is chosen for these facilities, the likely impact on geology and soils would be similar to the proposed action.

Table 2-1. Summary of Environmental Impacts for the Proposed Idaho Spent Fuel Facility and the No-Action Alternative (continued)

Affected Environment	Impacts	
	Proposed Idaho Spent Fuel Facility	**No-Action Alternative[a]**
Water Quality	SMALL. Construction phase impacts will be minimal to both surface water quality and groundwater quality. A storm water pollution prevention plan is in effect at INEEL. The proposed site is 140 to 146 m [460 to 480 ft] above the Snake River Plain Aquifer. Water used for construction phase dust control will evaporate or seep into surface soils. No new groundwater wells or percolation ponds will be required. There are no planned liquid discharges from the facility.	SMALL. No additional short-term impacts would occur because SNF would continue to be stored at existing facilities. There would be no construction or operational activities, and water quality would not be affected. In the longer term, additional facilities may be necessary to prepare SNF for shipment to a HLW repository. Depending on the design of these facilities, the likely impact on water quality would be similar to the proposed action.
Water Use	SMALL. During the first year of construction, about 1.5 million L [396,000 gal] of water will be used for dust suppression, with an additional estimated 1.91 million L [505,000 gal] for concrete production at the site. During the second year of construction, it is estimated that water needs will be reduced by half. Drinking water usage during operation will be about 141,950 L/mo [37,500 gal/mo]. These amounts are a small fraction of the 7.4 billion L [2.0 billion gal] used annually at the INEEL and the annual withdrawal of 43 billion L [11.4 billion gal] permitted by the DOE/State of Idaho Water Rights Agreement. Wastewater treatment requirements will be met via existing INTEC facilities.	SMALL. No additional short-term impacts would occur because SNF would continue to be stored at existing facilities. There would be no construction or operational activities, and water usage would continue at current rates. In the longer term, additional facilities may be necessary to prepare SNF for shipment to a HLW repository. Depending on the design of these facilities, the likely impact on water usage would be similar to the proposed action.
Ecology	SMALL. Minimal impacts from the construction and operation of the facility are anticipated. There are no wetlands or habitats for threatened or endangered plant or animal species at the 3.2-ha [8-acre] site or 4.1-ha [10-acre] laydown area. Secondary impacts on wildlife from noise and various human activities are expected to be minimal, of short duration, or both .	SMALL. No additional short-term impacts would occur because SNF would continue to be stored at existing facilities. There would be no construction or operational activities, and the land would continue to be used as a restricted access construction laydown area. In the longer term, additional facilities may be necessary to prepare SNF for shipment to a HLW repository, with a likely impact on ecological resources similar to the proposed action.

Table 2-1. Summary of Environmental Impacts for the Proposed Idaho Spent Fuel Facility and the No-Action Alternative (continued)		
	Impacts	
Affected Environment	Proposed Idaho Spent Fuel Facility	No-Action Alternative[a]
Air Quality	SMALL. Construction-related fugitive dusts and exhaust emissions will be temporary and highly localized. With construction phase watering, the fugitive dusts and particulates will be about 8.2 metric tons [9 tons]; this is small in relation to the INEEL emission inventory for particulates. No impacts to radiological air quality are anticipated from construction activities. During operation, there will be no chemical air discharges, and the vehicular exhausts will be small and within limitations. Therefore, no significant impacts to nonradiological air quality are anticipated. Facility operations are not expected to result in the atmospheric discharge of significant amounts of gaseous radioactive effluents. The facility is fully enclosed and includes a special ventilation system along with HEPA filters. Monitoring of stack emissions for particulate radionuclides, iodine-129, and tritium will be used to identify any releases.	SMALL. No additional short-term impacts would occur because SNF would continue to be stored at existing facilities. There would be no construction or operational activities, and the land would continue to be used as a restricted access construction laydown area. In the longer term, additional facilities may be necessary to prepare SNF for shipment to a HLW repository. Depending on the construction methods and design of these facilities, the likely impact on air quality would be similar to the proposed action.
Noise	SMALL. Construction phase noise levels will be typical of industrial areas; further, they will be temporary and highly localized. Noise from construction and operational traffic will be minimal in relation to existing traffic noise levels in the INTEC area. Potential noise levels from operations will be less than those from construction. Hearing protection will be required for workers per 29 CFR 1910.95. No unique noise receptors are in the vicinity of the proposed Idaho Spent Fuel Facility site. Therefore, noise impacts are not expected to be significant.	SMALL. No additional short-term impacts would occur because SNF would continue to be stored at existing facilities. There would be no construction or operational activities, and the land would continue to be used as a restricted access construction laydown area. In the longer term, additional facilities may be necessary to prepare SNF for shipment to a HLW repository. Depending on the construction methods and design of these facilities, the likely noise impacts would be similar to the proposed action.
Historical, Cultural, and Paleontological Resources	SMALL. There are no known historic, cultural resources, or paleontological resources within the 3.2-ha [8-acre] site and 4.1-ha [10-acre] laydown area. Thirty-eight buildings and structures within INTEC are potentially eligible for the National Register of Historic Places, although only two (CPP–603 and CPP–642) are close to the current storage location or proposed transfer routes. There are no plans for modification or demolition of either of these buildings. The proposed facility would not introduce a built environment into a pristine natural setting. There are potential cumulative effects from withdrawal of access to the proposed 7.3-ha [18-acre] site by the Shoshone–Bannock Tribes, but these lands already are contained within the limited access buffer area around INTEC.	SMALL. No additional short-term impacts would occur because SNF would continue to be stored at existing facilities. There would be no construction or operational activities, and the land would continue to be used as a restricted access construction laydown area. In the longer term, additional facilities may be necessary to prepare SNF for shipment to a HLW repository. If the same area is chosen for these facilities, the likely impact on historical, cultural, and paleontological resources would be similar to the proposed action.

Table 2-1. Summary of Environmental Impacts for the Proposed Idaho Spent Fuel Facility and the No-Action Alternative (continued)		
	Impacts	
Affected Environment	Proposed Idaho Spent Fuel Facility	No-Action Alternative[a]
Visual/Scenic Resources	SMALL. Because of its smaller scale in relation to the adjacent INTEC facilities, construction and operation of the proposed Idaho Spent Fuel Facility would not cause significant visual impacts to the BLM Class IV rating for the INTEC area. Fugitive dusts and exhaust emissions from construction would be localized and temporary and would not impair the BLM Class III rating of lands adjacent to INEEL, nor would the minimal to nil releases of radioactive particulates and gases during operations. No significant visual or scenic impacts are anticipated.	SMALL. No additional short-term impacts would occur because SNF would continue to be stored at existing facilities. There would be no construction or operational activities, and the land would continue to be used as a restricted access construction laydown area. In the longer term, additional facilities may be necessary to prepare SNF for shipment to a HLW repository. Depending on the construction methods and design of these facilities, the likely visual/scenic impacts would be similar to the proposed action.
Socioeconomic	SMALL. The total population in 2000 in the 7-county region of influence was 250,365, and population in the region of influence is estimated to reach almost 269,000 by 2005 and 339,700 by 2025. In the 1990s, employment in the region of influence grew at an average annual rate of about 2.6 percent. The region of influence experienced the lowest unemployment rate in a decade in 2000—4.0 percent. This rate was lower than the 4.9 percent for the state, though rates varied widely in the region of influence (from 2.5 percent in Madison County to 5.0 percent in Bannock County). The proposed Idaho Spent Fuel Facility would employ a maximum of 250 construction workers during the 2-year construction period and 60 workers during the first 3 years of operations. These numbers are small relative to the total employment at INEEL; for example, in fiscal year 2001, INEEL accounted for 8,100 jobs, or about 6 percent of the total jobs in the region of influence. Finally, housing and key community services such as education, law enforcement, fire protection, and medical services do not appear to be overstressed in the region of influence, and the additional workers can be accommodated in the region.	SMALL. No additional short-term impacts would occur because SNF would continue to be stored at existing facilities. The land would continue to be used as a restricted access construction laydown area. About 250 construction jobs and 60 operational jobs would not be created. In the longer term, additional facilities may be necessary to prepare SNF for shipment to a HLW repository. Depending on the construction methods and design of these facilities, the likely number of jobs created would be similar to the proposed action.
Environmental Justice	SMALL. The environmental justice study area was chosen to encompass an 80-km [50-mi] radius around INTEC. This area includes portions of the seven counties composing the region of influence for socioeconomics. Based on the 2000 census data, the minority population within 80 km [50 mi] of the proposed facility is about 12 percent of the total populations, and is comprised primarily of Native American, Hispanic, and Asian peoples. The low-income population within 80 km [50 mi] is about 13 percent of the total population. Overall, impacts from the proposed Idaho Spent Fuel Facility are small and do not disproportionately affect minority and low-income populations.	SMALL. No additional short-term impacts would occur because SNF would continue to be stored at existing facilities. There would be no construction or operational activities, and the land would continue to be used as a restricted access construction laydown area. In the longer term, additional facilities may be necessary to prepare SNF for shipment to a HLW repository, with a likely impact on environmental justice concerns similar to the proposed action.

Table 2-1. Summary of Environmental Impacts for the Proposed Idaho Spent Fuel Facility and the No-Action Alternative (continued)

	Impacts	
Affected Environment	**Proposed Idaho Spent Fuel Facility**	**No-Action Alternative[a]**
Public and Occupational Health and Safety	SMALL. Potential impacts were examined for normal, off-normal, and accident conditions. For normal operating conditions, no chemical discharges are planned, and a health and safety program will be in place for the workers. The primary pathway for offsite radiation exposure to the public is from atmospheric emissions of radioactive particulates, iodine-129, tritium, and a few other radionuclides. Iodine-129 and tritium contribute about 80 percent of the total dose. The estimated annual dose for the maximally exposed individual at the southern boundary of INEEL is 3×10^{-7} mSv [3×10^{-5} mrem] from the proposed Idaho Spent Fuel Facility; from all nearby facility operations (including the proposed Idaho Spent Fuel Facility), the dose is less than 0.0032 mSv [0.32 mrem]. The regulatory annual dose limit is 0.1 mSv [10 mrem], and the natural background annual radiation is 3.6 mSv [360 mrem] in this general area. Therefore, public radiation impacts during normal operation of the proposed Idaho Spent Fuel Facility are not significant. Occupational radiological doses to construction workers from the construction of the proposed Idaho Spent Fuel Facility will be less than 0.0032 mSv [0.32 mrem] annually. The NRC annual occupational limit is 50 mSv [5,000 mrem], and the natural background radiation dose is 3.6 mSv [360 mrem]. The maximum occupational doses to SNF-handling workers is 9.1 mSv [910 mrem] annually, with the NRC annual occupational limit of 50 mSv [5,000 mrem]. The annual radiation dose to all workers within an 8-km [5-mi] radius is 6.68×10^{-5} person-mSv [6.68×10^{-3} person-mrem]. Detailed analyses of the radiation doses from off-normal events and accidents at the proposed Idaho Spent Fuel Facility are in the safety analysis report[b] and will be evaluated as part of the NRC Safety Evaluation Report. Further, analyses also were made of the public and occupational health impacts of external events such as flooding, aircraft impact, volcanic hazards, seismic hazards, and extreme wind and wind-generated missiles. Design features and operational practices are expected to ensure the public and occupational health impacts of these events and accidents are small.	SMALL. No additional short-term impacts would occur because SNF would continue to be stored at existing facilities. There would be no construction or operational activities, and the land would continue to be used as a restricted access construction laydown area. In the longer term, additional facilities may be necessary to prepare SNF for shipment to a HLW repository. Depending on the design of these facilities, the likely impact on public and occupational health and safety would be similar to the proposed action.

Table 2-1. Summary of Environmental Impacts for the Proposed Idaho Spent Fuel Facility and the No-Action Alternative (continued)

Affected Environment	Impacts	
	Proposed Idaho Spent Fuel Facility	No-Action Alternative[a]
Waste Management	SMALL. Small quantities of gaseous, liquid, and solid low-level radioactive waste will be generated during the SNF receipt and repackaging operations planned for the first 3 years. Once fuel is repackaged and stored, no gaseous releases or liquid or solid radioactive wastes are anticipated on a regular basis from routine activities. Less than 19,700 L [5,200 gal] of low-level liquid wastes will be generated annually from nonroutine decontamination activities. The INEEL Radioactive Waste Management Complex has the capacity to handle the small quantities of wastes generated during the storage period for the repackaged SNF.	SMALL. No additional short-term impacts would occur because SNF would continue to be stored at existing facilities. There would be no construction or operational activities, and the land would continue to be used as a restricted access construction laydown area. No new wastes would be created or added to the existing waste stream. In the longer term, additional facilities may be necessary to prepare SNF for shipment to a HLW repository. Depending on the design of these facilities, the likely impact on waste management activities at INEEL would be similar to the proposed action.

BLM = Bureau of Land Management
DOE = U.S. Department of Energy
EIS = environmental impact statement
FWENC = Foster Wheeler Environmental Corporation
HEPA = high efficiency particulate air
HLW = high-level waste
INEEL = Idaho National Engineering and Environmental Laboratory
INTEC = Idaho Nuclear Technology and Engineering Center
NRC = U.S. Nuclear Regulatory Commission
SNF = spent nuclear fuel
TRIGA = training, research, and isotope reactors built by General Atomics

[a] Environmental impacts of current and planned DOE programs are addressed in two existing NEPA documents [(DOE. DOE/EIS–0203–F, "Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement." Idaho Falls, Idaho: DOE, Idaho Operations Office. 1995); (DOE. DOE/EIS–0287–F, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002)].
[b] FWENC. "Safety Analysis Report, Idaho Spent Fuel Facility." NRC Docket No. 72-25. ISF–FW–RPT–0033. Rev. 2. Morris Plains, New Jersey: FWENC. 2003.

The NRC staff have preliminarily concluded the overall benefits of the proposed Idaho Spent Fuel Facility outweigh the disadvantages and costs, based on consideration of the following:

- The proposed Idaho Spent Fuel Facility will have small impacts on the physical environment and human communities in the vicinity. Long-term impacts of the no-action alternative are likely to be similar to the impacts of the proposed action.
- The proposed action is designed to support the INEEL mission and comply with agreements and commitments negotiated by DOE, including the 1995 Settlement Agreement among DOE, the State of Idaho, and the U.S. Navy to remove SNF from Idaho by 2035.
- Currently, most of the SNF to be received by the proposed Idaho Spent Fuel Facility is stored at INTEC. Transfer distances from current storage locations to the proposed facility are relatively short.
- The current storage configuration does not prepare the SNF for shipment from INEEL to a national HLW repository.

The proposed Idaho Spent Fuel Facility will provide the ability to remove the SNF from existing canisters, place it in specially designed storage containers, then seal and place the loaded containers in interim storage. The new containers are designed to be compatible with transportation systems and with the eventual permanent disposal systems. Hence, once the SNF is placed in the canisters, it would not need to be repackaged for shipment to a national HLW repository when one becomes available.

2.8 References

DOE. DOE/EIS–0287–F, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.

———. DOE/EA–1217, "Environmental Assessment. Test Area North Pool Stabilization Project." Idaho Falls, Idaho: DOE, Idaho Operations Office. 1997.

———. "Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs." *Federal Register.* Vol. 61. pp. 9441–9443. March 8, 1996a.

———. "Record of Decision for the Final Environmental Impact Statement on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel; Notice." *Federal Register.* Vol. 61. pp. 25092–25103. May 17, 1996b.

———. "Environmental Statements Availability, etc; Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs." *Federal Register*. Vol. 60. pp. 28680–28696. June 1, 1995a.

———. DOE/EIS–0203–F, "Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement." Idaho Falls, Idaho: DOE, Idaho Operations Office. 1995b.

FWENC. "Environmental Report, Idaho Spent Fuel Facility." NRC Docket No. 72-25, ISF–FW–RPT–0032. Rev. 3. Morris Plains, New Jersey: FWENC. 2003a.

———. "Safety Analysis Report, Idaho Spent Fuel Facility." NRC Docket No. 72-25. ISF–FW–RPT–0033. Rev. 3. Morris Plains, New Jersey: FWENC. 2003b.

———. "License Application, Idaho Spent Fuel Facility." NRC Docket No. 72-25. ISF–FW–RPT–0127. Rev. 3. Morris Plains, New Jersey: FWENC. 2003c.

———. "Foster Wheeler Environmental Corporation Idaho Spent Fuel Facility Response to NRC Request for Additional Information Related to Environmental Review." Letter (March 7) from R.D. Izatt to NRC. NRC Docket No. 72-25. TAC No. L20768. FW–NRC–ISF–03–0048. Richland, Washington: FWENC. 2003d. [The preceding document is available for public review through the NRC electronic reading room at http://www.nrc.gov/reading-rm/adams.html.]

———. "Emergency Plan, Idaho Spent Fuel Facility." NRC Docket 72-25. ISF–FW–PLN–0021. Rev. 2. Morris Plains, New Jersey: FWENC. 2003e.

NRC. NUREG–1626, "Final Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation to Store the Three-Mile Island Unit 2 Spent Fuel at the Idaho National Engineering and Environmental Laboratory." Washington, DC: NRC. March 1998.

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

This section establishes a baseline for current conditions at the Idaho National Engineering and Environmental Laboratory (INEEL) site. The baseline provides a starting point from which to assess impacts of the proposed action described in Section 2.3. This baseline may include regional features and conditions, but where practicable, it is focused on the Idaho Nuclear Technology and Engineering Center (INTEC) facility, the site of the proposed action. Much of the information in this section is taken from the U.S. Department of Energy (DOE) Programmatic Spent Nuclear Fuel (SNF) Environmental Impact Statement (EIS) (DOE, 1995), the DOE Idaho High-Level Waste (HLW) and Facilities Disposition EIS (DOE, 2002a), and the U.S. Nuclear Regulatory Commission (NRC) EIS for the Three-Mile Island Independent Spent Fuel Storage Installation (ISFSI) (NRC, 1998). Specific information on the proposed Idaho Spent Fuel Facility has been taken from the environmental and safety analysis reports submitted by Foster Wheeler Environmental Corporation (FWENC) in support of its license application to NRC (FWENC, 2003a,b,c).

3.1 Site and Facility Description

This description of the INEEL facility is based on information provided in the DOE Idaho HLW and Facilities Disposition EIS (DOE, 2002a, Section 4.2).

3.1.1 The INEEL

The proposed Idaho Spent Fuel Facility is to be located at the INEEL, one of nine multiprogram laboratories within the DOE complex. The INEEL covers about 230,850 ha [570,000 acres] in southeast Idaho (Figure 3-1). Most of the INEEL is undeveloped, and only about 2 percent of the total area {4,617 ha [11,400 acres]} has been developed to support the DOE mission at INEEL.

The INEEL has nine primary facility areas. The proposed Idaho Spent Fuel Facility would be sited adjacent to the southeast corner of INTEC, a facility with the mission to receive and store SNF and radioactive wastes (see Figure 2-1). Other INEEL facilities include Test Area North, Naval Reactors Facility, Test Reactor Area, Central Facilities Area, Power Burst Facility, Auxiliary Reactor Area, Argonne National Laboratory–West, and the Radioactive Waste Management Complex (Figure 3-2). These facilities are not directly involved in the proposed action.

The INEEL is remote from major population centers, waterways,

Existing and Proposed Facilities

Idaho National Engineering and Environmental Laboratory (INEEL)—This existing facility is managed for the U.S. Department of Energy and contains about 230,850 ha [570,000 acres], most are undeveloped, but under controlled access.

Idaho Nuclear Energy Technology and Engineering Center (INTEC)—This existing facility, formerly known as the Idaho Chemical Processing Plant (ICPP), consists of about 150 buildings located on 101 ha [250 acres] in the south central part of the INEEL. It is the current site of HLW and SNF storage activities at INEEL, including current interim storage for the Peach Bottom and Shippingport SNF.

Idaho Spent Fuel Facility—This proposed facility is the focus of the proposed action. If licensed, this facility would provide dry storage for SNF from the Peach Bottom and Shippingport commercial reactors, as well as SNF from training, research, and isotope reactors built by General Atomics (TRIGA).

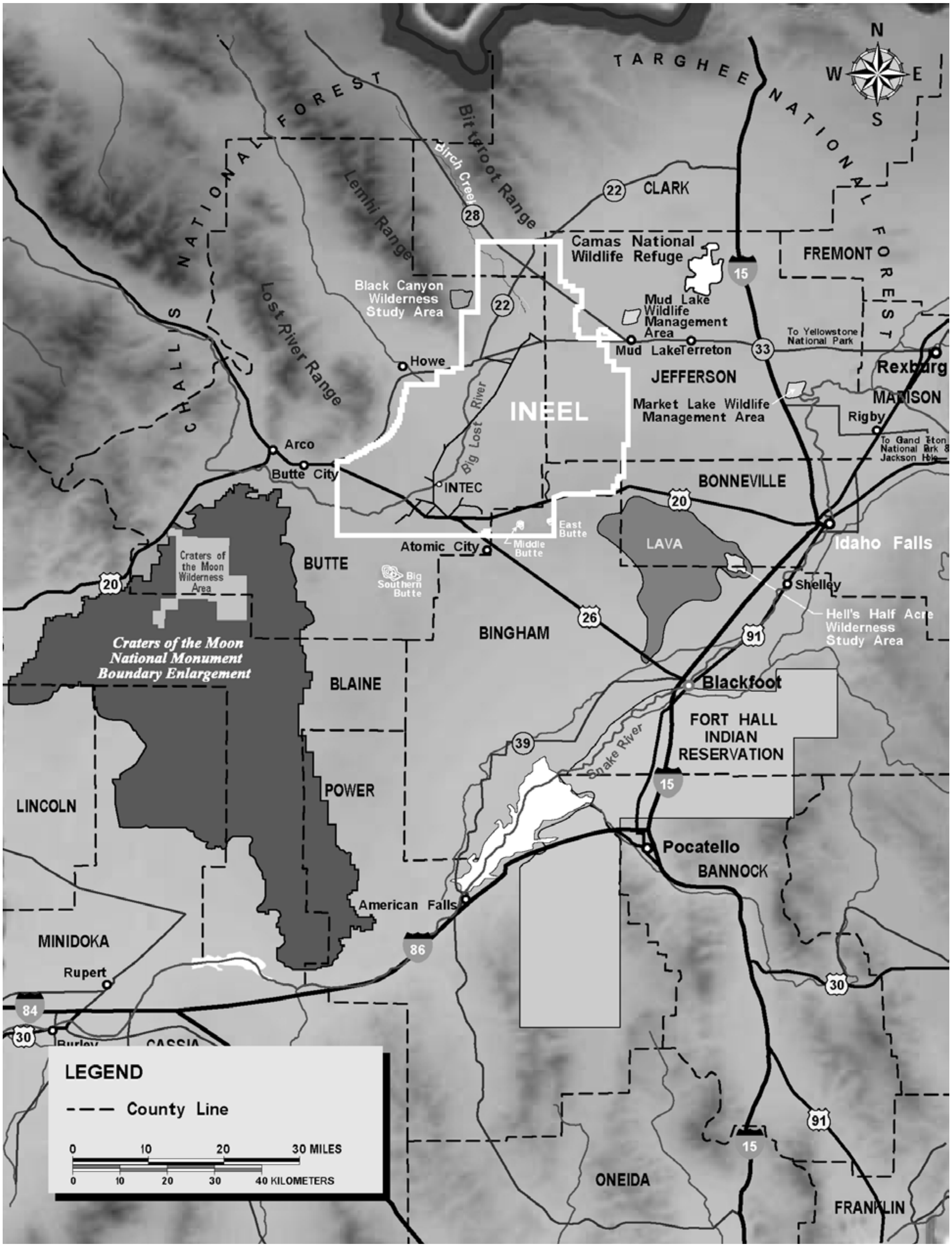


Figure 3-1. Regional Location of INEEL (Modified from DOE, 2002a)

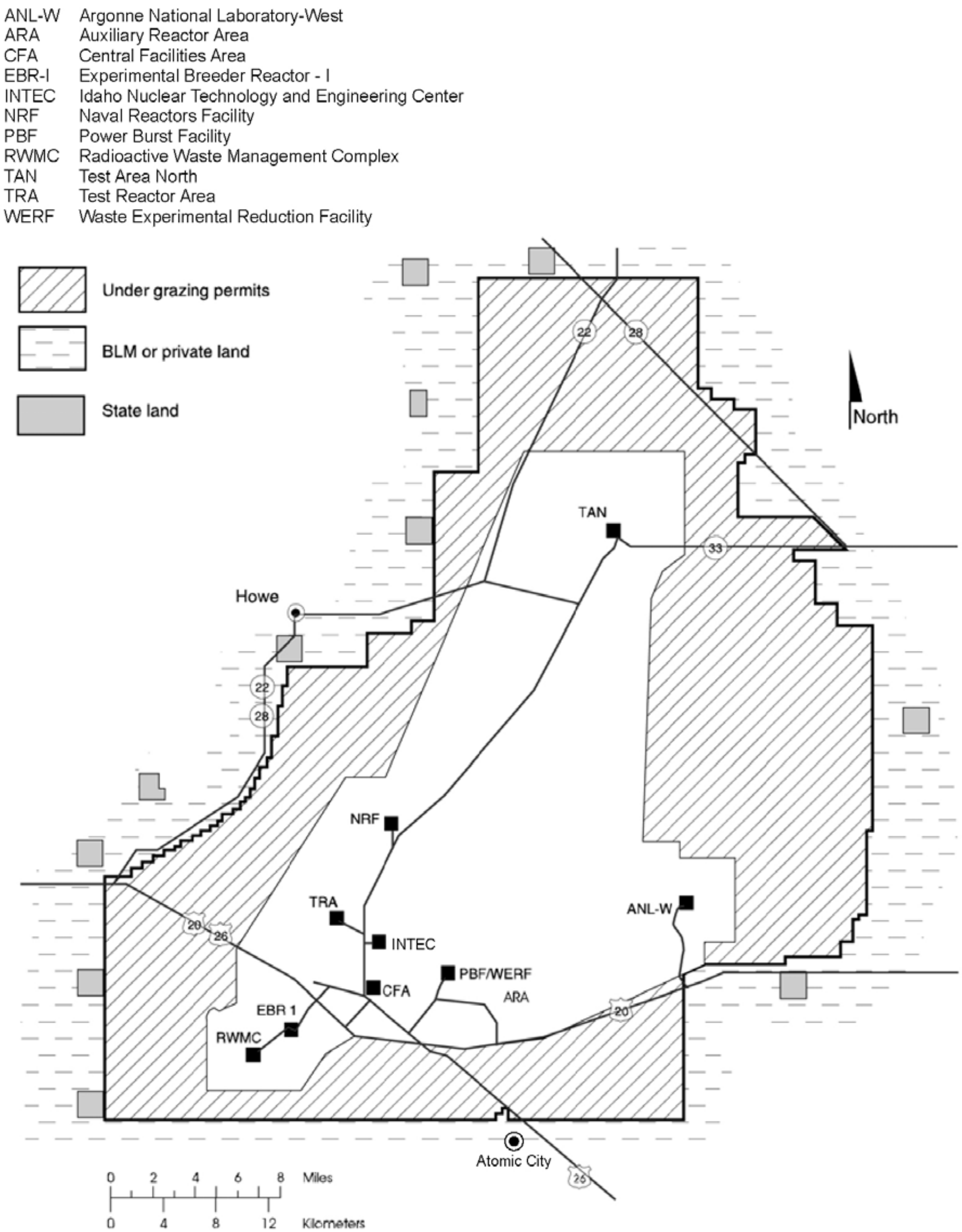


Figure 3-2. Current Land Use at INEEL (Modified from FWENC, 2003a)

and interstate transportation routes. INEEL has no permanent residents, and access to the INEEL facilities is controlled by DOE. Visitor access to the INEEL is also restricted, except for persons driving through INEEL on one of four public highways and visitors to the Experimental Breeder Reactor-1, a national historic landmark open to the public during summer months.

INEEL is located entirely in the state of Idaho, mostly within Butte County, but with portions in Bingham, Bonneville, Jefferson, and Clark Counties. Nearby cities include Mud Lake and Terreton to the east; Arco, Butte City, and Howe to the west; and Atomic City to the south. Larger communities farther from INEEL include Idaho Falls {80 km [50 mi]} and Rexburg {132 km [82 mi]} to the east; and Blackfoot {64 km [40 mi]} and Pocatello {80 km [50 mi]} to the southeast.

Tourist and recreation destinations surrounding the INEEL site include Craters of the Moon National Monument and Preserve, Hell's Half Acre Wilderness Study Area, Black Canyon Wilderness Study Area, Camas National Wildlife Refuge, Market Lake Wildlife Management Area, North Lake State Wildlife Management Area, Targhee and Challis National Forests, and the Snake River (Figure 3-1).

3.1.2 The INTEC

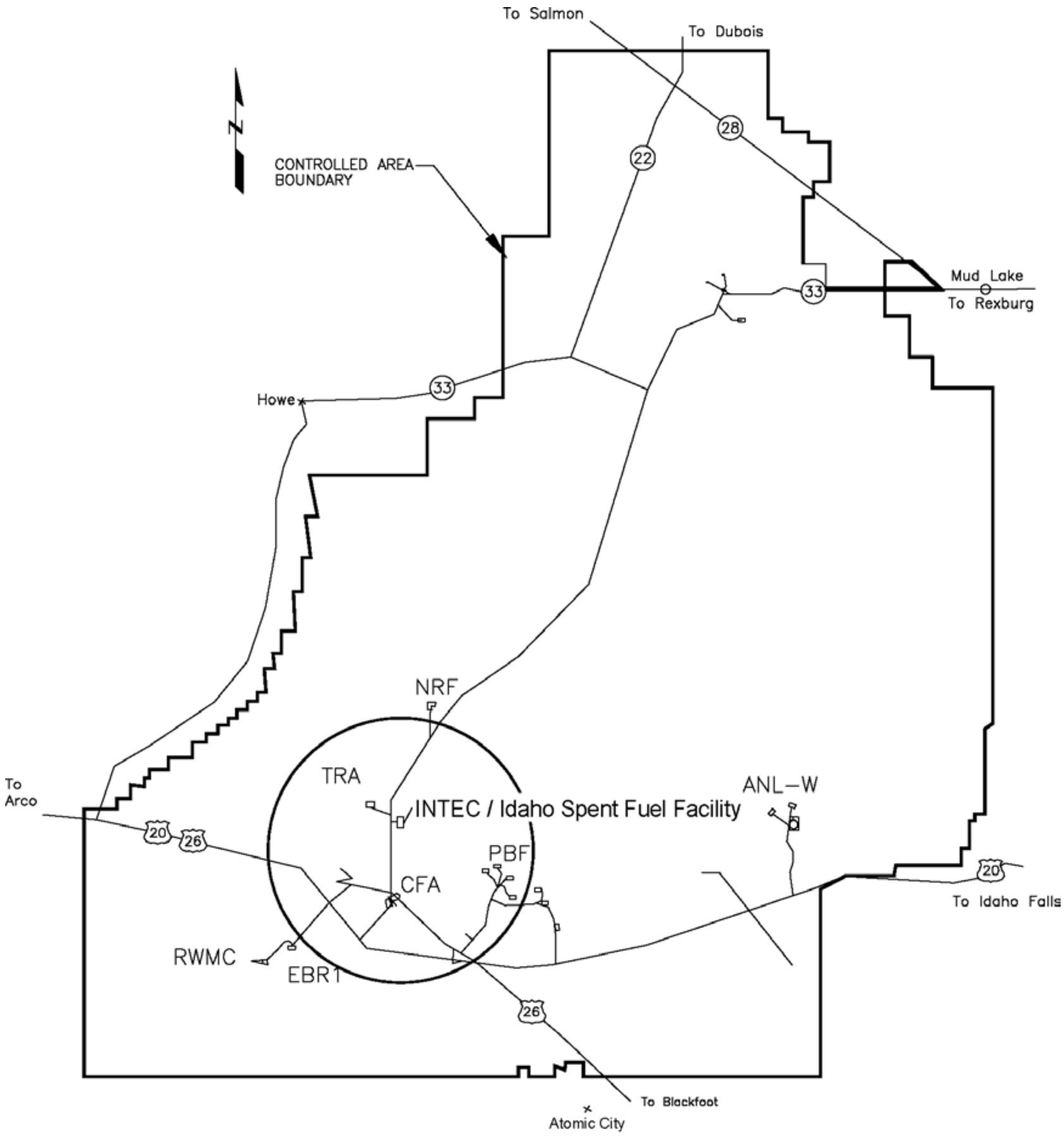
If licensed, the proposed Idaho Spent Fuel Facility (Figure 3-3) would be constructed adjacent to the eastern boundary of the INTEC. The INTEC facility consists of about 150 buildings located on 101 ha [250 acres] in the south-central part of the INEEL. The facility is located about 13.7 km [8.5 mi] north of the southern boundary, and the closest community is Atomic City, 16.9 km [10.5 mi] to the southeast (Figure 3-2). The INTEC facility is the current storage location of the Peachbottom and Shippingport SNF and the majority of the TRIGA fuel. It is also the location of the Three-Mile Island Unit 2 ISFSI (see Figure 1-1).

INTEC was originally constructed in the 1950s to reprocess and recover uranium-235 from SNF from government reactors. In addition, a treatment process known as calcining was developed at INTEC to reduce the volume of liquid radioactive waste generated during reprocessing and place it in a more-stable solid form. The INTEC was renovated and facilities upgraded during the 1980s. However, with a continued low demand for highly enriched uranium, reprocessing activities at INTEC ended in 1992.

The site for the proposed Idaho Spent Fuel Facility is a flat-lying area near the Big Lost River in the south-central part of the INEEL. The area is underlain by about 9 to 18 m [30 to 60 ft] of Big Lost River alluvial silts, sands, and gravels, which lie on an alternating sequence of basalt lava flows and interbedded sediments extending to a depth of about 600 to 700 m [2,000 to 2,300 ft]. Landforms in the vicinity of ISFSI consist of braided channels (some abandoned) of the Big Lost River to the west and north of the site and irregular flow lobes of basalt lavas to the east of the site (DOE, 2002a).

3.1.3 The Proposed Idaho Spent Fuel Facility

If constructed, the Idaho Spent Fuel Facility would be located on a previously disturbed site adjacent to the southeast corner of INTEC (Figure 2-1). The land currently serves as a construction laydown area for INTEC. It is sparsely vegetated, with only about 5 percent



Central Facilities Area (CFA)
Argonne National Laboratory West (ANL-W)
Experimental Breeder Reactor-1 (EBR-1)
Idaho Nuclear Technology and Engineering Center (INTEC)
Naval Reactor Facility (NRF)
Power Burst Facility (PBF)
Radioactive Waste Management Complex (RWMC)
Test Area North (TAN)
Test Reactor Area (TRA)
Idaho Spent Fuel Facility (ISF)

Figure 3-3. Location of Major Operating Facilities on INEEL (Modified from FWENC, 2003a)

coverage (FWENC, 2003a). The proposed site for the Idaho Spent Fuel Facility site is located at an elevation above the estimated 100- and 500-year flood plains for the Big Lost River. In the event of a probable maximum flood with overtopping of the Mackay Dam, the proposed site could be flooded (FWENC, 2003b, Section 2.4.4.2). The roads nearest to the proposed facility are INEEL-controlled access and include Spruce Avenue on the north, Balsa Street on the east, and East Perimeter road to the west. A railroad spur line from the Mackay Branch of the Union Pacific Railroad is just south of the site. No cities or towns are within a 16-km [10-mi] radius of the site (Figure 3-1).

3.2 Land Use

This description of existing and planned land uses for the INEEL and the surrounding area summarizes the current and projected land uses based on the discussion presented in the DOE Idaho HLW and Facilities Disposition EIS (DOE, 2002a, Section 4.2).

3.2.1 INEEL Land Use

DOE is the designated Federal agency with the responsibility and authority for effectively managing the INEEL lands in accordance with a series of Land Withdrawal Public Land Orders PLO 318, PLO 545, PLO 637, and PLO 691 that include about 204,930 ha [506,000 acres]. In addition, about 8,505 ha [21,000 acres] of state land and 17,415 ha [43,000 acres] of private land were transferred to DOE ownership and management, for a total of about 230,850 ha [570,000 acres] (Peterson, 1995). DOE is responsible for ensuring that the future use and management of these lands are in accordance with the Public Land Orders.

Most of the INEEL is undeveloped high-desert terrain, and most of the operations are performed within the nine primary facility areas that occupy 823 ha [2,032 acres]. A 139,725-ha [345,000-acre] security and safety buffer zone surrounds these developed areas. Approximately 6 percent of INEEL {13,770 ha [34,000 acres]} is devoted to utility rights-of-way and public roads (Figure 3-2). U.S. Highway 20 runs east and west and crosses the southern portion of INEEL, U.S. Highway 26 runs southeast and northwest, and Idaho State Highways 22, 28, and 33 cross the northeastern part of INEEL (DOE, 1995). Up to 137,700 ha [340,000 acres] of INEEL are leased for cattle and sheep grazing (DOE, 1995, Volume 2, Part A, Section 4.2), with grazing permits administered by the Bureau of Land Management (BLM). Livestock grazing, however, is prohibited within 0.8 km [0.5 mi] of any primary facility boundary and within 3.2 km [2 mi] of any nuclear facility. In addition, 365 ha [900 acres] located on the northeast boundary of the INEEL at the junction of Idaho State Highways 28 and 33 serve as the U.S. Sheep Experiment Station as a winter feedlot for sheep (DOE, 1997a).

On July 17, 1999, the Secretary of Energy and representatives of the U.S. Fish and Wildlife Service, BLM, and Idaho State Fish and Game Department designated 29,672 ha [73,263 acres] of the INEEL as the Sagebrush Steppe Ecosystem Reserve. The sagebrush steppe ecosystem was identified as critically endangered across its entire range by the National Biological Service in 1995. The INEEL Sagebrush Steppe Ecosystem Reserve, designated to ensure this portion of the ecosystem receives special consideration, is located in the northwest portion of the area. The southern boundary of the reserve runs east and west along section lines and is 17.6 km [11 mi] north of INTEC at the closest point. A natural resources management plan is being developed for the reserve (DOE, 2002a, Section 4.2).

In preparing its programmatic EIS for SNF management, DOE projected land-use scenarios at INEEL for the next 25, 50, 75, and 100 years (DOE, 1995). In general, the DOE analyses indicate that energy research and waste management activities would continue in the existing facility areas and, in some areas, expand into adjacent undeveloped areas. Future industrial development is projected to take place in the central portion of INEEL within existing major facility areas (DOE, 1993, 1997a, 2002a).

At INTEC, where most of the activities under the proposed action would take place, primary facilities include storage and treatment facilities for SNF, mixed HLW, and mixed transuranic waste/sodium-bearing waste, and process development and robotics laboratories. The original mission of INTEC was to function as a processing facility to extract uranium-235 from government-owned nuclear fuels from research and defense reactors. INTEC recovered uranium and rare gases from SNF so that these materials could be reused. Currently, INTEC operations include receipt and storage of DOE-assigned SNF; management of HLW prior to disposal in a repository; technology development for final disposition of SNF, mixed HLW, and mixed transuranic waste/sodium-bearing waste; and development of new waste management technologies.

Other than activities directly associated with the DOE mission, there are other uses for the land at INEEL. For example, recreational uses of the INEEL include public tours of the general facility areas and the Experimental Breeder Reactor-1, a national historic landmark. Controlled hunting is also permitted on INEEL to assist the Idaho Department of Fish and Game in reducing crop damage caused by wild game on adjacent private agricultural lands. These hunts are restricted to specific locations. INEEL is a designated National Environmental Research Park, functioning as a field laboratory set aside for ecological research and evaluation of the environmental impacts from nuclear energy development. INEEL does not lie within any of the land boundaries established by the Fort Bridger Treaty of 1868, and the entire INEEL is land occupied by DOE.

3.2.2 Offsite Land Use

Approximately 75 percent of the land adjacent to the INEEL is managed by the Federal government and administered by the BLM for wildlife habitat, mineral and energy production, grazing, and recreation. Approximately 1 percent of the adjacent land is owned by the State of Idaho and used for purposes similar to that of the Federal government. The remaining 24 percent of the land adjacent to INEEL is privately owned and primarily used for grazing and crop production (DOE, 2002a, Section 4.2).

In addition to the areas described in Section 3.1.1, the region surrounding INEEL has recreation and tourist attractions including Yellowstone National Park, Grand Teton National Park, the Jackson Hole recreation complex, Sawtooth National Recreation Area, Sawtooth Wilderness Area, and Sawtooth National Forest.

Lands surrounding INEEL are governed by Federal and state planning laws and regulations. Land-use planning in the State of Idaho is derived from the Local Planning Act of 1975. Currently, the State of Idaho does not have a land-use planning agency (DOE, 2002a, Section 4.2). Therefore, the Idaho legislature requires that each county adopt its own land use planning and zoning guidelines. At present, most of the surrounding counties have implemented guidelines to focus development adjacent to previously developed areas, with a goal of avoiding urban sprawl and the pressures that it might place on existing infrastructure. Because INEEL is remotely located, adjacent areas are not likely to experience residential and commercial development, and no new development is planned. However, recreational and agricultural uses are expected to increase in the surrounding area in response to greater demand for recreational areas and the conversion of rangeland to cropland (DOE, 2002a, Section 4.2).

3.3 Transportation and Infrastructure

Transportation and infrastructure at INEEL are described in the DOE Idaho HLW and Facilities Disposition EIS (DOE, 2002a, Section 4.10). Two interstate highways serve the regional area surrounding INEEL. Interstate 15, a north-south route that connects several cities along the Snake River, is 40 km [25 mi] east of INEEL. Interstate 86 intersects Interstate 15 about 64 km [40 mi] south of INEEL and provides linkage to points west. Interstate 15 and U.S. Highway 91 are primary access routes to the Fort Hall reservation. U.S. Highways 20 and 26 are the main access routes to the southern portion of INEEL. State Route 33 provides access to the northern INEEL facilities. Table 3-1 provides average daily and peak hourly traffic data for selected local highway segments in the vicinity of INEEL.

INEEL contains an on-site road system of about 140 km [87 mi] of paved service roads that are closed to the public (DOE, 1995, Volume 2, Part A, Section 4.1). Most roads undergo continuous maintenance and are adequate for the current level of normal transportation activity. Onsite roads presently have the capacity for increased traffic.

Railroad access to INEEL is provided by a DOE-owned spur line at Scoville Siding that is connected to a Union Pacific Blackfoot-to-Arco branch off a main line that follows the Snake River to the Pacific Northwest (DOE, 2002a). Rail shipments to INEEL include bulk commodities, SNF, and radioactive waste. Non-DOE air traffic over INEEL is limited to altitudes

Table 3-1. Baseline Traffic for Selected Highway Segments in the Vicinity of INEEL[a]

Route	Average Daily Traffic	Peak Hourly Traffic[b]
U.S. Highway 20—Idaho Falls to INEEL	2,100	315
U.S. Highways 20/26—INEEL to Arco	1,900	285
U.S. Highway 26—Blackfoot to INEEL	1,400	210
State Route 33—West from Mud Lake	600	90
Interstate 15—Blackfoot to Idaho Falls	11,000	1,650

EIS = environmental impact statement
INEEL = Idaho National Engineering and Environmental Laboratory

[a] DOE. DOE/EIS–0287–F, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.
[b] Estimated as 15 percent of average daily traffic

greater than 305 m [1,000 ft] over buildings and populated areas. Primary air traffic includes high-altitude commercial jets.

Hazardous, radioactive, industrial, commercial, and recyclable wastes are transported to and from INEEL. Hazardous materials include commercial chemical products and hazardous wastes that are nonradioactive and are regulated and controlled by the U.S. Department of Transportation based on the material's chemical reactivity, toxicity, and flammability. Table 3-2 summarizes shipments associated with INEEL from 1998 through 2001 based on data from the Enterprise Transportation Analysis System (DOE, 2002a). These shipments include express mail packages, radioactive waste shipments, and SNF shipments. Nonhazardous materials shipments accounted for more than 95 percent of INEEL shipments. Radioactive materials and hazardous materials shipments accounted for 1.2 percent and 3.2 percent of the shipments, respectively.

Occupational and public exposures from radioactive waste shipments have been estimated in prior EISs (DOE, 2002a, 1996c,d, 1995). These past estimates have indicated doses and estimated latent cancer fatalities from radioactive material transportation are small and indicate no adverse environmental impacts are associated with radioactive material transportation to INEEL.

3.4 Geology and Soils

This description of the general geology of the affected environment at the INEEL facility is based on information provided in the DOE Programmatic SNF EIS (DOE, 1995, Volume 2, Part A, Section 4.6).

Table 3-2. Annual Average Shipments to and from INEEL (1998–2001) by Type of Cargo and Transportation Mode[a]

Mode	Hazardous	Nonhazardous	Radioactive	Total
Air	221	18,549	177	18,947
Motor[b]	294	4,439	109	4,842
Other[c]	273	229	5	507
Rail	0	3	1	4
Total	788	23,220	292	24,300

EIS = environmental impact statement
INEEL = Idaho National Engineering and Environmental Laboratory

[a] Enterprise Transportation Analysis System (DOE. DOE/EIS–0287–F, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.)
[b] Commercial motor carriers
[c] Freight forwarder, private motor carrier, government vehicles, or parcel carriers

3.4.1 General Geology

The INEEL site is located on the Eastern Snake River Plain in southeast Idaho (Figure 3-4). Geologically, the Eastern Snake River Plain can be summarized as a broad northeast-trending basin that began filling with volcanic deposits about 6 million years ago. Most of the Plain that is visible today was shaped by volcanic eruptions of lava flows and domes during the last 1.2 million years. Overlying the lavas are thin, discontinuous deposits of wind-blown sand and loess, floodplain, riverbed and lake sediments, and landslope debris. These sedimentary deposits are often found between the lava flows, showing that a quiet period occurred between past volcanic eruptions. To the northeast, the Plain merges with the Yellowstone Plateau. Higher elevation mountains and valleys of the Basin and Range Province bound the Plain to the north and south. These mountains are formed by rocks more than 70 million years old, which have been folded and faulted. This Basin and Range deformation, which began 20 to 30 million years ago, affects some ongoing volcanic and tectonic processes in the INEEL area.

Earthquake histories and seismic characteristics of the Eastern Snake River Plain and the adjacent Basin and Range Province are different (Figure 3-5). The Plain historically has produced only infrequent, small-magnitude earthquakes (King, et al., 1987; Pelton, et al., 1990; Woodward-Clyde Consultants, 1992; Jackson, et al., 1993). Larger historical earthquakes and active faulting are associated with tectonic activity in the Basin and Range Province. For example, the 1959 Hebgen Lake Earthquake (moment magnitude 7.5) occurred about 150 km [93 mi] from the INEEL. The October 28, 1983, Borah Peak earthquake (moment magnitude 6.9, Richter magnitude 7.3) occurred along the Lost River fault about 100 km [62 mi] from the INEEL site. Although the Borah Peak earthquake produced peak ground accelerations of 0.022 *g* to 0.078 *g* at INEEL (Jackson, 1985), INEEL facilities were not damaged significantly (Guenzler and Gorman, 1985).

The tectonic forces that control nearby Basin and Range Province faulting likely affected the development of four northwest-trending volcanic zones that cross the Plain (Figure 3-5). Along with a northeast-trending zone that runs along the axis of the Plain, these zones have localized volcanism during the last 1.2 million years (Bowman, 1995; Hackett and Smith, 1992; Kuntz, et al., 1990). Most of this volcanism has consisted of thin basaltic lava flows and small volcanic vents like those on the island of Hawaii. Some past eruptions of rhyolite, however, have been more energetic and produced ash deposits and steep-sided volcanoes called domes. The last of these rhyolite eruptions occurred about 300,000 years ago (Kuntz, et al., 1990). The nearest volcano to the proposed Idaho Spent Fuel Facility site is 3 km [1.8 mi] to the northwest and is about 600,000 years old (Kuntz, et al., 1994). Although lava flows younger than about 200,000 years old are exposed within 5 km [3 mi] of the proposed Idaho Spent Fuel facility site, the young volcanoes that produced these lavas all occur more than 10 km [6 mi] from the site (Kuntz, et al., 1994).

3.4.2 Soils

According to FWENC (2003a, Section 2.5), "surficial sediments … at the ISF [proposed Idaho Spent Fuel] Facility site consist mostly of gravel, gravelly sands, and sands," and vegetative cover is only about 5 percent. Soils have been characterized and consist of 1.5 m [5 ft] of uncontrolled fill, or loose silt, overlaying about 7.6 m [25 ft] of dense sand and gravel. The silty soils are of loose to medium-dense consistency and have aeolian and fluvial origins (FWENC, 2003a, Section 6.1). The proposed Idaho Spent Fuel Facility would be built on a previously disturbed site.

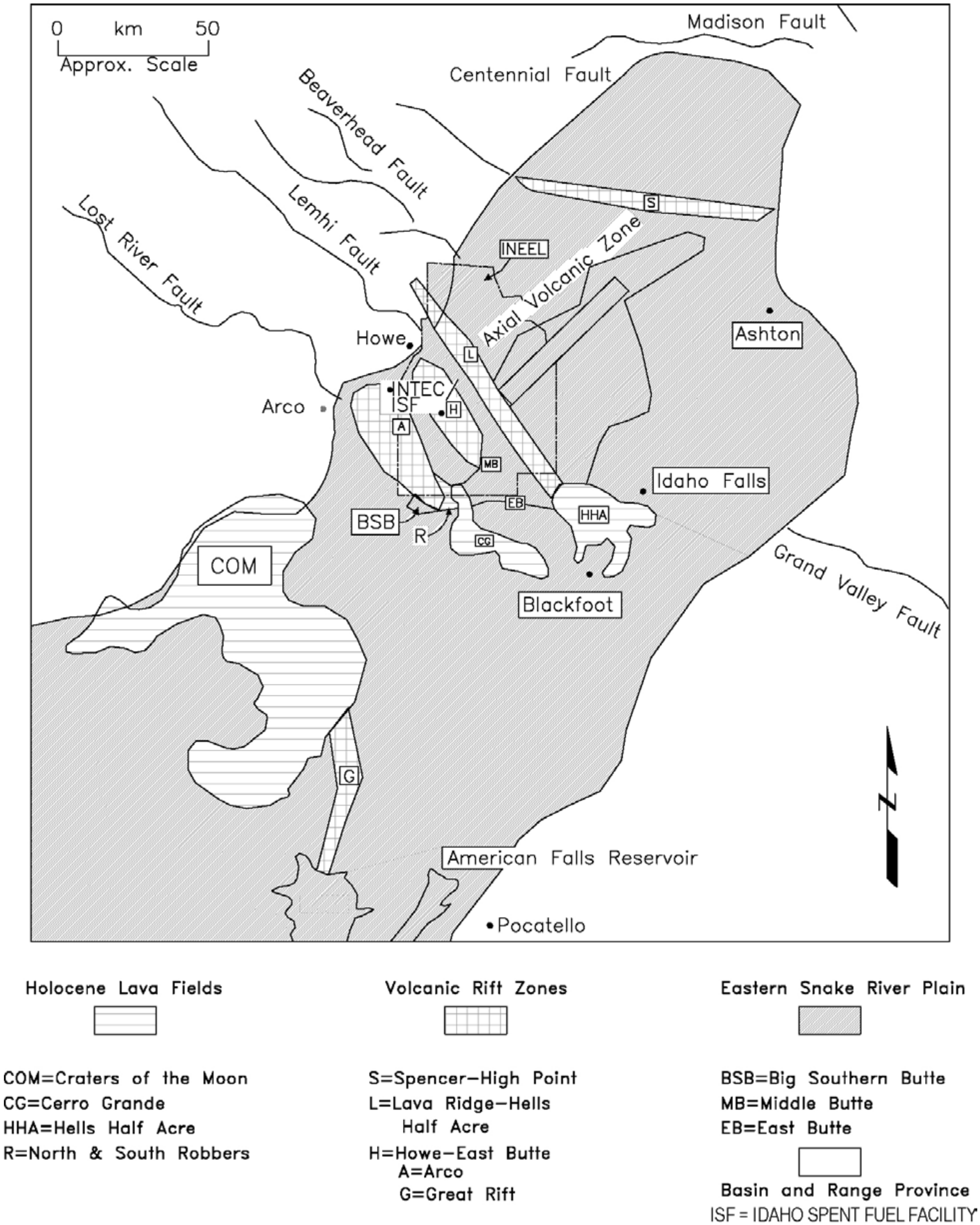


Figure 3-4. Volcanic Zones on the Eastern Snake River Plain (Modified from FWENC, 2003a)

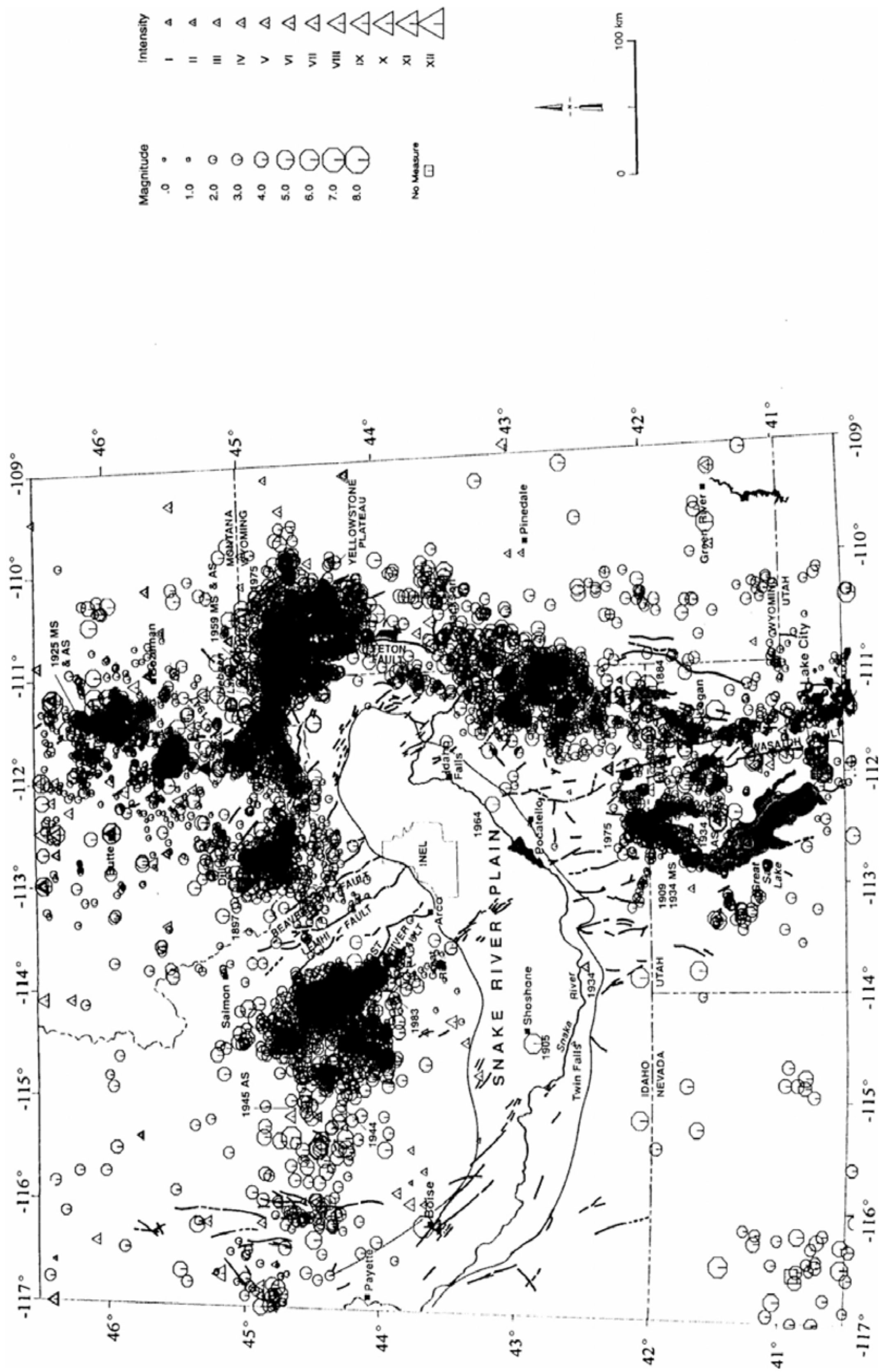


Figure 3-5. Historical Seismicity in the Region Surrounding INEEL (from FWENC, 2003b)

A remedial investigation of the INTEC site did not identify the proposed Idaho Spent Fuel Facility site as contaminated (Rodriguez, et al., 1997). Site investigations, in which soil contaminant levels were measured, were subsequently carried out by the DOE and FWENC on the proposed Idaho Spent Fuel Facility site. A radiological screening was performed in 2002, and all measured cesium-137 concentrations were well below the risk-based soil remediation goal of 23 pCi/g defined in the INTEC final record of decision (Idaho Department of Environmental Quality, 1999); in fact, none exceeded the INEEL background value of 0.8 pCi/g, also from that report. Because cesium-137 is consistently the highest activity soil contaminant elsewhere at INTEC and has the lowest activity remediation goal among radionuclides of concern (Idaho Department of Environmental Quality, 1999, Sections 5 and 8), it is an appropriate marker for establishing soil contamination. Therefore, the proposed Idaho Spent Fuel Facility site is not radiologically contaminated.

Nonradiological soil contamination is also of concern as a potential health hazard. FWENC performed sampling and analyses for nonradiological contaminants in 2000; results are shown in Table 3-3, which is reproduced from FWENC (2003d). FWENC used a five-step process to eliminate contaminants from consideration. In the first two steps, metals were eliminated if the maximum measured concentration was below background or if the metal is considered an essential nutrient. Table 3-3 presents the metals eliminated by these comparisons. The maximum measured iron concentration was 24,100 mg/kg [24,100 ppm], which is slightly higher than the background value of 24,000 mg/kg [24,000 ppm] (LMITCO, 1996). However, this difference is not considered significant. First, there are uncertainties in both the measurement and the statistical method used for calculating the background value that, though not reported in FWENC (2003d), will exceed the 0.4 percent difference. Second, the 24,000-mg/kg [24,000-ppm] background value is an upper tolerance limit for composite samples. Lockheed Martin Idaho Technologies Company (LMITCO) (1996) states the upper tolerance limit for composite samples should not be applied to grab samples. The corresponding LMITCO (1996) upper tolerance limit for grab samples is 35,000 mg/kg [35,000 ppm]. Thus, it is concluded that iron has been appropriately screened out.

In Step 3, organic constituents and remaining metals were compared to U.S. Environmental Protection Agency (EPA) Preliminary Remediation Goals (PRGs) for residential soil. For arsenic, the higher noncancer PRG was appropriately used because the cancer-based PRG was below background. Although all contaminants for which PRGs were available were below the PRG levels (Step 3 in Table 3-3), the potential combined effects must be considered. FWENC addressed this issue by stating that because the PRGs were based on a carcinogenic risk level of 1×10^{-6}, combining their effects would still result in risk below the INEEL-employed risk level of 1×10^{-4}. However, this rationale is not appropriate for the 13 contaminants for which noncancer PRGs were used. The potential additive risk can be evaluated by applying the methodology recommended in EPA (2002, Section 3.3), in which carcinogenic and noncarcinogenic risks are considered separately using maximum concentrations. The additive carcinogenic risk is below 1×10^{-6}, and the noncarcinogenic Hazard Index is below one. Thus, the additive risks are below the respective levels of concern. (Note: if arsenic is considered, the noncarcinogenic Hazard Index is 1.2; however, considering the high natural background, this value is not considered a significant exceedence of the level of concern.)

The first three screening steps eliminated all contaminants for which PRGs are defined. Step 4 compared the two remaining organic contaminants (phenanthrene, total petroleum hydrocarbons–diesel) to EPA Ecologically Based Screening Levels (EBSLs) (EPA, 1999). An

Table 3-3. Idaho Spent Fuel Site Soil Contamination Screening Results[a]

Detected Contaminant	Number of Samples	Sample Results		Step 1		Step 2	Step 3		Step 4		Step 5
		Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Background (Composite) (mg/kg)	Is Maximum Concentration Greater Than Background?	Non-Toxic Metal?	Region IX PRG[b] (mg/kg)	Is Maximum Concentration Greater Than PRG?	Region IV EBSL[c] (mg/kg)	Is Maximum Concentration Greater Than EBSL?	Potential Concern?
Aluminum	16	3,850	15,400	16,000	No	—	—	—	—	—	No
Arsenic	16	2.3	8.9	5.8	Yes	No	22[d]	No	—	—	No
Barium	16	59.2	234	300	No	—	—	—	—	—	—
Beryllium	16	0.24	0.96	1.8	No	—	—	—	—	—	No
Cadmium	2	0.12	0.25	2.2	No	—	—	—	—	—	—
Calcium	16	8,080	42,700	24,000	Yes	Yes	—	—	—	—	No
Chromium	16	9.0	32.6	33	No	—	—	—	—	—	No
Cobalt	16	2.5	8.8	11	No	—	—	—	—	—	No
Copper	16	5.3	19.3	22	No	—	—	—	—	—	No
Iron	16	6,340	24,100	24,000	No	—	—	—	—	—	No
Lead	16	4.2	98.9[e]	17	Yes	No	400	No	—	—	No
Magnesium	16	3,600	9,170	12,000	No	—	—	—	—	—	No
Manganese	16	158	542	490	Yes	No	1,800	No	—	—	No
Mercury	4	0.03	0.05	0.05	No	—	—	—	—	—	No
Nickel	16	6.2	25.2	35	No	—	—	—	—	—	No
Potassium	16	1,040	4,060	4,300	No	—	—	—	—	—	No
Selenium	16	0.52	1.7	0.22	Yes	No	390	No	—	—	No

Table 3-3. Idaho Spent Fuel Site Soil Contamination Screening Results[a] (continued)

Detected Contaminant	Number of Samples	Sample Results: Minimum Concentration (mg/kg)	Sample Results: Maximum Concentration (mg/kg)	Step 1: Background (Composite) (mg/kg)	Step 1: Is Maximum Concentration Greater Than Background?	Step 2: Non-Toxic Metal?	Step 3: Region IX PRG[b] (mg/kg)	Step 3: Is Maximum Concentration Greater Than PRG?	Step 4: Region IV EBSL[c] (mg/kg)	Step 4: Is Maximum Concentration Greater Than EBSL?	Step 5: Potential Concern?
Sodium	16	243	636	320	Yes	Yes		—	—	—	No
Thallium	11	0.22	0.86	0.43	Yes	No	5.2	No	—	—	No
Vanadium	16	13.2	50.0	45	Yes	No	550	No	—	—	No
Zinc	16	26.4	104	150	No	—	—	—	—	—	No
Acetone	14	0.002	0.054	NA	NA	No	1,600	No	—	—	No
Trichlorofluoromethane	1	0.003	0.003	NA	NA	No	390	No	—	—	No
2-Methylnaphthalene	2	0.25	0.45	NA	NA	No	1,600[f]	No	—	—	No
Benzo(b)fluoranthene	1	0.073	0.073	NA	NA	No	0.62	No	—	—	No
Bis(2-Ethylhexyl)phthalate	7	0.088	1.1	NA	NA	No	35	No	—	—	No
Chrysene	1	0.091	0.091	NA	NA	No	62	No	—	—	No
Dibenzofuran	2	0.081	0.12	NA	NA	No	290	No	—	—	No
Fluoranthene	2	0.082	0.13	NA	NA	No	2,300	No	—	—	No
Naphthalene	2	0.17	0.32	NA	NA	No	56	No	—	—	No
Phenanthrene	2	0.15	0.21	NA	NA	No	No PRG	No PRG	0.1	Yes	Yes
Pyrene	2	0.079	0.10	NA	NA	No	2,300	No	—	—	No

Table 3-3. Idaho Spent Fuel Site Soil Contamination Screening Results[a] (continued)

Detected Contaminant	Number of Samples	Sample Results		Step 1		Step 2	Step 3		Step 4		Step 5
		Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Background (Composite) (mg/kg)	Is Maximum Concentration Greater Than Background?	Non-Toxic Metal?	Region IX PRG[b] (mg/kg)	Is Maximum Concentration Greater Than PRG?	Region IV EBSL[c] (mg/kg)	Is Maximum Concentration Greater Than EBSL?	Potential Concern?
TPH-Diesel	1	>51	>51	NA	NA	No	No PRG	No PRG	No EBSL	No EBSL	No
Motor Oil	3	>100	>100	NA	NA	No	No PRG	No PRG	No EBSL	No EBSL	No

EBSL = Ecologically Based Screening Level
EPA = U.S. Environmental Protection Agency
FWENC = Foster Wheeler Environmental Corporation
NA = Not applicable
PRG = preliminary remediation goal
TPH = total petroleum hydrocarbons

[a] FWENC. "Foster Wheeler Environmental Corporation Idaho Spent Fuel Facility Response to NRC Request for Additional Information Related to Environmental Review." NRC Docket No. 72-25. TAC No. L20768. Table 5-1-1. Letter (March 7) from R.D. Izatt to NRC. FW–NRC–ISF–03–0048. Richland, Washington: FWENC. 2003.
[b] EPA Region IX, Preliminary Remediation Goals Table 2002 Update, Residential Soils. "Region 9 PRGs Table Users Guide/Technical Background Document." San Francisco, California: EPA, Region 9. 2002. <http://www.epa.gov/region09/waste/sfund/prg/files/02userguide.pdf>
[c] EPA Region IV, Recommended Ecological Screening Values (mg/kg) for soil. "Region 4 Waste Management Division Soil Screening Values for Hazardous Waste Sites." Atlanta, Georgia: EPA Region 4. <http://www.epa.gov/region04/waste/ots/epatab4.pdf> 1999.
[d] The residential soils PRG for arsenic is 0.39 mg/kg [0.39 ppm]. However, when the natural background is higher than the risk-based concentration, EPA Region 4 allows use of the noncancer PRG {22 mg/kg [22 ppm]} to evaluate the site.
[e] Only one lead sample was greater than background; it is likely that a minute piece of metal was part of this sample and represents a hot spot.
[f] EPA Region III, Risked Based Concentration Table. "Region III Risk-Based Concentration Table." Philadelphia, Pennsylvania: EPA Region 3. <http://www.epa.gov/reg3hwmd/risk/rbc1002.pdf> 2002. Region 9 PRG not available.

NOTE: To convert mg/kg to parts per million (ppm), multiply by 1.

EBSL is defined only for one—phenanthrene—and it exceeded the EBSL. All three contaminants were then passed to Step 5, in which alternative considerations were made. The maximum phenanthrene concentration was twice as high as the EBSL, however, the total for all polycyclic aromatic hydrocarbons (a group to which phenanthrene belongs) was below the corresponding EBSL for the group. In addition, the maximum phenanthrene concentration of 0.21 mg/kg [0.21 ppm] was well below the 5 mg/kg [5 ppm] value defined as moderate soil contamination that requires additional study (Beyer, 1990). Finally, FWENC (2003d) shows that total petroleum hydrocarbons–diesel and motor oil are well below levels of concern.

3.4.3 Geologic Natural Resources

No geologic resources are identified at the site of the proposed Idaho Spent Fuel Facility. Known mineral resources inside the INEEL boundary are limited to several quarries or pits that supply sand, gravel, pumice, silt, clay, and aggregate for road construction and maintenance, new facility construction and maintenance, waste burial activities, and ornamental landscaping cinders. Outside the INEEL site boundary, mineral resources include sand, gravel, pumice, phosphate, and base and precious metals (Strowd, et al., 1981; Mitchell, et al., 1981). The geologic history of the Plain makes the potential for petroleum production at INEEL very low. In 1979, INEEL drilled a geothermal exploration well to 3,159 m [10,365 ft]. Researchers measured a temperature of 142 °C [288 °F] but identified no commercial quantities of geothermal fluids (Idaho Department of Water Resources, 1980).

3.4.4 Seismic Hazard

The distribution of earthquakes at and near INEEL from 1884 to 1989 clearly shows that the Eastern Snake River Plain has a low rate of seismicity, whereas the surrounding Basin and Range Province has a relatively high rate (Figure 3-5) (Woodward-Clyde Consultants, 1992). The mechanism for faulting and generation of earthquakes in the Basin and Range Province is attributed to northeast-southwest directed crustal extension.

Major seismic hazards include the effects from ground shaking and surface deformation (faulting, tilting). Other potential seismic hazards (e.g., avalanches, landslides, mudslides, soil settlement, and soil liquefaction) are not likely to occur at INEEL because the local geologic conditions are not conducive. Based on the seismic history and the geologic conditions, earthquakes greater than moment magnitude 5.5 (and associated strong ground shaking and surface fault rupture) are not likely to occur in the Plain. However, moderate to strong ground shaking from earthquakes in the Basin and Range Province can affect INEEL. Researchers use patterns of seismicity and locations of mapped faults to assess potential sources of future earthquakes and to estimate levels of ground motion at the site. The sources and maximum magnitudes of earthquakes that could produce the maximum levels of ground motions at all INEEL facilities include the following (Woodward-Clyde Consultants, 1990, 1992):

- A moment magnitude 7.0 earthquake at the southern end of the Lemhi fault along the Howe and Fallert Springs segments;
- A moment magnitude 7.0 earthquake at the southern end of the Lost River fault along the Arco segment;

- A moment magnitude 5.5 earthquake associated with dike injection in either the Arco or Lava Ridge–Hell's Half Acre Volcanic Rift Zone and the Axial Volcanic Zone; and

- A random moment magnitude 5.5 earthquake in the Eastern Snake River Plain.

3.4.5 Volcanic Hazard

Potential volcanic hazards to the proposed Idaho Spent Fuel Facility arise primarily from lava flows and airborne ash-falls. Lavas are hot {1,100 °C [2,000 °F]}, heavy {2,600 kg/m^3 [4,374 lb/yd^3]} flows of molten rock that can travel down slopes at several miles per hour. Lava flows that could possibly affect the site would likely originate from a new basaltic volcano that formed in either the Axial Volcanic Zone or the Arco Volcanic Rift Zone (Figure 3-4). These volcanic zones are closest to the proposed Idaho Spent Fuel Facility and contain volcanoes younger than 400,000 years old. Based on an analysis of past volcanic eruptions in the INEEL area, the Volcanism Working Group (1990) estimated a likelihood of $<2 \times 10^{-5}$ per year for a new volcano forming in these zones and erupting a lava flow that would be long enough to reach the general area of the proposed Idaho Spent Fuel Facility.

Volcanic ash is a relatively hard, highly abrasive, fine-grained particulate that can produce loads on horizontal surfaces, readily clog air- and water-filtration systems, rapidly abrade pumps and seals, and short electrical systems. Volcanic ash-falls could occur at the site from eruptions as far away as the Cascade Mountains. Hoblitt, et al. (1987) calculated a 10^{-3} annual probability for a 1-cm- [0.4-in-] thick ash deposit forming at the INEEL from a Cascade volcano eruption. This annual probability decreases to 10^{-6} for a 10-cm- [4-in-] thick ash deposit (Hoblitt, et al., 1987). Rhyolite dome volcanoes, such as Big Southern Butte or East Butte, also have the potential to produce ash-fall deposits within tens of kilometers from the volcano (e.g., Scott, 1987). In addition, large-volume eruptions from the Yellowstone Volcanic Zone could produce appreciable ash-fall deposits at INEEL in the unlikely event that regional winds were directed to the southwest during a potential eruption (Figure 3-4).

3.5 Water Resources

3.5.1 Surface Water Resources

This description of the surface water resources in the affected environment at the INEEL is taken from the DOE Idaho HLW and Facilities Disposition EIS (DOE, 2002a, Section 4.8). Other than surface-water bodies formed from accumulated runoff during snowmelt or heavy precipitation and artificial infiltration and evaporation ponds, there is little surface water at the site.

3.5.1.1 Regional Drainage

INEEL is located in the Mud Lake–Lost River Basin (also known as the Pioneer Basin). Figure 3-6 shows major surface water features of this basin. This closed drainage basin includes three main streams—the Big and Little Lost Rivers and Birch Creek. These three streams drain the mountain areas to the north and west of INEEL, although most flow is diverted for irrigation in the summer months before it reaches the site boundaries.

The Big Lost River drains about 3,755 km^2 [1,450 mi^2] of land before reaching the site. Approximately 48 km [30 mi] upstream of Arco, Idaho, Mackay Dam controls and regulates the flow of the river, which continues southeast onto the Eastern Snake River Plain. The river channel then crosses the southwestern boundary of the INEEL, where the INEEL Diversion Dam controls surface-water flow. During heavy runoff events, the dam diverts surface water to a series of natural depressions, designated as spreading areas (Figure 3-6). During periods of high flow or low irrigation demand, the Big Lost River continues past the diversion dam to the northeast. It passes within 61 m [200 ft] of INTEC and 1,200 m [4,000 ft] of the proposed Idaho Spent Fuel Facility to an area of natural infiltration playas or sinks about 24 to 32 km [15 to 20 mi] northeast of INTEC. In dry years, surface water does not usually reach the western boundary of the site. Because INEEL is located in a closed drainage basin, surface water does not flow off the site.

Birch Creek drains an area of about 1,940 km^2 [750 mi^2]. Upstream of INEEL, surface water from Birch Creek is diverted during the summer to provide irrigation and to produce hydropower. In the winter, water flow crosses the northwest corner of the site, entering a humanmade channel 6.4 km [4 mi] north of Test Area North, where it then infiltrates into channel gravels.

The Little Lost River drains an area of about 1,825 km^2 [705 mi^2]. Streamflow is diverted for irrigation north of Howe, Idaho. Surface water from the Little Lost River has not reached the site in recent years; however, during high stream flow years, water would reach the site and infiltrate into the subsurface (DOE, 2002a, Section 4.8).

3.5.1.2 Local Drainage

INTEC is located on an alluvial plain and its northwest corner is about 61 m [200 ft] east of the Big Lost River channel. Located at the southeast corner of INTEC, the proposed Idaho Spent Fuel Facility is about 1,220 m [4,000 ft] east of the channel. Surface water generated from local precipitation would flow into lower areas on the site. This surface water either evaporates or infiltrates into the ground, increasing subsurface saturation and enhancing subsurface migration (Wilhelmson, et al., 1993). Localized flooding can occur at the site when the ground is frozen and melting snow combines with heavy spring rains. In 1969, rapid snowmelt caused extensive flooding in the lower Birch Creek Valley, and Test Area North was flooded (DOE, 2002a, Section 4.8).

The location of the proposed Idaho Spent Fuel Facility is just outside the INTEC complex on an open, previously disturbed 3.2-ha [8-acre] parcel of land immediately

Flood Frequency Terms

Flood frequency is typically characterized by the *recurrence interval* of a flood (or flow). This term is the average period of time that elapses between floods of a given size. Larger floods are more infrequent, and, therefore, have a larger recurrence interval. Recurrence intervals are calculated based on historical measurements of flow and on geologic evidence of flooding.

100-Year Flood—The 100-year flood does not necessarily occur only once every 100 years, but rather has a 1/100 (1 percent) probability of occurring in any given year.

500-Year Flood—Similar to the 100-year flood, the 500-year flood may occur more or less than once in a 500-year period, but has only a 1/500 (0.2 percent) probability in any given year.

Probable Maximum Flood—This hypothetical flow scenario is used to place an upper bound on the impacts of flooding. It is not assigned a probability, but is intended to represent the combination of events (snowmelt, precipitation, and dam failure) that could lead to maximum streamflow.

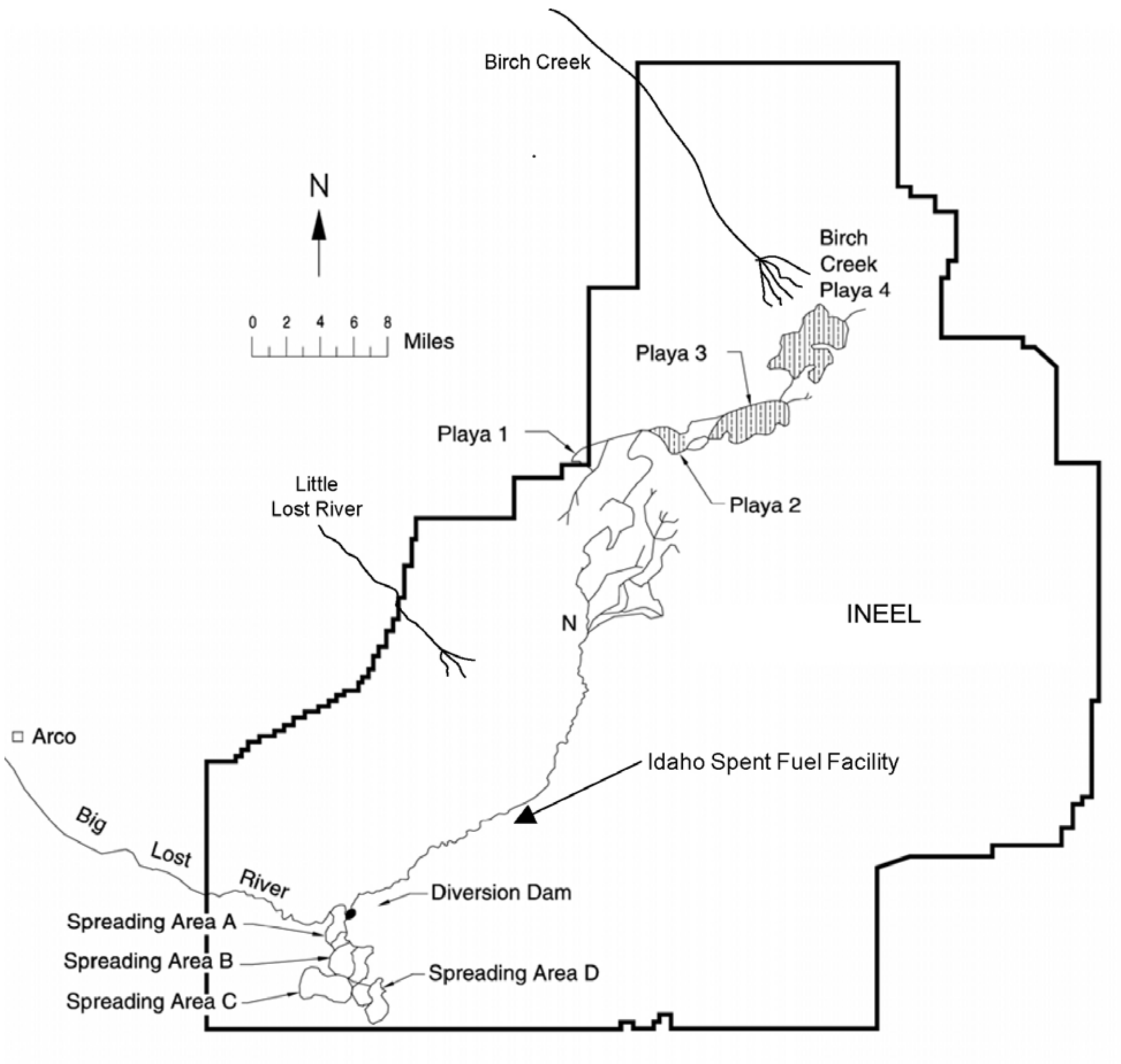


Figure 3-6. Surface Drainages Associated with the Big Lost River System (Modified from FWENC, 2003)

east of the INTEC perimeter fence, north of its coal-ash pit, and northeast of the coal-fired power plant. INTEC is surrounded by a storm water drainage ditch system (DOE, 2002a, Section 4.8). The drainage system, including dikes and erosion-prevention features designed to mitigate potential surface water flooding, is being upgraded (DOE, 2001a, 2002a). Storm water runoff from most areas of INTEC flows through the ditches to an abandoned gravel pit on the northeast side of INTEC. From the gravel pit, the runoff infiltrates and provides potential recharge to the Snake River Plain aquifer. The system is designed to handle a maximum 24-hour storm event with a 25-year recurrence interval. DOE built a secondary system around the facility to hold water if the first system overflows. Because the land is relatively flat (slopes of generally less than 1 percent) and annual precipitation is low, storm water runoff volumes are small and generally are spread over large areas where they evaporate or infiltrate the ground surface. Annual precipitation at INEEL averaged 22 cm/yr [8.7 in/yr] from 1951 through 1994. Annual net evaporation from large water surfaces in the Eastern Snake River Plain is 84 cm/yr [33 in/yr] (Rodriguez, et al., 1997).

Artificial surface water features at INTEC consist of two percolation ponds used for disposal of water from the service waste system and sewage-treatment lagoons and infiltration trenches for treated wastewater. Service water consists of raw water, demineralized water, treated water, and steam condensate (Rodriguez, et al., 1997). The sewage-treatment plant receives an average sanitary sewage flow of 159,000 L/day [42,000 gal/day]. The percolation ponds receive about 5.7 to 9.5 million L/day [1.5 to 2.5 million gal/day] of service wastewater per day and are each about 1.8 ha [4.5 acres] in size (Rodriguez, et al., 1997).

3.5.1.3 Flood Plains

Flood studies at the INEEL (Figure 3-7) include the examination of the flooding potential at INEEL facilities from a probable maximum flood (Koslow and Van Haaften, 1986) caused by the hypothetical failure of Mackay Dam, 73 km [45 mi] upstream of the INEEL. The U.S. Geological Survey has published a preliminary map of the 100-year flood plain for the Big Lost River on the INEEL (Berenbrock and Kjelstrom, 1998). As a result of this screening analysis, which indicated that INTEC may be subject to flooding from a 100-year flood, DOE commissioned additional studies (Ostenaa, et al., 1999) consistent with the requirements contained in DOE standards for a comprehensive flood hazard assessment (DOE, 1996a). There is no historical record of any flooding at the INTEC from the Big Lost River, although evidence of prehistoric flooding exists in the geologic sediments at the site.

Estimates of the 100- and 500-year flows for the Big Lost River were most recently published by the U.S. Geological Survey (Berenbrock and Kjelstrom, 1996) and the U.S. Bureau of Reclamation (Ostenaa, et al., 1999). The U.S. Geological Survey 100-year flow estimate is 205 m^3/s [7,260 ft^3/s] at the Arco gauging station 19 km [12 mi] upstream of the INEEL Diversion Dam. This estimate is based on 60 years of stream gauge data and conservative assumptions to account for the effects of Big Lost River regulation and irrigation. The U.S. Geological Survey published a preliminary map of the Big Lost River flood plain (Berenbrock and Kjelstrom, 1998) based on the 205-m^3/s [7,260-ft^3/s], 100-year flow estimate. In this study, it was assumed that the INEEL Diversion Dam did not exist and that 29.4 m^3/s [1,040 ft^3/s] would be captured by the diversion channel and flow to the spreading areas southwest of the Diversion Dam. The model then routed the remaining 176 m^3/s [6,220 ft^3/s] down the Big Lost River channel on the INEEL. A U.S. Army Corps of Engineers analysis of existing data (Bhamidipaty,1997) and an INEEL geotechnical analysis (LMITCO, 1998) both concluded that the INEEL Diversion Dam could

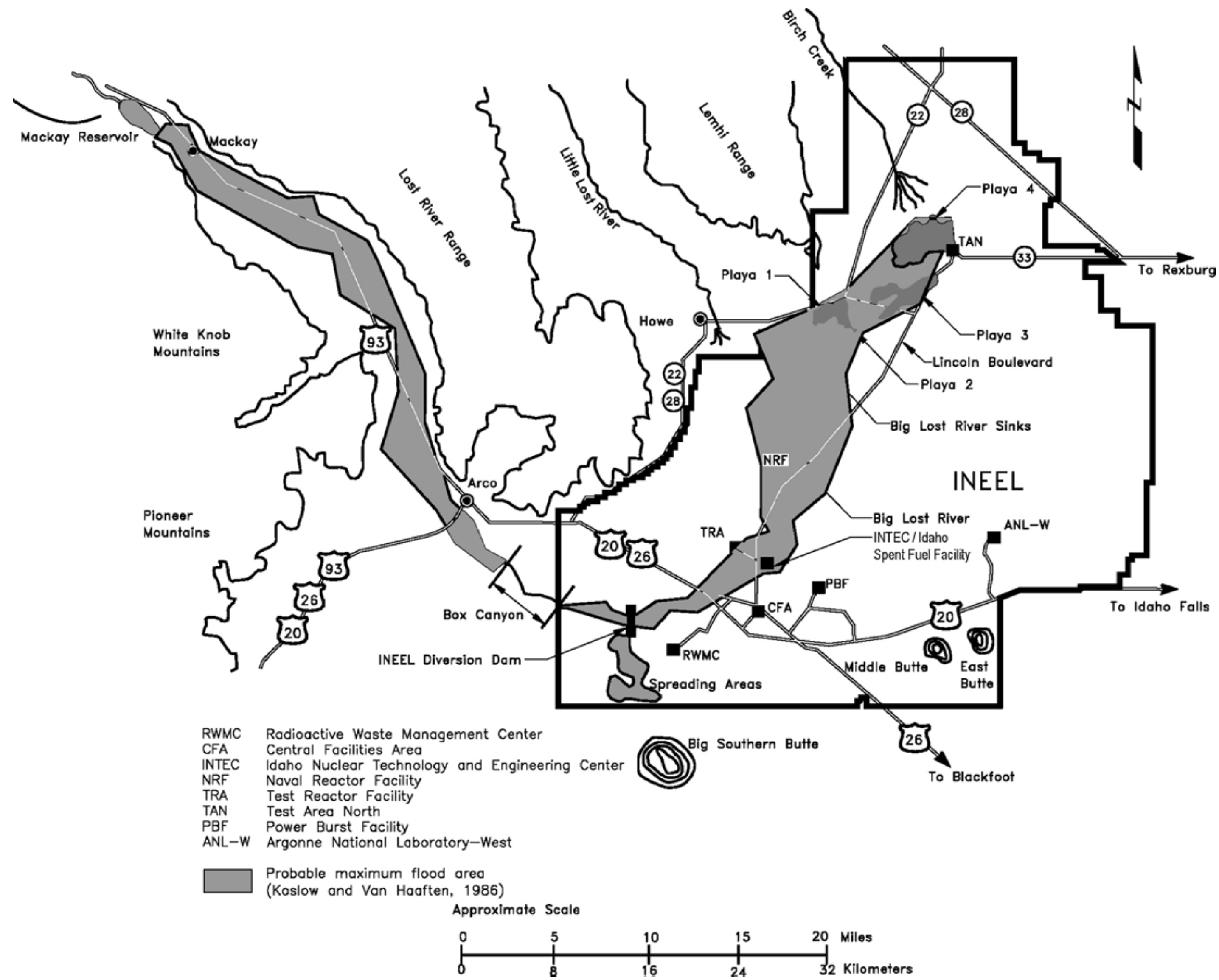


Figure 3-7. Predicted Inundation Area at INEEL for a Probable Maximum Flood Event with Overtopping of the Mackay Dam (Modified from FWENC, 2003b)

withstand flows up to 170 m^3/s [6,000 ft^3/s]. Culverts running through the diversion dam could convey a maximum of 25 m^3/s [900 ft^3/s] downstream, but their condition and capacity as a function of water elevation is unknown (Bhamidipaty, 1997). Although the net capacity of the INEEL Diversion Dam may exceed U.S. Geological Survey 100-year flow estimates, it is not certified or used as a flood control structure for flood plain mapping purposes. The estimated 100-year flood plain covers the northern part of INTEC, but does not reach the southeast corner where the proposed Idaho Spent Fuel Facility would be located (DOE, 2002a, Figure 4-9).

The flows and frequencies in the U.S. Bureau of Reclamation study are based on statistical analyses with input from stream gauge data and two-dimensional flow modeling constrained by geomorphic evidence. Radiocarbon dating indicates the geologic evidence records Big Lost River flow history for the last 10,000 years. The mean Bureau of Reclamation estimate for the 100-year flow of the Big Lost River is 82 m^3/s [2,910 ft^3/s]. The 100-year flood plain was estimated based on a flow with a 97.5-percent chance of not being exceeded in 100 years {92.6 m^3/s [3,270 ft^3/s]}. The mean Bureau of Reclamation estimate for the 500-year Big Lost River flow is 104 m^3/s [3,669 ft^3/s]. The 500-year flood plain was estimated based on a flow with a 97.5-percent chance of not being exceeded in 500 years {116 m^3/s [4,086 ft^3/s]}. These flood plain maps were generated assuming one-dimensional flow, no infiltration or flow loss along the Big Lost River flow path, and no diversion dam. With these conservative assumptions, small areas of the northern portion of INTEC could flood at the estimated 97.5 quantile 100- and 500-year flows. The southeast corner of INTEC where the proposed Idaho Spent Fuel Facility would be located is not within the estimated 97.5 quantile 100- and 500-year flood plains (DOE, 2002a, Figure 4-9). The estimated 100-year peak flow of the Big Lost River was reexamined and updated (Hortness and Rousseau, 2003) to resolve differences in previous estimates by the Bureau of Reclamation (Ostenaa, et al., 1999) and the U.S. Geological Survey (Kjelstrom and Berenbock, 1996). The 2003 report estimated a 100-year peak flow for the Big Lost River immediately upstream of the INEEL diversion dam of 106 m^3/s [3,750 ft^3/s] with upper and lower 95-percent confidence limits of 177 m^3/s [6,250 ft^3/s] and 37 m^3/s [1,300 ft^3/s]. These estimates indicate the conservative nature of earlier estimates by the U.S. Geological Survey {205 m^3/s [7,260 ft^3/s]} (Berenbrock and Kjelstrom, 1996) and the 1999 Bureau of Reclamation {82 m^3/s [2,910 ft^3/s]} (Ostenaa, et al., 1999).

3.5.1.4 Surface Water Quality

Water quality in the Big Lost River has remained fairly constant over the period of record. Applicable drinking water quality standards for measured physical, chemical, and radioactive parameters have not been exceeded (DOE, 1995, Volume 2, Part A, Section 4.8). The chemical composition of the water reflects the carbonate mineral composition of the surrounding mountain ranges northwest of INEEL and the chemical composition of return irrigation water drained to the Big Lost River (DOE, 2002a, Section 4.8). INEEL activities do not directly affect the quality of surface water outside the site because discharges are to humanmade seepage and evaporation basins or storm water injection wells. Effluents are not discharged to natural surface waters. In addition, surface water does not flow directly off the site (Hoff, et al., 1990). However, water from the Big Lost River, as well as seepage from evaporation basins and storm water injection wells, does infiltrate the Snake River Plain Aquifer (DOE, 2002a, Section 4.8). These areas are inspected, monitored, and sampled as stipulated in the INEEL Storm Water Pollution Prevention Program (DOE, 2001a).

DOE measures surface water quality at INTEC at two storm water monitoring locations, the percolation ponds and the sewage-treatment lagoons. The storm water monitoring locations are at the inlet to the retention basin on the northeast side of INTEC and on the south side of a coal pile at the discharge to a ditch. The coal pile is located on the southeast side of INTEC. DOE monitors for metals, inorganics, radiological constituents, and volatile organic compounds in storm water (LMITCO, 1997). EPA-specified nonradiological benchmarks (EPA, 1995) and radiological benchmarks from the Derived Concentration Guides from DOE Order 5400.5 form the baseline values from which DOE monitors. INTEC data for 1996 indicate that contaminants are below benchmark levels (DOE, 2002a, Section 4.8). Benchmarks are the pollutant concentrations above which EPA and DOE have determined represent a level of concern. The level of concern is the concentration at which a storm water discharge could potentially impact or contribute to water quality impairment or affect human health as a result of ingestion of water or fish.

Liquid effluents monitored at INTEC include effluent from the service waste system to the percolation ponds and effluent from the sewage-treatment plant prior to discharge to the rapid infiltration trenches. Wastewater Land Application Permits from the State of Idaho have been issued for these discharges. Monitoring results for the percolation pond in 1996 indicate the effluent constituent concentrations are within acceptable ranges, and annual flow volumes are within the limits specified in the permits (LMITCO, 1997). In 2000, the sewage treatment plant effluent did not exceed the 100-mg/L [100-ppm] total suspended solids limit or the flow limit specified in the permit. The 20-mg/L [20-ppm] total nitrogen limit for the sewage treatment plant effluent was exceeded in three monthly samples during the calendar year. The 2000 total nitrogen average was 15.6 mg/L [15.6 ppm]. As part of the ongoing nitrogen study, an indepth inventory of nitrogen sources contributing to the INTEC sewage treatment plant was performed. The study did not identify any new sources. Additional corrective actions are planned (DOE, 2001b).

3.5.2 Groundwater Resources

This description of the subsurface water resources in the affected environment at INEEL is taken from the DOE Idaho HLW and Facilities Disposition EIS (DOE, 2002a, Section 4.8). Subsurface water at the site occurs in the Snake River Plain Aquifer and the vadose zone. Generally, the term groundwater refers to usable quantities of water that enter freely into wells during confined and unconfined conditions within an aquifer.

3.5.2.1 Local Hydrogeology

The INEEL overlies the Snake River Plain Aquifer, the largest aquifer in Idaho (Figure 3-8). This aquifer is the major source of drinking water for southeast Idaho and has been designated a sole-source aquifer by EPA. This aquifer underlies the Eastern Snake River Plain and covers an area of about 24,900 km^2 [9,611 mi^2]. The aquifer flows to the south and southwest. Depth to the top of the aquifer ranges from 61 m [200 ft] in the northern part of INEEL to about 274 m [900 ft] in the southern part. Beneath the proposed Idaho Spent Fuel Facility, the depth to water is estimated to be 140 to 146 m [460 to 480 ft] (Rodriquez, et al., 1997). The aquifer, with estimates of thickness ranging from 76 m [250 ft] to more than 914 m [3,000 ft], consists of thin basaltic flows, interspersed with sedimentary layers.

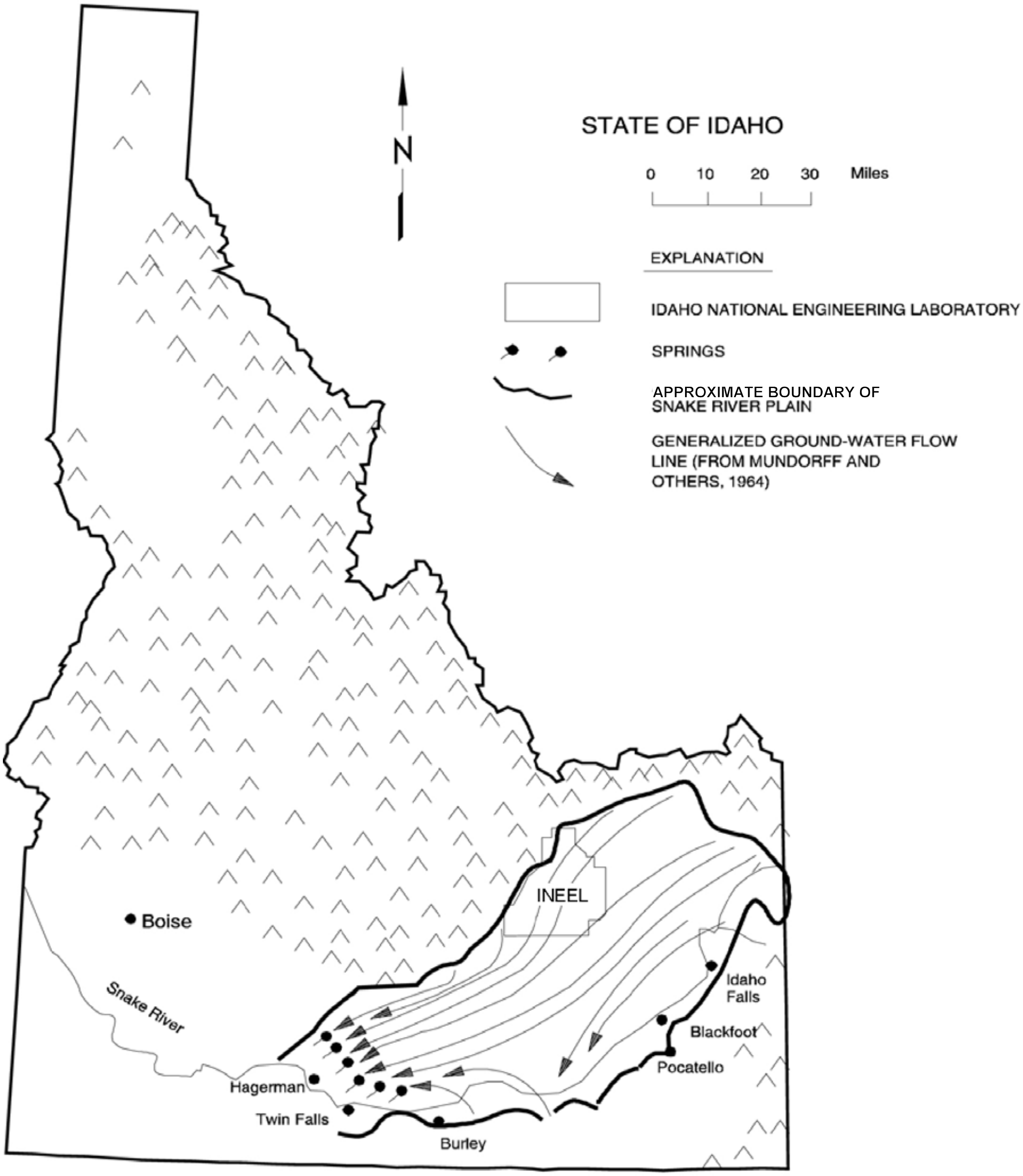


Figure 3-8. Regional Groundwater Flow in the Snake River Plain Aquifer Beneath INEEL (Modified from FWENC, 2003b). To Convert Miles to Kilometers, Multiply by 1.6.

The drainage basin recharging the Snake River Plain Aquifer covers an area of about 90,640 km^2 [35,000 mi^2] (DOE, 1995, 2002a). The aquifer is recharged by infiltration of irrigation water, seepage from stream channels and canals, underflow from tributary stream valleys extending into the watershed, and direct infiltration from precipitation (DOE, 2002a, Section 4.8). Most recharge is from irrigation water and by valley underflow from the mountains to the north and northeast of the plain and along the northeastern margins of the plain. Some recharge also occurs directly from precipitation (Rodriguez, et al., 1997). Groundwater in the aquifer generally flows south and southwestward across the Snake River Plain. The estimated water storage in the aquifer is 2.5×10^{12} m^3 [2 billion acre-ft]. A typical irrigation well can yield as much as 26,500 L/min [7,000 gal/min] (DOE, 1995) or 13.9 billion L/yr [3.7 billion gal/yr] of water if pumped every day (DOE, 2002a, Section 4.8). The Snake River Plain Aquifer is among the most productive aquifers in the nation.

Groundwater discharges primarily from the aquifer through springs that flow into the Snake River and from pumping for irrigation. Major springs and seepages that flow from the aquifer are located near the American Falls Reservoir (southwest of Pocatello) and the Thousand Springs area between Milner Dam and King Hill (near Twin Falls) (DOE, 2002a, Section 4.8).

The aquifer's ability to transmit water (transmissivity) and its ability to store water (storativity) are important physical properties of the aquifer. In general, the hydraulic characteristics of the aquifer enable the easy transmission of water, particularly in the upper portions. The rate at which water moves through the ground depends on the hydraulic gradient (change in elevation and pressure with distance in a given direction) of the aquifer, the effective porosity (percentage of void spaces), and hydraulic conductivity (capacity of a porous media to transport water) of the soil and bedrock. The local hydraulic gradient is low, 2×10^{-4} m/km [1.2 ft/mi], compared to the regional gradient of 8×10^{-4} km/mi [4 ft/mi] (Rodriguez, et al., 1997). In the INTEC area, the hydraulic conductivity ranges over five orders of magnitude {0.03 to 3,048 m/day [0.10 to 10,000 ft/day]}, with an average of 246 m/day [1,300 ft/day] (Rodriguez, et al., 1997). Because aquifer porosity and hydraulic conductivity decrease with depth, most of the water in the aquifer moves through the upper 61 to 152 m [200 to 500 ft] of the basalts. Estimated flow rates within the aquifer range from 1.5 to 6.1 m [5 to 20 ft] per day (Barraclough, et al., 1981).

3.5.2.2 Vadose Zone Hydrology

The vadose zone extends down from the ground surface to the regional water table (the top of the Snake River Plain Aquifer). Within the vadose zone, water and air occupy openings in the geologic materials. Subsurface water in the vadose zone is referred to as vadose water. At the site, this complex zone consists of surface sediments (primarily clay and silt, with some sand and gravel) and many relatively thin basaltic lava flows, with some sedimentary interbeds. Thick surficial deposits occur in the northern part of the site, which thin to the south where basalt is exposed at the surface. Perched water bodies are the exception. The vadose zone at INTEC extends from the ground surface to 140–146 m [460–480 ft] below the ground surface (Rodriguez, et al., 1997). The vadose zone protects the groundwater by filtering many contaminants through adsorption, buffering dissolved chemical wastes, and slowing the transport of contaminated liquids to the aquifer. The vadose zone also protects the aquifer by storing large volumes of liquid or dissolved contaminants released to the environment through spills or migration from disposal pits or ponds, allowing natural decay processes to occur.

Travel times for water through the vadose zone are important for an understanding of contaminant movement. The flow rates in the vadose zone depend directly on the extent of fracturing, the percentage of sediments versus basalt, and the moisture content of vadose zone material. Flow increases under wet conditions and slows under dry conditions. During dry conditions, transport of contaminants downward toward the aquifer is slow. Measurements taken at the INEEL Radioactive Waste Management Complex during unsaturated flow conditions indicated a downward infiltration rate ranging from 0.55 to 1.7 mm/yr [0.14 to 0.43 in/yr] (Cecil, et al., 1992). In another study during near-saturated flow conditions in the same area, standing water infiltrated downward 2.1 m [6.9 ft] in less than 24 hours (Kaminsky, 1991). During 1994, an infiltration study was conducted at INTEC that showed significant increase in moisture to a depth of 3 m [10 ft] after 2 hours (LMITCO, 1995).

3.5.2.3 Perched Water

Perched water occurs when water migrates vertically and laterally from the surface until it reaches an impermeable layer above the regional water table (Irving, 1993). As perched water spreads laterally, sometimes for hundreds of meters, it moves over the edges of the impermeable layer and continues downward. In general, perched water bodies slow the downward migration of fluids that infiltrate into the vadose zone from the surface because the downward flow is not continuous (DOE, 2002a, Section 4.8).

Historically at INTEC there have been three zones of perched water ranging from about 9 to 98 m [30 to 322 ft] below the ground surface. These zones include (i) a shallow perched water zone in the Big Lost River alluvium above the basalt, (ii) an upper basalt perched water zone, and (iii) a lower basalt perched water zone. Each zone is comprised of a number of smaller perched water bodies that may or may not be hydraulically connected.

The shallow perched water zone in the Big Lost River alluvium in the southern area of INTEC is believed to no longer exist (Rodriguez, et al., 1997). The upper basalt perched water zone occurs between the depths of 30 and 43 m [100 and 140 ft]. At the northern end of INTEC, there is a body of upper basalt perched water beneath the sewage treatment ponds on the eastern side of INTEC extending toward the west under north-central INTEC. The western portion of the northern perched water body receives water from other sources including the Big Lost River, leaking fire water lines, precipitation infiltration, steam condensate dry wells, and lawn irrigation (DOE, 2002a, Section 4.8). In the southern area of INTEC, a large body of perched water in the upper basalt has resulted primarily from discharge to the percolation ponds (Rodriguez, et al., 1997). The lower basalt perched water zone occurs in the basalt between 97 and 128 m [320 and 420 ft] below the ground surface. Two areas of perched water occur in the lower basalt, essentially directly beneath the upper basalt perched water. The northern body of lower basalt perched water is recharged from the sources contributing to the upper perched water. The lower perched water was influenced by the failure of an injection well in the late 1960s and late 1970s that allowed injection of service wastewater directly into the northern lower perched water body. The southern lower basalt perched water body is recharged from the discharge from the percolation ponds (Rodriguez, et al., 1997).

3.5.2.4 Subsurface Water Quality

Natural water chemistry and contaminants originating at the site affect subsurface water quality. The INEEL Groundwater Protection Management Program and DOE perform groundwater monitoring at INTEC and the surrounding area to monitor drinking water, detect unplanned releases to groundwater, identify potential environmental problems, and ensure compliance with Federal, State of Idaho, and DOE groundwater regulations and monitoring requirements. Subsurface water quality is also monitored by the U.S. Geological Survey and the Bechtel BWXT Idaho, LLC, Environmental Monitoring Program. This program collects samples from surface water, perched water, and aquifer wells to identify contaminants and contaminant migration to and within the aquifer. Groundwater monitoring at INEEL is generally divided into four categories: drinking water monitoring, compliance monitoring, surveillance monitoring, and special studies.

Several factors determine the natural groundwater chemistry of the Snake River Plain Aquifer beneath the site. These factors include the weathering reactions that occur as water interacts with minerals in the aquifer and the chemical composition of (i) groundwater originating outside the site; (ii) precipitation falling directly on the land surface; and (iii) streams, rivers, and runoff infiltrating the aquifer (DOE, 2002a, Section 4.8). The chemistry of the groundwater is different, depending on the source areas. For example, groundwater from the northwest contains calcium, magnesium, and bicarbonate leached from sedimentary rocks, and groundwater from the east contains sodium, fluorine, and silicate resulting from contact with volcanic rocks. Although the natural chemical composition of groundwater beneath the site does not exceed the EPA drinking water standards for any component, the natural chemistry affects the mobility of contaminants introduced into the subsurface from INEEL activities. Many dissolved contaminants adsorb (or attach) to the surface of rocks and minerals in the subsurface, thereby retarding the movement of contaminants in the aquifer and inhibiting further migration of contamination. Many naturally occurring chemicals compete with contaminants for adsorption sites on the rocks and minerals or react with contaminants to reduce their attraction to rock and mineral surfaces.

INTEC drinking water wells are hydrologically upgradient of the INTEC facility. Measured drinking water parameters at INEEL are compared to the maximum contaminant levels established in the Safe Drinking Water Act. State regulations are in the Idaho Rules for Public Drinking Water Systems (Idaho Department of Environmental Quality, 2001a). In 2000, the most recent year with published data, all drinking water samples collected at INTEC had concentrations below the maximum contaminant levels specified in Federal and state drinking water regulations (DOE, 2001b).

DOE performs compliance groundwater monitoring at INTEC to meet the requirements of the State of Idaho Wastewater Land Application Permits. The two areas monitored include wells in the vicinity of the percolation ponds and near the sewage treatment pond. The permits require compliance with the Idaho Groundwater Quality Standards in specified downgradient groundwater monitoring wells, annual discharge volume and application rates, and effluent quality limits (Idaho Department of Environmental Quality, 2001b). Permit variance limits were granted for total dissolved solids and chloride at the percolation pond compliance monitoring wells. The primary source of total dissolved solids and chloride in the percolation ponds is the INTEC water treatment processes. The data for 1996 indicate that no permit limits (or permit variance limits) were exceeded at the percolation ponds in 1996 (LMITCO, 1997). At the compliance well for monitoring the sewage treatment plant, maximum allowable concentrations were not exceeded. At a shallow well (ICPP–MON–PW–024) adjacent to the sewage treatment plant, however, levels of total dissolved solids, chloride, and nitrogen compounds were elevated. DOE monitors this well to evaluate the effectiveness of treatment and to detect unplanned releases. Based on the information obtained from the monitoring data, DOE would alter treatment processes to optimize wastewater treatment and remove elevated nitrogen compounds (LMITCO, 1997).

DOE conducts surveillance monitoring at INTEC to meet the requirements of DOE Order 450.1. This order requires DOE facilities with contaminated (or potentially contaminated) groundwater resources to establish a groundwater monitoring program. The monitoring program is designed to determine and document the impacts of facility operations on groundwater quantity and quality and to demonstrate compliance with Federal, state, and local regulations. DOE (2002a, Section 4.8) summarizes monitoring parameters that exceeded surveillance thresholds (Table 3-4). The surveillance thresholds are the Safe Drinking Water Act maximum contaminant levels and secondary maximum contaminant levels.

At the perched-water surveillance wells for the percolation ponds, the constituents elevated above the threshold limits include aluminum, chloride, iron, lead, and strontium-90. The causes for the elevated aluminum, lead, and iron concentrations are uncertain, although there may be some corrosion of well components. The chloride concentration is consistent with historical chloride concentrations and reflects the concentration within the percolation ponds. The source of chloride is the water-treatment processes. The strontium-90 concentrations are most likely residual from the historical discharges of radionuclides to the percolation ponds. Most radionuclide discharges to the percolation ponds were discontinued in 1993 when the INTEC Liquid Effluent Treatment and Disposal Facility began operations.

In 1995, surveillance monitoring at the sewage-treatment plant wells indicated measurements of total coliform, iron, and strontium-90 above threshold levels. DOE suspects that the total coliform measurement is the result of cross-contamination. The source of iron is unknown. Strontium-90 concentrations are consistent with historical values (LMITCO, 1997). In 2000, data were available for USGS–52, indicating the gross alpha concentrations were above threshold levels (DOE, 2002c). Constituents detected above threshold levels in surveillance wells are strontium-90 and tritium. Strontium-90 and tritium values are consistent with historical values and reflect discontinued discharge practices (LMITCO, 1997).

In 1995, an indepth study of soil and groundwater contamination was conducted at INTEC (Rodriguez, et al., 1997), and, in 2001, tracer and monitoring studies were conducted on INTEC perched water and the Snake River Plain Aquifer (DOE, 2002c,d). Table 3-5 shows the maximum concentrations of inorganics and radionuclides in the Snake River Plain Aquifer found in these studies and monitoring efforts. The percolation pond perched water body was not monitored as part of the 1995 study, but was previously described as part of the discussion of the surveillance monitoring program. All perched water bodies monitored in the 1995 study had samples exceeding the nitrate and nitrite Federal and state drinking water maximum contaminant level of 10 mg/L [10 ppm]. The highest nitrate and nitrite concentration {69.6 mg/L [69.6 ppm]} was found in the northern lower perched water body. For radionuclides, the maximum gross alpha and gross beta concentrations in perched water are in the northern upper perched water body. Tritium, strontium-90, and technetium-99 were found in all perched water bodies. In 2001, all the perched water bodies again exceeded the maximum contaminant level for nitrate and nitrite. However, only half of the 15 sample results were exceedences. The highest nitrate and nitrite concentration {60.3 mg/L [60.3 ppm]} is slightly lower at the same location (MW–1) of the maximum concentration observed in the 1995 study (DOE, 2002a, Section 4.8). The only inorganic found to exceed its maximum contaminant level in perched water was chromium.

Table 3-4. Monitoring Parameters That Were Exceeded for INTEC Surveillance Wells[a]

Location	Exceeded Parameter	Maximum Concentration	Surveillance Threshold[b]
PW–1[c]	Aluminum	0.254 mg/L	0.05 mg/L
	Iron	26 mg/L	0.3 mg/L
	Lead	0.0036 mg/L	0 mg/L
PW–2[c]	Aluminum	1.49 mg/L	0.05 mg/L
	Chloride	287 mg/L	250 mg/L
	Iron	2.2 mg/L	0.3 mg/L
	Strontium-90	8.3 ± 3.4 pCi/L	8.0 pCi/L
PW–4[c]	Iron	2.2 mg/L	0.3 mg/L
PW–5[c]	Aluminum	0.0562 mg/L	0.05 mg/L
	Iron	2.93 mg/L	0.3 mg/L
USGS–036[d]	Strontium-90	9.54 ± 1.34 pCi/L	8.0 pCi/L
USGS–052[d]	Gross alpha	15 ± 3.86 pCi/L	15.0 pCi/L
USGS–057[d]	Strontium-90	21.1 ± 3.43 pCi/L	8.0 pCi/L
USGS–067[d]	Strontium-90	11.1 ± 1.47 pCi/L	8.0 pCi/L
ICPP–MON–A–021[e]	Total coliform	20 colonies/100 mL	<1 colony/100 mL
ICPP–MON–A–022[f]	Iron	0.487 mg/L	0.3 mg/L

DOE = U.S. Department of Energy
EIS = environmental impact statement
INTEC = Idaho Nuclear Technology and Engineering Center

[a] DOE. DOE/EIS–0287–F, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.
[b] Surveillance thresholds are comparison values consisting of maximum contaminant levels and secondary maximum contaminant levels (40 CFR Part 141).
[c] INTEC percolation pond perched water surveillance well
[d] INTEC percolation pond aquifer surveillance well
[e] INTEC upgradient background well (upgradient Sewage Treatment Plant well)
[f] INTEC Sewage Treatment Plant surveillance well

NOTE: To convert liters (L) to gallons (gal), multiply by 0.264; to convert milligrams per liter (mg/L) to parts per million, multiply by 1.0; to convert picocuries (pCi) to Becquerel, multiply by 0.037.

Chromium exceedences were found in all the perched water bodies. The only organic was methylene chloride from well PW–1. The highest radioactive contaminant levels (strontium-90 and technetium-99) continue to be found in the northern upper perched water body. Tritium is the primary contaminant found in the southern upper perched water body. Gross alpha and beta were not analyzed in 2001. The maximum radiological contaminant levels for strontium-90, technetium-99, and tritium have decreased by as much as 50 percent since the 1995 study (DOE, 2002a, Section 4.8).

Table 3-5. Maximum Concentrations of Inorganics and Radionuclides in the Snake River Plain Aquifer in the Vicinity of INTEC[a]

Contaminant	Maximum Concentration	Well	Maximum Contaminant Level[b]	Background
Inorganics (mg/L)				
Aluminum	ND	—	0.2[c]	—
Antimony	4.6×10^{-3}	USGS–59	0.006	—
Arsenic	0.011	USGS–59	0.05	—
Barium	0.21	USGS–112	2	0.05–0.07
Beryllium	ND	—	0.004	—
Cadmium	3.0×10^{-3}	USGS–39	0.005	<0.001
Calcium	76	CPP–2	NS	—
Chromium	0.039	USGS–39	0.1	0.002–0.003
Cobalt	1.0×10^{-3}	USGS–85	NS	—
Copper	0.014	CPP–2	1.3	—
Iron	0.13	USGS–123	0.3[c]	—
Lead	0.018	USGS–84	0.015	<0.005
Magnesium	22	USGS–67	NS	—
Manganese	0.044	USGS–122	0.05	—
Mercury	3.6×10^{-4}	USGS–44	0.002	<0.0001
Nickel	5.0×10^{-3}	USGS–123	0.1	—
Potassium	6.80	USGS–122	NS	—
Selenium	3.0×10^{-3}	USGS–47	0.05	<0.001
Silver	7.0×10^{-4}	USGS–77	0.1[c]	<0.001
Sodium	77	USGS–59	NS	—
Thallium	ND	—	0.002	—
Vanadium	0.010	USGS–82	NS	—
Zinc	0.45	USGS–115	5[c]	—
Zirconium	ND	—	NS	—
Radionuclides (pCi/L)				
Gross Alpha	15 ± 3.86	MW–52	15	0–3
Gross Beta	96.5 ± 6	MW–48	<4 mrem/yr[d]	0–7
Tritium	$1.4 \times 10^{4} \pm 771$	USGS–114	20,000	0–40
Strontium-90	45 ± 7.57	MW–47	8	0

Table 3-5. Maximum Concentrations of Inorganics and Radionuclides in the Snake River Plain Aquifer in the Vicinity of INTEC[a] (continued)

Contaminant	Maximum Concentration	Well	Maximum Contaminant Level[b]	Background
Plutonium-238	ND	—	15	0
Plutonium-239/240	ND	—	15	0
Americium-241	0.742 ± 0.0336	LF2–8	15	0
Neptunium-237	ND	MW–18	15	—
Iodine-129	1.06 ± 0.19	LF3–8	1	0
Technetium-99	322 ± 6.6	USGS–52	900	—
Uranium-233/234	1.62 ± 0.153	USGS–123	—	—
Uranium-235/236	0.146 ± 0.057	USGS–35	—	—
Uranium-238	0.851 ± 0.126	USGS–85	—	—

EIS = environmental impact statement
INTEC = Idaho Nuclear Technology and Engineering Center
MCL = maximum contaminant levels
ND = not detected
NS = no standard

[a] DOE. DOE/EIS–0287–F, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.
[b] MCL from the Safe Drinking Water Act (40 CFR Part 140) and DOE Order 5400.5 unless otherwise noted.
[c] Secondary MCL from the Safe Drinking Water Act (40 CFR Part 140).
[d] Beta particle/photon radioactivity shall not produce annual dose equivalent to the total body or internal organ greater than 0.04 mSv [4 mrem/yr].

NOTE: To convert liters (L) to gallons (gal), multiply by 0.264; to convert milligrams per liter (mg/L) to parts per million, multiply by 1.0; to convert picocuries (pCi) to Becquerel, multiply by 0.037.

For the Snake River Plain Aquifer, the concentrations measured in the 1995 study are primarily related to the past disposal of waste through the INTEC injection well. The injection well was drilled to a depth of 183 m [598 ft] (DOE, 2002a, Section 4.8) and was routinely used for disposal of service waste water through 1984, and permanently closed by pressure grouting in 1989. An estimated 22,000 Ci [8.1×10^{14} Bq] of radioactive contaminants were released through the injection well. Most of the radioactivity is attributed to tritium (96 percent). Americium-241, technetium-99, strontium-90, cesium-137, cobalt-60, iodine-129, and plutonium contribute the remaining radioactivity. The general trend in these contaminants is decreasing with time, including the most current data from 2001 (DOE, 2002a, Section 4.8).

The combined tritium disposal to infiltration ponds at INTEC and the Test Reactor Area from 1992 to 1995 averaged 107 curies per year, compared to 910 curies per year from 1952 to 1983 (DOE, 2002a, Section 4.8). The tritium plume with a concentration exceeding 500 pCi/L decreased from an area of 117 km^2 [45 mi^2] in 1988 to about 104 km^2 [40 mi^2] in 1991. Since 1991, the concentration has remained nearly unchanged. The higher concentration lines, however, have moved closer to their origin at INTEC and the Test Reactor Area. Prior to 1989, strontium-90 concentrations in the Snake River Plain Aquifer were decreasing. The concentrations from 1992 to 2001 have remained fairly constant. This constancy is due to the migration of contamination from the near-surface releases into the perched water bodies and subsequently into the Snake River Plain Aquifer (Rodriguez, et al., 1997). When the Big Lost River flows, the added infiltrating water would tend to reduce the concentrations observed in the Snake River Plain Aquifer due to dilution of the perched water bodies.

Iodine-129 was discharged to the aquifer until 1984 through the injection well previously described. More than 90 percent of the iodine-129 in the aquifer is from the injection well. Smaller contributions include the percolation ponds and contaminated soils. Measurements taken in 1990–1992 indicated the presence of iodine-129 in 32 of 51 wells at INTEC. The concentrations ranged from below the detection limit to 3.82 pCi/L (Rodriguez, et al., 1997). In 2001, only 2 of 41 wells sampled detected iodine-129 above the maximum contaminant level (1 pCi/L). The two wells are located south of INTEC at the Central Facilities Area landfill. In addition, iodine-129 was not detected in the sample analyzed from well USGS–46 (DOE, 2002b).

3.5.3 Water Use and Rights

The surface and subsurface water use in the affected environment at INEEL is described in the DOE SNF Programmatic EIS (DOE, 1995, Volume 2, Part A, Section 4.8.3).

The INEEL does not withdraw or use surface water for site operations, nor does it discharge effluents to natural surface water. However, the three surface-water bodies at or near the site (Big and Little Lost Rivers and Birch Creek) have the following designated uses: agricultural water supply, cold-water biota, salmonid spawning, and primary and secondary contact recreation. In addition, waters in the Big Lost River and Birch Creek have been designated for domestic water supply and as special resource waters.

Groundwater use on the Snake River Plain includes irrigation; food processing and aquaculture; and domestic, rural, public, and livestock supply. Water use for the upper Snake River drainage basin and the Snake River Plain Aquifer was 16.4 trillion L [4.3 trillion gal] per year in 1985, which was more than 50 percent of the water used in Idaho and about 7 percent of agricultural withdrawals in the nation. Most water withdrawn from the Eastern Snake River Plain {1.8 trillion L [0.47 trillion gal] per year} is for agriculture. The aquifer is the source of all water used at INEEL. Site activities withdraw water at an average rate of 7.4 billion L/yr [2.0 billion gal/yr] (DOE, 2002a, Section 4.8). The baseline annual withdrawal rate, however, dropped to 6.5 billion L [1.7 billion gal] in 1995. The average annual withdrawal is equal to about 0.4 percent of the water consumed from the Eastern Snake River Plain Aquifer or 53 percent of the maximum annual yield of a typical irrigation well. Of the quantity of water pumped from the aquifer, a substantial portion is returned to the aquifer through seepage ponds, with the remaining water lost to the atmosphere through evaporation (DOE, 2002a, Section 4.13.1).

A sole-source aquifer, as designated by the Safe Drinking Water Act, is one that supplies 50 percent of the drinking water consumed in the area overlying the aquifer. Sole-source aquifer areas have no alternative source or combination of sources that could physically, legally, and economically supply all those who obtain their drinking water from the aquifer. Because groundwater supplies 100 percent of the drinking water consumed within the Eastern Snake River Plain (Gaia Northwest, Inc., 1988) and an alternative drinking water source or combination of sources is not available, the EPA designated the Snake River Plain Aquifer a sole-source aquifer in 1991.

DOE holds a Federal Reserved Water Right for the INEEL, which permits a water-pumping capacity of 2.3 m^3/s [80 ft^3/s] and a maximum water consumption of 43.2 billion L/yr [11.4 billion gal/yr] for drinking, process water, and noncontact cooling. Because it is a Federal Reserved Water Right, the site priority on water rights dates back to the establishment of INEEL.

3.6 Ecological Resources

During the past decade, many detailed studies have been documented that include descriptions of the ecology at and in the vicinity of INTEC. Several of these studies were reviewed and are summarized here to describe the ecological resources at or near INTEC (Rope, et al., 1993; DOE, 1995, 2002a; NRC, 1998). To ensure that this ecological information was up to date, the NRC consulted with the U.S. Fish and Wildlife Service about potential threatened, endangered, and sensitive species near INTEC. This section discusses the following ecological resources of INEEL: (i) plant communities and associations; (ii) animal communities (both terrestrial and aquatic); (iii) threatened, endangered, and sensitive species; and (iv) wetlands.

3.6.1 Plant Communities and Associations

The flora at and near INTEC has been well characterized by previous studies, some for EISs related to other projects at INEEL. A detailed description of the flora of the potentially affected environment near INTEC is provided in the DOE Programmatic SNF EIS (DOE, 1995, Volume 2, Part A, Section 4.9).

Vegetation on the INEEL site is primarily of the shrub-steppe type and is a small fraction of the 45,000 km^2 [17,375 mi^2] of this vegetation type in the Intermountain West. The 15 vegetation associations on the INEEL site range from primarily shadescale-steppe vegetation at lower altitudes through sagebrush- and grass-dominated communities to juniper woodlands along the foothills of the nearby mountains and buttes (Rope, et al., 1993; Kramber, et al., 1992; Anderson, 1991). These associations can be grouped into six basic types: juniper woodland, grassland, shrub-steppe (which consists of sagebrush-steppe and salt desert shrubs), lava, bareground-disturbed, and wetland vegetation. Shrub-steppe vegetation, which is dominated by big sagebrush *(Artemisia tridentata),* saltbush *(Atriplex* spp.), and rabbitbrush *(Chrysothamnus* spp.) covers more than 90 percent of the INEEL. Grasses include cheatgrass *(Bromus tectorum),* Indian ricegrass *(Oryzopsis hymenoides),* wheatgrasses *(Agropyron* spp.), and squirreltail *(Sitanion hysterix).* Herbaceous plants include phlox *(Phlox* spp.), wild onion *(Allium* spp.), milkvetch *(Astragalus* spp.), Russian thistle *(Salsola kali),* and various mustards.

Facility and human-disturbed (grazing not included) areas include only about 2 percent of INEEL. Introduced annuals, including Russian thistle and cheatgrass, frequently dominate disturbed areas. These species usually are less desirable to wildlife as food and cover and compete with more desirable perennial native species. These disturbed areas serve as a seed source, increasing the potential for the establishment of Russian thistle and cheatgrass in surrounding less-disturbed areas. Vegetation inside facility boundaries is generally disturbed or landscaped. Species richness on INEEL is comparable to that of like-sized areas with similar terrain in other parts of the Intermountain West. Plant diversity is typically lower in disturbed and modified areas.

Although no wildfires have occurred recently near INTEC, a study conducted for the DOE Idaho HLW and Facilities Disposition EIS (DOE, 2002a, Section 4.9) added information about how large wildfires in 1994, 1995, 1996, 1999, and 2000 have changed the vegetation cover at INEEL in the affected areas.

Large wildfires in 1994, 1995, 1996, 1999, and 2000 played an important role in the vegetation cover at INEEL. Figure 3-9 shows the location of the wildfires. In July 1994, the Butte City fire burned 6,928 ha [17,107 acres] along the western boundary of INEEL (Anderson, et al., 1996). In August 1995, 2,767 ha [6,831 acres] along a corridor running north and south of the Argonne National Laboratory–West facility burned (Anderson, et al., 1996). During the summer of 1996, six fires burned a total of 14,762 ha [36,450 acres] on and adjacent to INEEL. These fires burned virtually all the aboveground biomass, resulting in severe wind erosion and, therefore, blowing dust (Patrick and Anderson, 1997). Wildfires in 1999 burned about 16,200 ha [40,000 acres] more of the INEEL and in the summer and early fall of 2000, three separate fires burned an additional 14,580 ha [36,000 acres]. The first of these fires in late July 2000 burned about 12,150 ha [30,000 acres] northwest of the Radioactive Waste Management Complex. A second fire in early August burned about 810 ha [2,000 acres] west of Argonne National Laboratory–West. A third fire in mid-September burned about 1,620 ha [4,000 acres] northwest of INTEC.

Although the growth of grasses and forbs that typically follow wildfires in sagebrush-steppe areas of the INEEL offers food for foraging mule deer, pronghorn, and elk (Environmental Science and Research Foundation, Inc., 1999), those plants do not provide suitable winter habitat and food for sage grouse. Sage grouse are dependent on sagebrush, particularly for important winter habitat (ideal winter habitat consists of healthy, mature stands of big sagebrush). The INEEL contains one of the largest contiguous areas of protected sagebrush-steppe habitat in the world, and is one of the most important wintering areas for sage grouse in Idaho (Environmental Science and Research Foundation, Inc., 2000). The wildfires that burned more than 54,675 ha [135,000 acres] of sagebrush steppe on the INEEL since 1994 are certainly cause for concern, particularly in view of sage grouse population declines across the region. DOE is continuing to study the impacts of wildfires on the ecological resources of the site and the region in attempts to better understand the dynamics of that ecosystem and to identify ways of preserving the biodiversity at INEEL.

3.6.2 Animal Communities

The terrestrial fauna at and near INTEC has been characterized by previous studies, some for EISs related to other projects at INEEL. A detailed description of the terrestrial fauna of the potentially affected environment near INTEC is provided in the DOE Programmatic SNF EIS (DOE, 1995, Volume 2, Part A, Section 4.9).

The INEEL site supports animal communities characteristic of shrub-steppe vegetation and habitats. More than 270 vertebrate species occur, including 46 mammal, 204 bird, 10 reptile, 2 amphibian, and 9 fish species (Arthur, et al., 1984; Reynolds, et al., 1986). Common small-mammal genera include mice *(Reithrodontomys* spp. and *Peromyscus* spp.), chipmunks *(Tamias* spp.*),* jackrabbits *(Lepus* spp.), and cottontails *(Sylvilagus* spp.*).*

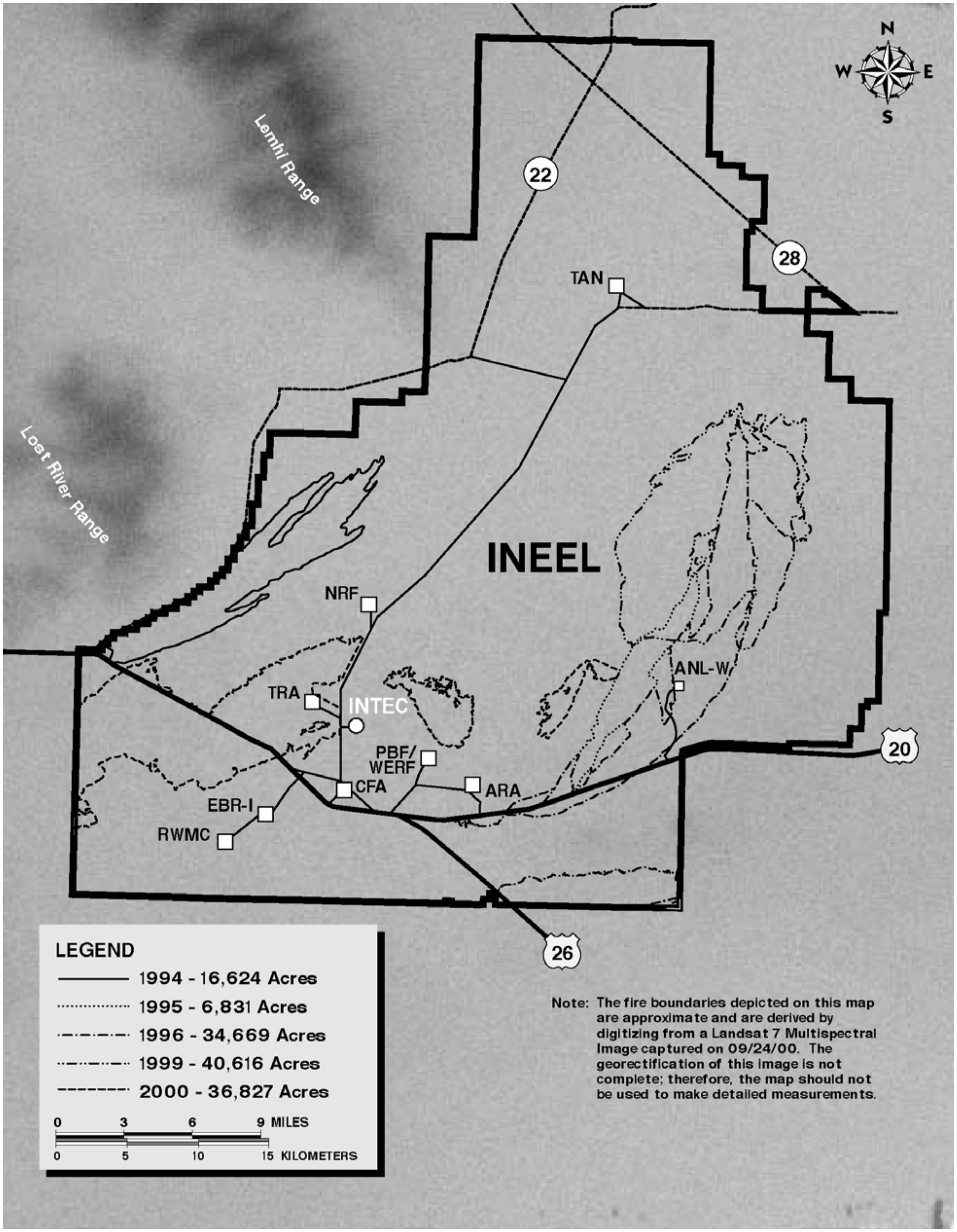


Figure 3-9. Approximate Location of Wildfires at INEEL (Modified from DOE, 2002a). To Convert Acres to Hectares, Multiply by 0.405.

Songbirds and passerines commonly observed at the INEEL include the American robin *(Turdus migratorius),* horned lark *(Eremophila alpestris),* black-billed magpie *(Pica pica),* sage thrasher *(Oreoscoptes montanus),* Brewer's sparrow *(Spizella breweri),* sage sparrow *(S. belli),* and western meadowlark *(Sturnella neglecta),* while resident upland gamebirds include the sage grouse *(Centrocercus urophasianus)*, chukar *(Alectoris chukar)*, and grey partridge *(Perdix perdix).* Common migratory bird species, that use INEEL for part of the year include a variety of waterfowl [e.g., mallard *(Anas plaryrhynchos),* northern pintail *(Anas acuta),* Canada goose *(Branta canadensis)*] and raptors [e.g., Swainson's hawk *(Buteo swainsoni),* rough-legged hawk *(B. lagopus),* and American kestrel *(Falco sparverius)*].

The most abundant big-game species that occur on the INEEL are elk (*Cervus elaphus*) and pronghorn (*Antilocapra americana*), with mule deer (*Odocoileus hemionus*) and moose (*Alces alces*) present in small numbers as transients. Since 1986, the number of elk wintering and summering at INEEL has increased, with many being year-round residents. The big-game populations are dependent on, among other things, populations during the previous year, severity of winter conditions, and acreage of recently burned land. In the case of elk, the population is also dependent on any game-control measures taken during a given year. Other large mammals observed on the INEEL site include coyote *(Canis latrans),* which is common across the site, and badger *(Taxidea taxus)* and bobcat *(Felis rufus),* both present across the site but much less abundant.

A more recent study conducted for the DOE Idaho HLW and Facilities Disposition EIS (DOE, 2002a, Section 4.9) adds that mountain lions have been observed in the area, along with a variety of snakes and lizards.

Numerous researchers have studied effects of radiation exposure from contaminated areas at INEEL on small mammals and birds. The researchers have concluded that subtle sublethal effects (e.g., reduced growth rates and life expectancies) can occur in individual animals as a result of radiation exposure. The researchers, however, can attribute no population or community-level impacts to such exposures (Halford and Markham, 1978; Evenson, 1981; Arthur, et al., 1986; Millard, et al., 1990).

The monitoring of radionuclide levels outside the boundaries of the various INEEL facilities and off the INEEL site has detected radionuclide concentrations above background levels in individual plants and animals (Craig, et al., 1979; Markham, et al., 1982; Morris, 1993), but these limited data suggest that populations of exposed animals (e.g., mice and rabbits) as well as animals that feed on these exposed animals (e.g., eagles and hawks) are not at risk.

3.6.3 Aquatic Fauna

The aquatic fauna near INTEC has been characterized by previous studies, some for EISs related to other projects at INEEL. Only intermittent streams cross the INEEL in the vicinity of INTEC. While streams are active, the INEEL site supports nine fish species (Arthur, et al., 1984; Reynolds, et al., 1986). A detailed description of the aquatic fauna of the potentially affected environment near INTEC is provided in the DOE Programmatic SNF EIS (DOE, 1995, Volume 2, Part A, Section 4.9).

3.6.4 Threatened, Endangered, and Sensitive Species

> **Protected Species**
>
> Endangered Species—Any species in danger of extinction throughout all or a significant portion of its range.
>
> Threatened Species—Any species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Threatened, endangered, and sensitive species were identified in the applicant's environmental report (FWENC, 2003a, Appendix A). These species were identified using the Idaho Department of Fish and Game's list of Species with Special Status in Idaho (Idaho Conservation Data Center, 1997). This species list is included as Table 3-6 and includes Federal- and state-listed species of plants and animals. To ensure this information is up to date and in accordance with Section 7 of the Endangered Species Act, NRC obtained the most recent list of potential threatened, endangered, and sensitive species at INEEL (U.S. Department of the Interior, 2002).

A detailed description of the threatened and endangered species near INTEC is provided in Volume 2, Part A, Section 4.9.3, Threatened, Endangered, and Sensitive Species, of the DOE SNF Programmatic EIS (DOE, 1995). Federal and state regulatory agency lists (DOE, 2002a, Section 4.9, U.S. Department of the Interior, 2002), the Idaho Department of Fish and Game Conservation Data Center list, and information from site surveys provided the information to identify Federal- and state-protected, candidate, and sensitive species that potentially occur on INEEL. This information identified one Federal-listed threatened (bald eagle), one Federal-listed nonessential experimental population (gray wolf), and nine special-concern species (northern sagebrush lizard, ferriginous hawk, long-billed curlew, greater sage-grouse, long-eared myotis, small-footed myotis, Townsend's big-eared bat, pygmy rabbit, and Merriam's shrew) as animals that potentially occur on the INEEL site (Table 3-6). Three additional animal species listed by the state as endangered or species of special concern occur on the site. No frequent observations of the Federal- or state-listed animal species have occurred near any of the facilities where proposed actions would occur. This analysis did not identify any Federal- or state-listed plant species as potentially occurring on the INEEL site. Six plant species identified by Federal agencies or the Idaho Native Plant Society as sensitive, rare, or unique occur on the site (U.S. Department of the Interior, 2002; DOE, 2002a).

3.6.5 Wetlands

> **Wetlands**
>
> Wetlands are areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation adapted for life in saturated soil conditions.

Results of wetland surveys at INEEL have been reported by DOE (1995, 2002a). The wetlands of the affected environment at the INEEL is described in Wetlands, of the DOE SNF Programmatic EIS (DOE, 1995, Volume 2, Part A, Section 4.9.4). The U.S. Fish and Wildlife Service National Wetlands Inventory has identified more than 130 areas inside the boundaries of INEEL that might possess some wetlands characteristics. However, recent survey results reported in the DOE Idaho HLW and Facilities Disposition EIS (DOE, 2002a, Section 4.9) indicate that no wetland areas occur within the INTEC boundary.

Table 3-6. Listed Threatened and Endangered Species, Species of Concern, and Other Unique Species That Occur, or Possibly Occur, on INEEL

Species		Classification: Federal[a]	Classification: State[b]	Occurrence on INEEL[a, b]
Amphibians and Reptiles	Northern sagebrush lizard (*Sceloporus graciosus graciosus*)	C[c]	—	Resident
Birds	American peregrine falcon (*Falco peregrinus anatum*)	—	E	Winter visitor
	Bald eagle *(Haliaeetus leucocephalus)*	LT	E	Occasional wintering area
	Ferruginous hawk *(Buteo regalis)*	C	P	Widespread summer resident
	Boreal owl (*Aegolius funereus*)	—	SC	Recorded, but not confirmed
	Flammulated owl *(Otus flammeolus*)	—	SC	Recorded, but not confirmed
	Long-billed curlew *(Numenius americanus)*	C	P	Limited summer distribution
	Greater sage-grouse (*Centrocercus urophasianus*)	C	—	Upland resident
Mammals	Gray wolf *(Canis Lupus)*	XN	E	Several sightings since 1993
	Long-eared myotis *(Myotis evotis)*	C	—	Limited onsite distribution
	Small-footed myotis (*Myotis ciliolabrum*)	C	—	Resident
	Townsend's big-eared bat *(Corynorhinus townsendii)*	C	SC	Resident
	Pygmy rabbit *(Brachylagus idahoensis)*	C	SC	Limited onsite distribution
	Merriam's shrew (*Sorex merriami*)	C	—	Resident
Plants	Ute's ladies tresses *(Spiranthes diluvialis)*	—	INPS–GP2	Found near, but not on, INEEL
	Speal-tooth dodder *(Cuscuta denticulata)*	—	INPS–1	Found near, but not on, INEEL
	Spreading gilia (*Ipomopsis [Gilia] polycladon*)	—	INPS–2	Common in western foothills
	Lemhi milkvetch *(Astragalus aquilonius)*	—	INPS–GP3	Limited distribution
	Painted milkvetch (*Astragalus ceramicus var. apus*)	C	—	Resident
	Winged-seed evening primrose *(Camissonia pterosperma)*	—	INPS–S	Rare and limited

DOE = U.S. Department of Energy
EIS = environmental impact statement
INEEL = Idaho National Engineering and Environmental Laboratory

Federal
LT Listed Threatened
XN Experimental Population
C Of Concern

State
E Endangered
P Protected Non-Game Species
SC Special Concern
INPS–1 Idaho Native Plant Society-State Priority 1
INPS–2 Idaho Native Plant Society-State Priority 2
INPS–GP2 Idaho Native Plant Society-Global Priority 2
INPS–GP3 Idaho Native Plant Society-Global Priority 3
INPS—S Idaho Native Plant Society-Sensitive

[a] From U.S. Fish and Wildlife Service species list number 1–4–02–SP–921 [U.S. Department of the Interior. "Department of Energy, Idaho National Engineering and Environmental Laboratory Species List Update." Letter (September 3) to R.D. Blew. Boise, Idaho: U.S. Department of the Interior, U.S. Fish and Wildlife Service. 2002.]
[b] DOE. DOE/EIS–0287–F, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.
[c] Federal species labeled as "C" are of concern to the U.S. Fish and Wildlife Service, but have no legal status on the Endangered Species Act. In the context of ecosystem-level management, however, the U.S. Fish and Wildlife Service suggests these species and their habitats be considered in project planning and review.

3.7 Meteorology, Climatology, and Air Quality

3.7.1 Meteorology and Climatology

The INEEL is located on a mile-high area of the Eastern Snake River Plain in southeast Idaho. Figure 3-10 provides a simplified topographic map of the area (Clawson, et al., 1989). Topographic cross sections are presented in FWENC (2003b, Figures 2.3-5 through 2.3-12). The climate is semiarid and exhibits low relative humidity, large daily temperature swings near the ground, and large variations in annual precipitation. Average seasonal temperatures measured onsite range from −7.3 °C [18.8 °F] in winter to 18.2 °C [64.8 °F] in summer, with an annual average temperature of 5.6 °C [42 °F] (DOE, 1995). Temperature extremes range from a summertime maximum of 39.4 °C [103 °F] to a wintertime minimum of −45 °C [−49 °F] (DOE, 2002a, p. 4-25). The Centennial and Bitterroot Mountain Ranges restrict most of the cold winter air masses from entering the Eastern Snake River Plain. More detailed information on temperature extremes and ranges is available (FWENC, 2003b,Tables 2.3-1 and 2.3-2). A freeze-thaw cycle {when maximum air temperature exceeds 0 °C [32 °F] and minimum air temperature is 0 °C [32 °F] or colder} occurs, on average, in 42 percent of the days in the year.

The average midday relative humidity ranges from about 18 percent in summer to about 55 percent in winter. In January (the coldest month), the air temperature averages −8.6 °C [16.5 °F] and the dewpoint averages −13.6 °C [7.4 °F]. In July (the warmest month), the air temperature averages 20.6 °C [69.0 °F] and the dewpoint averages 0.8 °C [33.5 °F].

Annual precipitation is light, averaging 22.1 cm [8.7 in] and ranging from 10 to 35.6 cm [4 to 14 in]. Monthly precipitation extremes are 0 to 12.7 cm [0 to 5 in]. The greatest short-term precipitation rates are primarily attributable to thunderstorms, which occur about 2 or 3 days per month during the summer. Maximum storm precipitation amounts for 1-hour and 24-hour time periods have also been presented (FWENC, 2003b,Table 2.3-16). The maximum 1-hour and 24-hour precipitation is 1.37 and 4.2 cm [0.54 and 1.6 in]. Determinations have been made on the average number of days with specified amounts of precipitation and snow (FWENC, 2003b, Tables 2.3-17 and 2.3-18).

Average annual snowfall at INEEL is 70.1 cm [27.6 in], with extremes of 17.3–151.6 cm [6.8–59.7 in]. The greatest 24-hour snowfall was 23 cm [9 in]. The maximum snow depth is 56.6 cm [22.3 in], and the average snow depth varies from 0 to 16.3 cm [0 to 6.4 in] (FWENC, 2003b, Table 2.3-19). Considerable blowing and drifting up to several feet high occur when several inches of loose snow are present during moderate to strong winds. Damage from hail has not been experienced to date at INEEL. Because crops and property have been damaged from hail in nearby areas, hail damage is possible at INEEL.

Most onsite locations experience the predominant southwest–northeast wind flow of the Eastern Snake River Plain, although terrain features near some locations cause variations from this flow regime. The wind rose diagrams in Figure 3-11 show annual wind flow. These diagrams show the frequency of direction from which the wind blows and the wind speed at three of the meteorological monitoring sites at INEEL for 1988–1992. Additional wind rose data are also available (FWENC, 2003b, Figures 2.3-13 through 2.3-16). The orientation of the Eastern Snake River Plain and surrounding mountain ranges results in the predominance of southwesterly winds from storms and daily solar heating. The next most frequent winds blow from the northeast. Winds from this direction are frequently unstable or

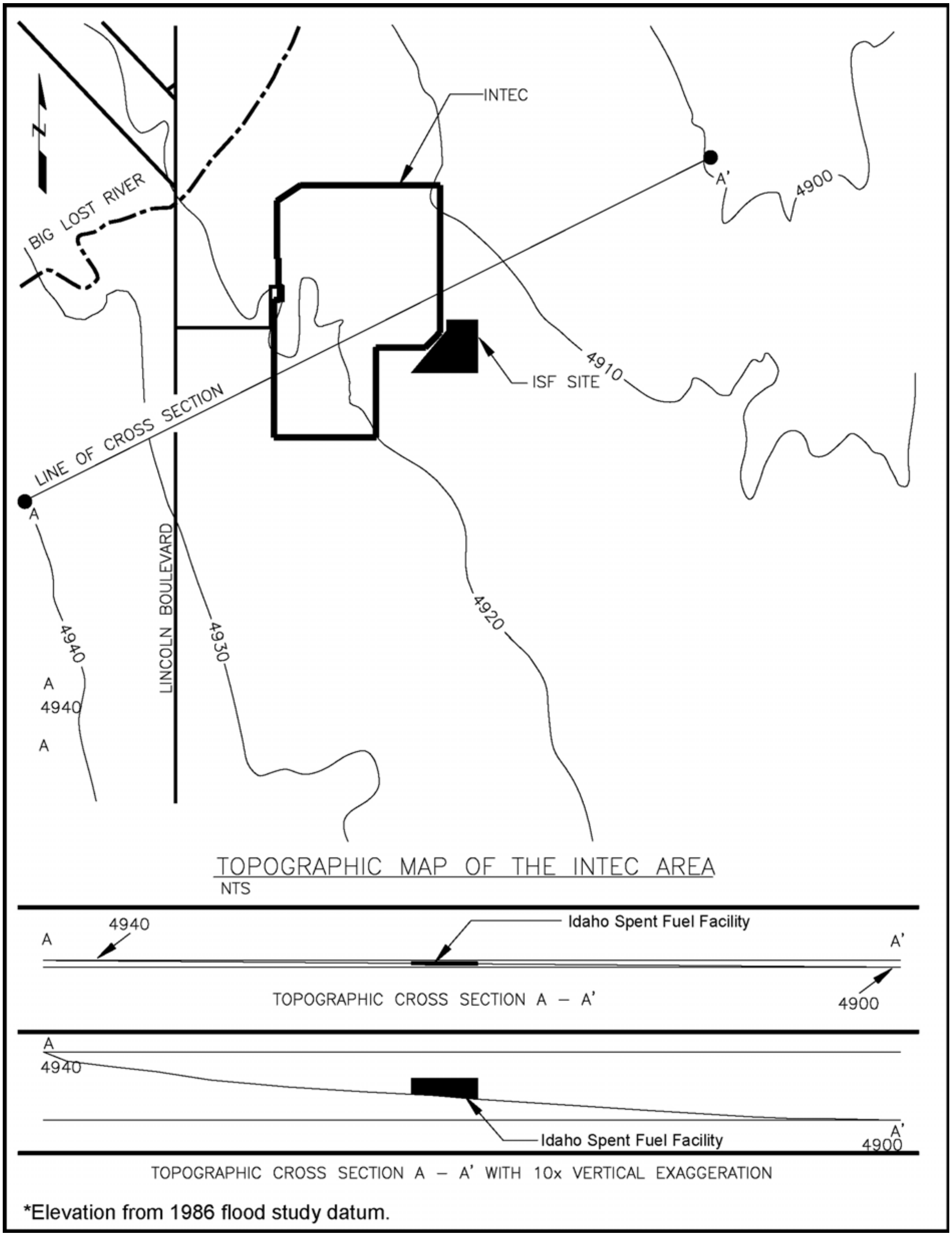


Figure 3-10. General Surface Topography in the Vicinity of the Proposed Idaho Spent Fuel Facility (Modified from FWENC, 2003b). To Convert Feet to Meters, Multiply by 0.3048.

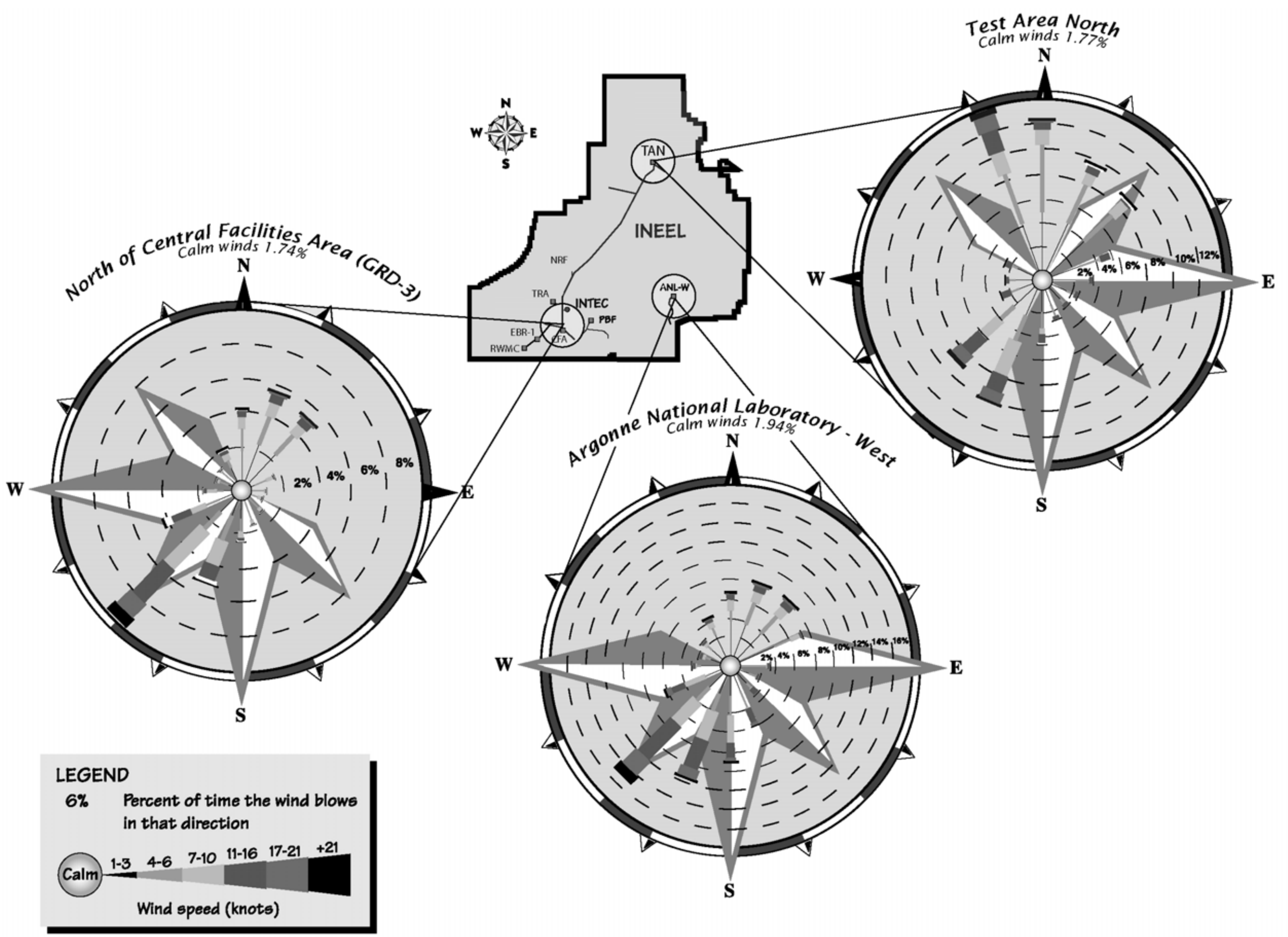


Figure 3-11. Annual Average Wind Direction and Wind Speed at Meteorological Stations on INEEL (Modified from DOE, 2002a)

neutral, promote effective dispersion, and extend to a considerable depth through the atmosphere. At night, cool, stable air frequently drains down the valley in a shallow layer from the northeast toward the southwest. With these conditions, dispersion is limited until solar heating mixes the plume the following day. Winds above such stable layers exhibit less variability and provide the transport environment for materials released from INEEL sources. More detailed information on the influences of the wind field is available (FWENC, 2003b, Section 2.3.1.2.1).

Monthly-average and highest hourly average wind speeds have been recorded at heights of 6 and 76 m [20 and 250 ft] (FWENC, 2003b, Table 2.3-10). The monthly average wind speeds at 6 m [20 ft] range from 8.2 km/hr [5.1 mi/hr] in December to 14.9 km/hr [9.3 mi/hr] in April and May and blow from the southwest or west-southwest. The highest hourly average near-ground wind speed measured onsite was 82 km/hr [51 mi/hr] from the west-southwest, with a maximum instantaneous gust of 125 km/hr [78 mi/hr] (FWENC, 2003b, Table 2.3-14; Clawson, et al., 1989). Strong gusts may result from pressure gradients from large-scale systems or thunderstorms and can be expected from any direction.

Other than thunderstorms, severe weather is uncommon. Five funnel clouds (vortex does not reach the ground) and no tornadoes (vortex reaches the ground) were reported onsite between 1950 and 1994 (FWENC, 2003b, Section 2.3.1.3.3). Additional information on the probabilities of tornadoes occurring in the region have been evaluated (Ramsdell and Andrews, 1986). A design-basis tornado has been specified to bound any tornado expected on the INEEL site (FWENC, 2003b, Table 2.3-15). The data reported in Ramsdell and Andrews (1986) indicate the INEEL site area is a low tornado-hazard area. The average annual probability of any tornado occurring within this geographic region is 6.0×10^{-7} per year. The annual probability that a tornado of Category F–2 or higher wind speeds in excess of 181 km/hr [113 mph] will occur is estimated to be 1.69×10^{-7} per year, and the maximum wind speed that will occur with a probability of 1×10^{-7} per year [the lowest probability that needs to be considered (Ramsdell and Andrews, 1986)] is estimated to be 274 km/hr [171 mph] (Category F–2).

Dust devils are small atmospheric vortices generated over hot land surfaces and are common during the summer months. The resulting dust clouds can cover up to several hundred yards in diameter and extend several hundred feet in the air (Clawson, et al., 1989). Neither hurricanes nor tropical storms occur at INEEL because of the moderating influence of the Pacific Ocean and isolation provided by the surrounding mountains (FWENC, 2003b, Section 2.3.1.3.5).

Visibility in the region is good because of the low moisture content of the air and minimal sources of visibility-reducing pollutants. DOE (2002a) provides additional information on visibility. An average air density of 1.06×10^{-3} g/cm^3 [3.83×10^{-5} lb/in^3] was computed for an average temperature of 5.8 °C [42.4 °F] and average atmospheric pressure of 64 cm [25 in] of mercury (Clawson, et al., 1989).

The average daily atmospheric pressure for the entire year averages a high of 63.86 cm [25.14 in] of mercury and a low of 63.47 cm [24.99 in] of mercury (FWENC, 2003b, Table 2.3-11). The average daily high atmospheric pressures range from 63.68 to 64.08 cm [25.07 to 25.23 in] of mercury. The average daily low atmospheric pressures range from 63.25 to 63.60 cm [24.90 to 25.04 in] of mercury. The annual mean daily pressure range averages to 0.38 cm [0.15 in] of mercury and varies from 0.25 cm [0.10 in] of mercury in the summer to 0.51 cm [0.20 in] of mercury in the winter. Although the maximum pressure changes in 1 hour and 24 hours have not been recorded at INEEL, maximum changes are thought to be bounded by 0.25 cm [0.1 in] of mercury per hour and 2.5 cm [1 in] of mercury per day based on synoptic and climatological records (FWENC, 2003b, Section 2.3.1.2.10).

3.7.2 Air Quality and Emissions

3.7.2.1 Introduction to Air Quality

The description of the air quality at INEEL is based on the characterization performed to support the DOE Programmatic SNF EIS (DOE, 1995, Volume 2, Part A, Section 4.7) and the Idaho HLW and Facilities Disposition EIS (DOE, 2002a, Section 4.7), which provided an update on changes in air resource conditions since the initial characterization. Air quality regulations have been established to protect the public from potential harmful effects of air pollution. These regulations (i) designate acceptable levels of pollution in ambient air, (ii) establish limits on radiation doses to members of the public, (iii) establish limits on air pollution emissions and resulting deterioration of air quality due to vehicular and other sources of human origin, (iv) require air permits to regulate (control) emissions from stationary (nonvehicular) sources of air pollution, and (v) designate prohibitory rules, such as rules that prohibit open burning.

The Clean Air Act and amendments provide the regulatory framework to protect the nation’s air resources and public health and welfare. In Idaho, EPA and the State of Idaho Department of Environmental Quality are jointly responsible for establishing and implementing programs that meet the requirements of the Clean Air Act. INEEL activities are subject to air quality regulations and standards established in the Clean Air Act, the State of Idaho, and the internal policies and requirements of DOE. Table 3-7 contains an overview of the Federal, state, and DOE programs for air quality management. Additional background information for air resources is presented in the Idaho HLW and Facilities Disposition EIS (DOE, 2002a, Appendix C.2).

3.7.2.2 Nonradiological Conditions

Persons in the Eastern Snake River Plain are exposed to a variety of nonradiological air pollutants. This section summarizes the sources and levels of these pollutants. Types of pollutants assessed include (i) the criteria pollutants regulated under the National and State Ambient Air Quality Standards and (ii) other types of pollutants with potentially toxic properties called toxic or hazardous air pollutants. Criteria pollutants are nitrogen dioxide, sulfur dioxide, carbon monoxide, lead, ozone, and respirable particulate matter (PM) less than or equal to 10 micrometers {1.0×10^{-6} m [3.9×10^{-7} in]} in size (PM_{10}). PM of that size are small enough to pass easily into the lower respiratory tract. Normally, ozone is not directly emitted into the atmosphere. Instead, ozone is formed by the reactions of nitrogen oxides and oxygen in the presence of sunlight. Volatile organic compounds, sometimes called precursor organics, contribute to the formation of ozone. It is the release of nitrogen oxides and volatile organic compounds into the atmosphere that results in the formation of ozone. Therefore, volatile organic compounds and nitrogen oxides are assessed as precursors leading to the development of ozone. Toxic air pollutants can be divided into two classifications: carcinogens, or cancer-causing agents, and noncarcinogens.

Table 3-7. Overview of Federal, State, and DOE Programs for Air Quality Management[a]		
Clean Air Act		
Federal Program	**State of Idaho Administration Program**	**DOE Compliance Program**
• **National Ambient Air Quality Standards** Set limits on ambient air concentrations of sulfur dioxide, nitrogen dioxide, respirable particulate matter, carbon monoxide, lead, and ozone (criteria pollutants). Primary standards for protection of public health; secondary standards for protection of public welfare. • **Prevention of Significant Deterioration** Limits deterioration of air quality and visibility in areas that currently meet the National Ambient Air Quality Standards. Requires Best Available Control Technology on major sources in attainment areas. • **New Source Performance Standards** Regulate emissions from specific types of industrial facilities (e.g., fossil fuel-fired steam generators and incinerators). • **National Emission Standards for Hazardous Air Pollutants** Control airborne emissions of specific substances harmful to human health. Specific provisions regulate hazardous air pollutants and limit radionuclide dose to a member of the public to 0.1 mSv [10 mrem] per year. Control emission of hazardous air pollutants from combustion of hazardous waste, as well as other categories of activities that may result in hazardous air pollutant emissions.	• **Rules for the Control of Air Pollution in Idaho** Current Regulations of the State of Idaho Department of Environmental Quality include — **Idaho Ambient Air Quality Standards**—Similar to National Ambient Air Quality Standards but also include standards for total fluorides. — **New Source Program**—Permit to Construct is required for essentially any construction or modification of a facility that emits an air pollutant; major facilities require PSD analysis and Permit to Construct. — **Carcinogenic and Noncarcinogenic Toxic Air Pollutant Increments**—Define acceptable ambient concentrations for many specific toxic air pollutants associated with sources constructed or modified after May 1, 1994; require demonstration of preconstruction compliance with toxic air pollutant increments. — **Operating Permits**—Required for nonexempt sources of air pollutants; define operating conditions and emissions limitations as well as monitoring and reporting requirements.	Policy to comply with applicable regulations and maintain emissions at levels as low as reasonably achievable. Policy implemented through DOE orders: DOE (Headquarters) orders apply to all DOE and DOE–contractor operations. DOE–Idaho Operations Office supplemental directives provide direction and guidance specific to INEEL. The most relevant DOE orders and their DOE–Idaho Operations Office supplemental directives are DOE Order 450.1 establishes general environmental protection program requirements and assigns responsibilities for ensuring compliance with applicable laws, regulations, and DOE policies. DOE Order 5400.5 provides guidelines and requirements for radiation protection of the public.

Table 3-7. Overview of Federal, State, and DOE Programs for Air Quality Management[a] (continued)		
Clean Air Act		
Federal Program	**State of Idaho Administration Program**	**DOE Compliance Program**
• **Clean Air Act Amendments of 1990** Sweeping changes to the Clean Air Act, primarily to address acid rain, nonattainment of National Ambient Air Quality Standards, operating permits hazardous air pollutants, potential catastrophic releases of acutely hazardous materials, and stratospheric ozone depletion. Specific rules and policies not yet fully developed and implemented in all areas (e.g., hazardous air pollutants).	• **Rules and Standards for Hazardous Waste** Include standards for hazardous waste treatment facilities, including limits on emissions. Consistent with Federal standards.	DOE Order 5480.4 prescribes the application of mandatory Environment, Safety, and Health standards that shall be used by all DOE and DOE–contractor operations (implemented via DOE–Idaho Operations Office Supplemental Directive 5480.4). DOE Order 5480.19 provides guidelines and requirements for plans and procedures in conducting operations at DOE facilities (implemented via DOE–Idaho Operations Office Supplemental Directive 5480.19).

DOE = U.S. Department of Energy
EIS = environmental impact statement
INEEL = Idaho National Engineering and Environmental Laboratory
PSD = prevention of significant deterioration

[a] DOE. DOE/EIS–0287–F, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.

3.7.2.2.1 Sources of Nonradiological Air Emissions

The population of the Eastern Snake River Plain is exposed to air pollutants that come from a variety of sources including agricultural and industrial activities, residential wood burning, wind-blown dust, and automobile exhaust. Many of the activities at INEEL also emit air pollutants. Sources such as thermal treatment processes, boilers, and emergency generators emit both criteria and toxic air pollutants. Nonthermal chemical-processing operations, waste management activities other than combustion, and research laboratories are potential sources of toxic air pollutants. Waste management, construction, and related activities such as excavation also generate fugitive dust.

Background emission rates for existing facilities have been characterized for two separate cases. The actual emissions case represented the collective emission rates of nonradiological pollutants experienced by INEEL facilities and the maximum emissions case represented a scenario in which all permitted sources at INEEL are assumed to operate in such a manner that they emit specific pollutants to the maximum extent allowed by operating permits or applicable regulations. This scenario is appropriate because many facilities operate at levels well below those allowed by operating permits, which set conditions such as maximum hours of operation or emission rates.

A total of 26 toxic air pollutants have been identified that are emitted from existing INEEL facilities in quantities exceeding the screening levels established by the State of Idaho. The health hazard associated with toxic air pollutants emitted in lesser quantities is considered low enough by the State of Idaho not to require detailed assessment. For a few toxic air pollutants, actual 1996 emissions were greater than the levels assessed in the DOE Programmatic SNF EIS (DOE, 1995, Volume 2, Part A, Section 4.7). These increases were primarily attributable to decontamination and decommissioning activities (DOE, 2002a, Section 4.7).

3.7.2.2.2 Existing Nonradiological Conditions

The assessment of nonradiological air quality described in the DOE Programmatic SNF EIS (DOE, 1995, Volume 2, Part A, Section 4.7) was based on the assumption that the available monitoring data are not sufficient to allow a meaningful characterization of existing air quality and that such a characterization must rely on an extensive program of air-dispersion modeling. The modeling program applied for this purpose utilized computer codes, methods, and assumptions considered acceptable by EPA and the State of Idaho for regulatory compliance purposes. The methodology applied in the assessments performed is described in the DOE Programmatic SNF EIS (DOE, 1995, Appendix F–3).

3.7.2.2.3 Onsite Conditions

The DOE Programmatic SNF EIS (DOE, 1995) contains an assessment of existing conditions for each facility area as a result of cumulative toxic air-pollutant emissions from sources located within all areas of INEEL. Except for public roads, criteria levels are not assessed for onsite locations because standards for these pollutants apply only to ambient air locations (i.e., locations to which the general public has access.) Toxic air pollutants, however, are assessed because of potential exposure of workers to these hazardous substances. Typically, the dominant contributors to pollutant levels at each of these areas are sources within that area. Onsite levels of specific toxics are compared to occupational exposure limits established to protect workers.

Table 3-8 contains results from the DOE Programmatic SNF EIS (DOE, 1995) for the highest predicted concentrations of toxic air pollutants at onsite locations for the maximum baseline case at INEEL. None of these concentration levels at the INTEC area of the INEEL site exceeded the occupational exposure limits. Some estimates presented in Table 3-8 take into account operation of the New Waste Calciner Facility. DOE placed this facility on standby in 2000 and submitted a two-phased partial closure plan for the calciner portion of the facility in August 2000 (DOE, 2002a, Section 2.2.5). The plan is consistent with an April 19, 1999, modification to the Notice of Noncompliance Consent Order signed by the DOE and the Idaho Department of Health and Welfare in 1992. In publishing the record of decision for the alternatives evaluated in the INEEL HLW and Facilities Disposition EIS, DOE will decide whether to upgrade and permit the calciner. If DOE decides to upgrade the calciner, DOE will modify the closure plan, as necessary, through the permitting process.

Table 3-8. Highest Predicted Concentrations of Toxic Air Pollutants at Onsite Locations for the Maximum Baseline Case at INEEL, Including Anticipated Increases to the Baseline[a]

Toxic Air Pollutant	Location of Maximum Concentration[b]	Maximum 8-Hour Concentrations ($\mu g/m^3$)	Occupational Exposure Limit ($\mu g/m^3$)	Percent of Standard
Carcinogens				
Acetaldehyde	ANL–W	1.1×10^{2}	1.8×10^{5}	<1
Arsenic	CFA	2.8×10^{-1}	1.0×10^{1}	3
Benzene	CFA	3.1×10^{3}	3.0×10^{3}	103
Butadiene	TRA	3.8×10^{3}	2.2×10^{4}	17
Carbon Tetrachloride	RWMC	2.5×10^{2}	1.3×10^{4}	2
Chloroform	RWMC	1.7×10^{1}	9.8×10^{3}	<1
Formaldehyde	ANL–W	5.7×10^{1}	9.0×10^{2}	6
Hexavalent Chromium	INTEC/TAN	2.4×10^{0}	5.0×10^{1}	5
Hydrazine	TRA	1.8×10^{-3}	1.0×10^{2}	<1
Methylene Chloride	CFA/INTEC	3.2×10^{0}	1.7×10^{5}	<1
Nickel	CFA	4.1×10^{1}	1.0×10^{2}	41
Perchloroethylene	CFA	4.3×10^{2}	1.7×10^{5}	<1
Trichloroethylene	RWMC	4.0×10^{1}	2.7×10^{5}	<1
Noncarcinogens				
Ammonia	INTEC	9.7×10^{2}	1.7×10^{4}	6
Cyclopentane	CFA	1.1×10^{3}	1.7×10^{6}	<1
Hydrochloric Acid	CFA	1.1×10^{2}	7.0×10^{3}	2
Mercury	INTEC	3.0×10^{0}	5.0×10^{1}	6
Naphthalene	CFA	2.3×10^{3}	5.0×10^{4}	5
Nitric Acid	INTEC	7.7×10^{2}	5.0×10^{3}	15
Phosphorus	TAN	5.5×10^{1}	1.0×10^{2}	55
Potassium Hydroxide	ANL–W	1.4×10^{1}	2.0×10^{3}	<1
Styrene	PBF	3.5×10^{2}	2.1×10^{5}	<1
Toluene	CFA	2.5×10^{4}	1.9×10^{5}	13

Table 3-8. Highest Predicted Concentrations of Toxic Air Pollutants at Onsite Locations for the Maximum Baseline Case at INEEL, Including Anticipated Increases to the Baseline[a] (continued)

Toxic Air Pollutant	Location of Maximum Concentration[b]	Maximum 8-Hour Concentrations ($\mu g/m^3$)	Occupational Exposure Limit ($\mu g/m^3$)	Percent of Standard
Trimethylbenzene	CFA	1.3×10^4	1.2×10^5	11
Trivalent Chromium	TAN	6.3×10^0	5.0×10^2	1

ANL–W = Argonne National Laboratory–West
CFA = Central Facilities Area
DOE = U.S. Department of Energy
INEEL = Idaho National Technology and Engineering Center
INTEC = Idaho Nuclear Engineering and Technology Center
PBF = Power Burst Facility
RWMC = Radioactive Waste Management Complex
TAN = Test Area North
TRA = Test Reactor Area

[a] DOE. DOE/EIS–0203–F, "Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement." Vol. 2, Part A, Section 4.7. Idaho Falls, Idaho: DOE, Idaho Operations Office. 1995.
[b] Occupational exposure limits are 8-hour, time-weighted averages established by the American Conference of Governmental Industrial Hygienists or Occupational Safety and Health Administration; the lower (most restrictive) of the two limits is used.

NOTE: To convert to $\mu g/m^3$ to oz/ft^3, multiply by 1×10^{-9}.

3.7.2.2.4 Offsite Conditions

Estimated maximum offsite pollutant concentrations were calculated in the DOE Programmatic SNF EIS (DOE, 1995) for locations along the INEEL site boundary, public roads within the site boundary, and at Craters of the Moon Wilderness Area and Preserve. Table 3-9 contains the results for criteria pollutant levels associated with facilities that existed or were projected to operate before mid-1995. These results indicate that all concentrations of criteria pollutants in all areas are well within the ambient air quality standards. Table 3-10 contains the results for carcinogenic toxic air-pollutant levels at INEEL site boundary locations including anticipated increases to the baseline. All carcinogenic air-pollutant levels are below the ambient air quality standards. Table 3-11 contains the results for noncarcinogenic air-pollutant levels at INEEL site boundary locations and public

Air Quality Terms

PM is dust, smoke, other solid particles and liquid droplets in the air. Particle size is important and is measured in micrometers (µm). A micrometer is 1 millionth of a meter (3.9×10^{-5} in).

Criteria Pollutants are pollutants for which the EPA has set National Ambient Air Quality Standards. The criteria pollutants are sulfur oxides, nitrogen dioxide, carbon monoxide, PM_{10} and $PM_{2.5}$ (PM_{10} and $PM_{2.5}$ are PM with a diameter less than 10 µm and 2.5 µm, respectively), lead, and ozone.

Background is an air concentration value, based on measured pollutant data, that accounts for the impact of emissions from existing facilities.

National Ambient Air Quality Standards are set for the criteria pollutants. The primary standards set maximum limits on outdoor air concentrations of these pollutants to protect public health with an adequate margin of safety. Secondary standards specify maximum concentrations that would protect the public. If both a primary and a secondary standard exist, the more restrictive standard is normally used for assessment purposes.

Table 3-9. Ambient Air Concentrations of Criteria Pollutants from the Combined Effects of Maximum Baseline Emissions and Projected Increases[a]

		Maximum Projected Concentration ($\mu g/m^3$)[b]				Percent of Standard		
	Averaging Time	Site Boundary	Public Roads	Craters of the Moon Wilderness Area	Applicable Standard[c] ($\mu g/m^3$)	Site Boundary	Public Roads	Craters of the Moon Wilderness Area
Carbon Monoxide	1 hour 8 hours	530 170	1,300 310	140 30	40,000 10,000	1 2	3 3	0.3 0.3
Nitrogen Dioxide	Annual	7.3	11	0.6	100	7	11	1
Sulfur Dioxide	3 hours 24 hours Annual	220 53 2.5	600 140 6.2	62 11 0.3	1,300 370 80	17 15 3	46 38 8	5 3 0.4
Respirable Particulates[d]	24 hours Annual	20 0.77	35 3.5	3.2 0.12	150 50	13 2	24 7	2 0.2
Lead	Quarterly	2.0×10^{-3}	2.0×10^{-3}	10×10^{-4}	1.5	0.2	0.3	0.01

DOE = U.S. Department of Energy

[a] DOE. “Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement.” Section 4.7. Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.
[b] Includes contribution from existing sources and projected increases.
[c] All standards are primary air quality standards (designed to protect public health), except for 3-hour sulfur dioxide, which is a secondary standard (designed to protect public welfare).
[d] Assumes all particulate matter emissions are of respirable size (i.e., less than 10 microns). Particulate matter concentrations do not include fugitive dust from activities such as construction. Additional standards for smaller sized particles (2.5 microns and less) have been promulgated. Current air quality levels are well within the proposed standards.

NOTE: To convert to $\mu g/m^3$ to oz/ft^3, multiply by 1×10^{-9}.

Table 3-10. Highest Predicted Concentrations of Carcinogenic Air Pollutants at Site Boundary Locations for the Maximum Baseline Case at INEEL, Including Anticipated Increases to the Baseline[a]

Toxic Air Pollutant	Annual Average Concentrations (μg/m^3)	Standard[b] (μg/m^3)	Percent of Standard
Acetaldehyde	1.1×10^{-2}	4.5×10^{-1}	2
Arsenic	9.0×10^{-5}	2.3×10^{-4}	39
Benzene	2.9×10^{-2}	1.2×10^{-1}	24
Butadiene	1.0×10^{-3}	3.6×10^{-3}	28
Carbon Tetrachloride	6.0×10^{-3}	6.7×10^{-2}	9
Chloroform	4.0×10^{-4}	4.3×10^{-2}	<1
Formaldehyde	1.2×10^{-2}	7.7×10^{-2}	16
Hexavalent Chromium	6.0×10^{-5}	8.3×10^{-5}	72
Hydrazine	1.0×10^{-6}	3.4×10^{-4}	<1
Methylene Chloride	6.0×10^{-3}	2.4×10^{-1}	3
Nickel	2.7×10^{-3}	4.2×10^{-3}	65
Perchloroethylene	1.1×10^{-1}	2.1×10^{-0}	5
Trichloroethylene	9.7×10^{-4}	7.7×10^{-2}	1

DOE = U.S. Department of Energy
EIS = environmental impact statement
INEEL = Idaho National Engineering and Environmental Laboratory

[a] DOE. DOE/EIS–0203–F, "Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement." Vol. 2, Part A, Section 4.7. Idaho Falls, Idaho: DOE, Idaho Operations Office. 1995.
[b] Acceptable ambient concentrations for carcinogens listed in Rules for the Control of Air Pollution in Idaho. Acceptable ambient concentrations for carcinogens are increments that apply only to new (not existing) sources and are used here only as reference levels.

NOTE: To convert to µg/m^3 to oz/ft^3, multiply by 1×10^{-9}.

Table 3-11. Highest Predicted Concentrations of Noncarcinogenic Air Pollutants at Site Boundary and Public Road Locations for the Maximum Baseline Case at INEEL, Including Anticipated Increases to the Baseline[a]

Toxic Air Pollutant	Location	Annual Average Concentration ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Percent of Standard[b]
Ammonia	Public Road Site Boundary	6.0×10^{0} 4.1×10^{-1}	1.8×10^{2}	3 <1
Cyclopentane	Public Road Site Boundary	2.7×10^{0} 3.9×10^{-2}	1.7×10^{4}	<1 <1
Hydrochloric Acid	Public Road Site Boundary	9.8×10^{-1} 9.7×10^{-2}	7.5×10^{0}	13 1
Mercury	Public Road Site Boundary	4.2×10^{-2} 1.3×10^{-2}	1.0×10^{0}	4 1
Naphthalene	Public Road Site Boundary	1.8×10^{1} 1.9×10^{-3}	5.0×10^{2}	4 <1
Nitric Acid	Public Road Site Boundary	6.4×10^{-1} 2.6×10^{-1}	5.0×10^{1}	1 <1
Phosphorus	Public Road Site Boundary	3.0×10^{-1} 8.9×10^{-3}	1.0×10^{0}	30 <1
Potassium Hydroxide	Public Road Site Boundary	2.0×10^{-1} 2.0×10^{-1}	2.0×10^{1}	1 1
Proprionaldehyde	Public Road Site Boundary	3.0×10^{-1} 6.4×10^{-3}	4.3×10^{0}	7 <1
Styrene	Public Road Site Boundary	1.3×10^{0} 2.4×10^{-4}	1.0×10^{3}	<1 <1
Toluene	Public Road Site Boundary	3.7×10^{2} 6.2×10^{-2}	3.8×10^{3}	10 <1
Trimethylbenzene	Public Road Site Boundary	1.0×10^{2} 1.0×10^{-2}	1.2×10^{3}	8 <1
Trivalent Chromium	Public Road Site Boundary	3.6×10^{-2} 2.2×10^{-3}	5.0×10^{0}	<1 <1

DOE = U.S. Department of Energy
EIS = environmental impact statement
INEEL = Idaho National Engineering and Environmental Laboratory

[a] DOE. DOE/EIS–0203–F, "Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement." Vol. 2, Part A, Section 4.7. Idaho Falls, Idaho: DOE, Idaho Operations Office. 1995.
[b] Acceptable ambient concentrations listed in Rules of the Control of Air Pollution in Idaho. Acceptable ambient concentrations are increments that apply only to new (not existing) sources and are used here only as reference levels.

NOTE: To convert to $\mu g/m^3$ to oz/ft^3, multiply by 1×10^{-9}.

road locations including anticipated increases to the baseline. All noncarcinogenic air-pollutant levels are below the ambient air quality standards. Levels at some public road locations, which are closer to emission sources, are higher than site boundary locations but still below the ambient air quality standards.

Concentrations of certain criteria pollutants from existing INEEL sources were also compared to Prevention of Significant Deterioration (PSD) regulations, which have been established to ensure that air quality remains good in those areas where ambient air quality standards are not exceeded. The Idaho HLW and Facilities Disposition EIS (DOE, 2002a, Appendix C.2, Section C.2.2.2) contains a detailed description of PSD regulations. The PSD regulations use criteria called increments. These increments are allowable increases over baseline conditions from sources that have become operational after certain baseline dates. Increments have been established for sulfur dioxide, respirable particulates, and nitrogen dioxide. Separate PSD increments are established for pristine areas, such as national park or wilderness areas (termed Class I areas) and for the nation as a whole (termed Class II areas). Craters of the Moon Wilderness Area is the Class I area nearest to the INEEL site, while the site boundary and public roads are the applicable Class II areas. Federal land managers (e.g., BLM or National Park Service) are responsible for the protection of air quality values, including visibility, in land areas under their jurisdiction. The Clean Air Act requires the prevention of any future impairment and the remedying of any existing impairment in Class I Federal areas. Section 3.10 of this EIS contains information concerning Visual/Scenic descriptions.

The amount of increment consumed by existing sources subject to PSD regulation described in this EIS is based on estimates presented in the Idaho HLW and Facilities Disposition EIS (DOE, 2002a). The DOE used two air-dispersion models to generate the estimates in the Idaho HLW and Facilities Disposition EIS (DOE, 2002a, Appendix C.2, Section C.2.3.3). Selection of the air-dispersion model was based on the distance from the emission source to the monitoring site. The National Park Service recommends using an air-dispersion model called CALPUFF to assess conditions at receptor locations greater than 50 km [31 mi] from the emission source. The other air-dispersion model, ISCST3, was used to assess conditions at receptor locations less than 50 km [31 mi] from the emission source. Table 3-12 contains the CALPUFF model-estimated maximum increment consumption at the Class I area locations for western portions of Craters of the Moon Wilderness Area and Preserve, Yellowstone National Park, and Grand Teton National Park. Tables 3-13 and 3-14 contain the ISCST3 model estimated maximum increment consumption for the eastern portion of the Craters of the Moon Class I area and the Class II area on and around INEEL. The Craters of the Moon area appears in the estimate for both CALPUFF and ISCST3 models because portions of the area were closer than 50 km [31 mi] from the INTEC emission source and portions of the area were farther than 50 km [31 mi] from the emission source. The amount of increment consumed at all Class I and Class II areas remains well within allowable levels.

3.7.2.2.5 Summary of Nonradiological Air Quality

The air quality on and around INEEL is good and within applicable guidelines. The area around the INEEL is either in attainment or unclassified for all National Ambient Air Quality Standards. Portions of Bannock and Power Counties in Idaho, near the region of influence, are in a nonattainment area for PM. For toxic emissions, all INEEL boundary and public road levels have been found to be well below reference levels appropriate for comparison. Current emission rates for some toxic pollutants are higher than the baseline levels assessed in the

Table 3-12. PSD Increment Consumption at Distant Class I Areas by Sources Subject to PSD Regulation[a,b]

Pollutant	Averaging Time	Allowable PSD Increment (μg/m^3)	Craters of the Moon National Monument[c]		Yellowstone National Park[d]		Grand Teton National Park[e]	
			Maximum Predicted Concentration (μg/m^3)	Percent of PSD Increment Consumed	Maximum Predicted Concentration (μg/m^3)	Percent of PSD Increment Consumed	Maximum Predicted Concentration (μg/m^3)	Percent of PSD Increment Consumed
Sulfur Dioxide[f]	3 hours 24 hours Annual	25 5 2	11 3.4 0.23	44 68 12	2.7 0.66 0.026	11 13 1.3	4 0.99 0.045	16 20 2.3
Respirable Particulates	24 hours Annual	8 4	0.61 0.032	7.6 0.8	0.22 4.7×10^{-3}	2.8 0.12	0.25 7.4×10^{-3}	3.1 0.19
	Annual	2.5	0.27	11	6.6×10^{-3}	0.26	0.022	0.88

DOE = U.S. Department of Energy
EIS = environmental impact statement
INTEC = Idaho Nuclear Technology and Engineering Center
PSD = prevention of significant deterioration

[a] DOE. DOE/EIS–0287–F, “Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement.” Section 4.7. Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.
[b] Modeled assuming maximum emission rates and full utilization (8,760 hr/yr) for each source.
[c] The results for Craters of the Moon National Monument represent the impacts predicted 65 km [39 mi] from INTEC, which correspond to the western portion of Craters of the Moon irrespective of direction.
[d] The results for Yellowstone National Park represent the impacts predicted 160 km [100 mi] from INTEC, which correspond to the closest (southwestern) boundary of Yellowstone, irrespective of direction.
[e] The results for Grant Teton National Park represent the impacts predicted 160 km [100 mi] from INTEC, which correspond to the closest (westernmost) boundary of Grand Teton, irrespective of direction.
[f] Based on fuel sulfur content of 0.3 percent.

NOTE: To convert to µg/m^3 to oz/ft^3, multiply by 1×10^{-9}.

Table 3-13. PSD Increment Consumption at the Craters of the Moon Class I Areas by Sources Subject to PSD Regulation[a,b]

Pollutant	Averaging Time	Allowable PSD Increment[c] (μg/m^3)	Maximum Predicted Concentration (μg/m^3)	Percent of PSD Increment Consumed
Sulfur Dioxide[d]	3 hours 24 hours Annual	25 5 2	8.1 1.9 0.12	32 37 6
Respirable Particulates	24 hours Annual	8 4	0.57 0.025	7.2 0.6
Nitrogen Dioxide	Annual	2.5	0.40	16

DOE = U.S. Department of Energy
EIS = environmental impact statement
IDAPA = Idaho Administrative Procedures Act
PSD = prevention of significant deterioration

[a] DOE. DOE/EIS–0287–F, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Section 4.7. Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.
[b] Assumes maximum emission rates and full utilization (8,760 hr/yr) for each source.
[c] Increments specified are State of Idaho standards (Idaho Department of Environmental Quality. "IDAPA 58, Title 1, Chapter 1, Rules for the Control of Air Pollution in Idaho." Sections 549–581. Boise, Idaho: Idaho Department of Environmental Quality. 2001. <http://www.state.id.hs/adm/adminrules/rules/IDAPA58/0101.pdf> (April 15, 2003)
[d] Sulfur dioxide results have been modified from the original results by a factor of 0.6 to reflect a change in fuel sulfur content from 0.5 to 0.3 percent.

NOTE: To convert to µg/m^3 to oz/ft^3, multiply by 1×10^{-9}.

DOE Programmatic SNF EIS (DOE, 1995), but resulting ambient concentrations are expected to remain below reference levels. Similarly, all toxic pollutant levels at onsite locations are expected to remain below the lower of two occupational limits established by either the Occupational Safety and Health Administration or the American Conference of Government Industrial Hygienists for protection of workers.

3.7.2.3 Radiological Air Quality

This section provides information concerning the levels of airborne radiological exposure to the population of the Eastern Snake River Plain.

What is a Sievert?

The effects of radiation exposure on humans depend on the kind of radiation received, the total amount of radiation energy absorbed, and the sensitivity and mass of tissues involved. A sievert (Sv) is a unit of radiation dose calculated by a formula that takes these three factors into account. Another common unit of radiation dose is the rem [1 Sv = 100 rem]. The average annual radiation dose to an individual in the United States from natural background and artificial sources is about 0.0036 Sv [0.36 rem] or 3.6 millisievert (mSv) [360 millirem (mrem)]. This average quantity represents the summation of external and internal doses.

Table 3-14. PSD Increment Consumption at Class II Areas at INEEL by Sources Subject to PSD Regulation[a]

		Maximum Predicted Concentration[b]				
Pollutant	**Averaging Time**	**Allowable PSD Increment[c] (μg/m^3)**	**INEEL Boundary (μg/m^3)**	**Public Road (μg/m^3)**	**Amount of Increment Consumed (μg/m^3)**	**Percent of PSD Increment Consumed[d]**
Sulfur Dioxide[e]	3 hour 24 hour Annual	512 91 20	80 16 1.1	120 27 3.6	120 27 3.6	23 29 18
Respirable Particulates	24 hour Annual	30 17	4.9 0.19	10 0.53	10 0.53	34 3.1
Nitrogen Dioxide	Annual	25	3.3	8.8	8.8	35

DOE = U.S. Department of Energy
EIS = environmental impact statement
IDAPA = Idaho Administrative Procedures Act
INEEL = Idaho National Engineering and Environmental Laboratory
PSD = prevention of significant deterioration

[a] DOE. DOE/EIS–0287–F, “Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement.” Section 4.7. Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.
[b] Modeled assuming maximum emission rates and full utilization (8,760 hours per year).
[c] Increments specified are State of Idaho standards [Idaho Department of Environmental Quality. “IDAPA 58, Title 1, Chapter 1, Rules for the Control of Air Pollution in Idaho.” Section 579–581. Boise, Idaho: Idaho Department of Environmental Quality. 2001. <http://www.state.id.hs/adm/adminrules/rules/IDAPA58/0101.pdf> (April 15, 2003)].
[d] The amount of increment consumed is equal to the highest value of either the site boundary or public road locations.
[e] Sulfur dioxide results have been modified from the original results by a factor of 0.6 to reflect a change in fuel sulfur content from 0.5 to 0.3 percent.

NOTE: To convert to µg/m^3 to oz/ft^3, multiply by 1×10^{-9}.

3.7.2.3.1 Sources of Radiation

The population of the Eastern Snake River Plain is exposed to radiation that comes from natural background sources and artificial sources. Both of these radiation sources are described in detail in Section 3.13.

3.7.2.3.2 Existing Radiological Conditions

Monitoring and assessment activities are conducted to characterize existing radiological conditions at INEEL and the surrounding environment. Table 3-15 provides a summary of the principal types of airborne radioactivity emitted from INEEL facilities during 1999 and 2000.

An indication of onsite radiological conditions is also obtained by comparing measured levels on and near INEEL with measured levels from locations near the site, but at a distance sufficient not to be affected by the site. Figure 3-12 shows the offsite dosimeter locations, as well as locations where various food products are collected for radioactivity analysis. Results from locations on and near INEEL include contributions from natural background conditions and

Table 3-15. Summary of Airborne Radionuclide Emissions (in Curies) for 1999 and 2000 from Facility Areas at INEEL[a]

Area	Tritium/Carbon-14		Iodines		Noble Gases		Mixed Fission and Activation Products[b]		U/Th/Transuranic[c]	
	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000
Monitored Sources										
Argonne National Laboratory–West	11	2.5	—[d]	—	1.9×10^{3}	400	—	—	—	—
Central Facilities Area	—	—	—	—	—	—	—	—	—	—
INEEL	8.9	13	2.6×10^{-3}	6.1×10^{-3}	—	—	6.9×10^{-4}	7.2×10^{-4}	2.4×10^{-6}	2.8×10^{-6}
Naval Reactors Facility	—	—	—	—	—	—	—	—	—	—
Power Burst Facility	55	2.6×10^{-4}	4.2×10^{-12}	6.1×10^{-3}	—	—	—	—	2.8×10^{-9}	—
Radioactive Waste Management Complex	—	—	—	—	—	—	—	—	—	—
Test Area North	—	93	—	7.9×10^{-3}	—	920	2.7×10^{-6}	3.4×10^{-7}	—	—
Test Reactor Area	—	—	—	—	—	—	—	—	—	—
INEEL Total	75	110	2.6×10^{-3}	0.014	1.9×10^{3}	1.3×10^{3}	7.0×10^{-4}	7.2×10^{-4}	2.4×10^{-6}	2.8×10^{-6}
Other Release Points										
Argonne National Laboratory–West	0.014	0.010	—	—	—	—	—	—	—	—
Central Facilities Area	—	—	—	—	—	—	2.7×10^{-8}	6.6×10^{-8}	3.1×10^{-5}	1.0×10^{-9}
INEEL	1.1×10^{-5}	150	1.6×10^{-7}	6.1×10^{-11}	—	1.2×10^{3}	1.4×10^{-3}	4.4×10^{-3}	2.9×10^{-6}	8.2×10^{-4}
Naval Reactors Facility	0.67	0.69	5.0×10^{-6}	9.0×10^{-6}	0.047	0.68	1.5×10^{-4}	1.1×10^{-4}	—	6.0×10^{-6}
Power Burst Facility	7.1×10^{-5}	0.018	3.3×10^{-10}	1.6×10^{-16}	1.5×10^{-11}	2.8×10^{-13}	7.0×10^{-5}	9.8×10^{-5}	5.6×10^{-9}	4.4×10^{-7}
Radioactive Waste Management Complex	0.021	0.011	—	—	—	—	4.6×10^{-8}	3.1×10^{-7}	1.0×10^{-6}	7.2×10^{-6}
Test Area North	5.3×10^{-4}	1.4×10^{-7}	—	—	—	—	2.7×10^{-7}	4.4×10^{-4}	5.7×10^{-7}	1.1×10^{-6}
Test Reactor Area	170	200	0.13	0.38	1.2×10^{3}	1.5×10^{3}	0.45	2.3	7.4×10^{-6}	1.3×10^{-5}
INEEL Total	170	350	0.13	0.38	1.2×10^{3}	2.7×10^{3}	0.45	2.3	4.3×10^{-5}	8.5×10^{-4}

Table 3-15. Summary of Airborne Radionuclide Emissions (in Curies) for 1999 and 2000 from Facility Areas at INEEL[a] (continued)										
	Tritium/Carbon-14		Iodines		Noble Gases		Mixed Fission and Activation Products[b]		U/Th/Transuranic[c]	
Area	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000
Fugitive Sources										
Argonne National Laboratory–West	—	—	—	—	—	—	—	—	—	—
Central Facilities Area	3.5	3.7	—	—	—	2.9×10^{-6}	1.9×10^{-5}	2.6×10^{-4}	1.4×10^{-10}	1.5×10^{-5}
INEEL	8.9×10^{-9}	0.092	3.8×10^{-8}	8.0×10^{-3}	—	7.1	9.2×10^{-6}	0.22	5.9×10^{-8}	1.2×10^{-3}
Naval Reactors Facility	—	—	—	—	—	—	—	3.9×10^{-5}	—	4.9×10^{-8}
Power Burst Facility	0.018	—	—	—	—	—	5.6×10^{-5}	5.6×10^{-5}	2.7×10^{-7}	2.8×10^{-7}
Radioactive Waste Management Complex	55	130	—	—	—	—	3.7×10^{-7}	3.7×10^{-7}	9.5×10^{-9}	9.5×10^{-9}
Test Area North	0.060	0.15	—	—	—	—	1.1×10^{-4}	8.8×10^{-4}	9.4×10^{-8}	9.8×10^{-8}
Test Reactor Area	87	100	1.2×10^{-3}	9.3×10^{-3}	5.0×10^{-5}	2.0×10^{-4}	1.0×10^{-3}	1.6×10^{-3}	7.4×10^{-8}	9.9×10^{-6}
INEEL Total	150	230	1.2×10^{-3}	0.017	5.0×10^{-5}	7.1	1.2×10^{-3}	0.22	5.1×10^{-7}	1.2×10^{-3}
Total INEEL Releases										
Argonne National Laboratory–West	11	2.5	—	—	1.9×10^{3}	400	—	—	—	—
Central Facilities Area	3.5	3.7	—	—	—	2.9×10^{-6}	1.9×10^{-5}	2.6×10^{-4}	3.1×10^{-5}	1.5×10^{-5}
INEEL	8.9	160	2.6×10^{-3}	0.014	—	1.2×10^{3}	2.1×10^{-3}	0.23	5.5×10^{-6}	2.0×10^{-3}
Naval Reactors Facility	0.67	0.69	5.0×10^{-6}	9.0×10^{-6}	0.047	0.68	1.5×10^{-4}	1.5×10^{-4}	—	6.0×10^{-6}
Power Burst Facility	55	0.018	3.3×10^{-10}	1.6×10^{-10}	1.5×10^{-11}	2.8×10^{-13}	1.3×10^{-4}	1.5×10^{-4}	2.8×10^{-7}	7.2×10^{-7}
Radioactive Waste Management Complex	55	130	—	—	—	—	4.2×10^{-7}	6.8×10^{-7}	1.0×10^{-6}	7.2×10^{-6}
Test Area North	0.061	93	—	7.9×10^{-3}	—	920	1.1×10^{-4}	1.3×10^{-3}	6.6×10^{-7}	1.2×10^{-6}
Test Reactor Area	260	300	0.13	0.39	1.2×10^{3}	1.5×10^{3}	0.45	2.3	7.5×10^{-6}	2.3×10^{-3}
INEEL Total	400	690	0.13	0.41	3.1×10^{3}	4.0×10^{3}	0.45	2.5	4.6×10^{-5}	2.1×10^{-3}

DOE = U.S. Department of Energy
EIS = environmental impact statement
INEEL = Idaho National Technology and Engineering Center

[a] DOE. DOE/EIS–0287–F, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Section 4.7. Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.
[b] Mixed fission and activation products that are primarily particulate in nature (e.g., cobalt-60, strontium-90, and cesium-137)
[c] U/Th/Transuranic = Radioisotopes of heavy elements such as uranium, thorium, plutonium, americium, and neptunium
[d] Dash indicates amount is negligibly small or zero

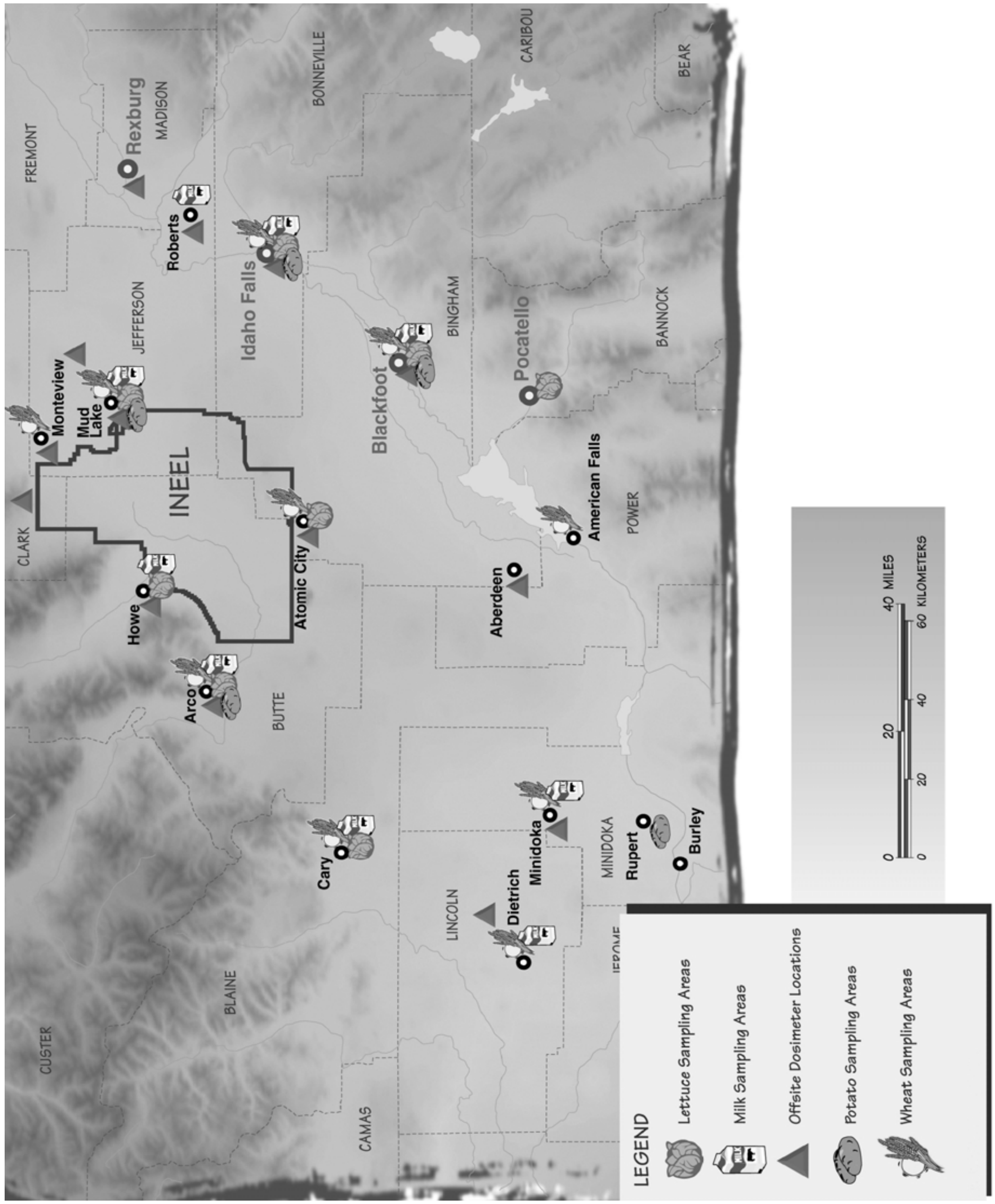


Figure 3-12. Offsite Environmental Radiological Monitoring and Sampling Locations (Modified from DOE, 2002a, Section 4.7)

INEEL site emissions. Results from distant locations represent only natural background conditions because distant locations are not influenced by INEEL emissions. These data show that for the 5-year period 1995–1999, average radiation exposure levels for the boundary locations were no different from those at distant stations. The average annual external dose from natural background sources measured by the Environmental Surveillance, Education and Research Program during 1999 was 1.22 mSv [122 mrem] for distant locations and 1.24 mSv [124 mrem] for boundary community locations (DOE, 2002a, Section 4.7). These differences are well within the range of normal variation. On INEEL, dosimeters around some facilities may show slightly elevated levels, because many are intentionally placed to monitor the dose rate in areas adjacent to the radioactive material storage areas or areas of known soil contamination (DOE, 2002a, Section 4.7).

Radiation and Radioactivity

Radioactivity or Radioactive Decay is the process by which unstable atoms emit radiation to reach a more stable state.

Radiation is the movement of energetic particles or waves through matter and space. Radiation comes from radioactive material or from equipment such as x-ray machines. Radiation may either be ionizing or nonionizing radiation.

Ionizing Radiation is radiation that has enough energy to cause atoms to lose electrons and become ions.

Radiation Dose is the quantity of radiation that is deposited in a material. The radiation dose to humans, commonly referred to as a dose equivalent, is measured in units of sieverts (Sv). One Sv is equivalent to 100 rem.

Collective Dose is the sum of the individual doses received in a given period of time by a specified population. The unit of collective dose is person-sieverts or person-rem. For example, 1,000 people who each receive a 0.01 Sv [1 rem] dose, receive a collective dose of 10 person-Sv [1,000 person-rem].

3.7.2.3.3 Summary of Radiological Conditions

Radioactivity and radiation levels resulting from INEEL site emissions are low, well within applicable standards, and negligible when compared with doses received from natural background sources.

3.8 Noise

As discussed in this section of the EIS, noise is used to indicate unwanted sound that can be a byproduct of activities at INEEL. A common sound measurement used to indicate sound intensity is the A-weighted sound level (decibel-A or dBA). Sounds reported in these units are intended to take into account the sensitivity of the human ear for sounds of different pitches.

At INEEL, noises that affect the public are dominated primarily by vehicle traffic, including buses, private vehicles, delivery trucks, construction trucks, aircraft, and freight trains. During a normal work week, a majority of the employees at the INEEL site are transported to various work areas at INEEL by a fleet of buses covering 72 routes. Approximately 1,200 private vehicles also travel to and from INEEL daily (DOE, 2002a, Section 4.10). There is no airport at INEEL, and noise from an occasional commercial aircraft crossing INEEL at high altitudes is indistinguishable from the natural background noise of the site. Rail transport noises originate from diesel engines, wheel and track contact, and whistle warnings at rail crossings. Normally no more than one train per day, and usually fewer than one train per week, service INEEL via the Scoville spur (DOE, 2002a, Section 4.10).

Noise measurements taken about 15 m [50 ft] from U.S. Highway 20 during a peak commuting period indicate that the sound levels from traffic at INEEL range from 69 to 88 dBA (Leonard, 1993). Buses are the primary source of this highway noise with a sound level of 82 dBA at 15 m [50 ft] (Leonard, 1993). Industrial activities (i.e., shredding) at the Central Facilities Area produce the highest noise levels measured at 104 dBA. Noise generated at INEEL is not propagated at detectable levels offsite, since all primary facilities are at least 4.8 km [3 mi] from site boundaries. INEEL buses operate offsite, but are part of the normal levels of traffic noise in the community. In addition, previous studies on effects of noise on wildlife indicate that even high intermittent noise levels at INEEL (more than 100 dBA) would not affect wildlife productivity (Leonard, 1993).

The noise level at INEEL ranges from 10 dBA (rustling grass) to 115 dBA, the upper limit for unprotected hearing exposure established by the Occupational Safety and Health Administration from the combined sources of industrial operations, construction activities, and vehicular traffic. The natural environment of INEEL has relatively low ambient noise levels ranging from 35 to 40 dBA (Leonard, 1993). In conducting its industrial operations and construction activities, INEEL complies with Occupational Safety and Health Administration regulations (29 CFR 1910.95). These regulations require that any INEEL personnel exposed to an 8-hour time-weighted average of 85 dBA or greater must be issued hearing protection (DOE, 2002a, Section 4.10). The regulations also require that any exposure to impulse or impact noise should be limited to 140-dBA peak sound pressure level.

3.9 Cultural, Historical, Archaeological, Ethnographical, and Paleontological Resources

3.9.1 Cultural Resources

To date, more than 100 cultural resource surveys have been conducted at INEEL through the auspices of DOE. These surveys and investigations have identified many archaeological and historic sites within the INEEL boundaries. Prehistoric settlement and use of the area date back 12,000 years, as evidenced in archeological investigations that have been conducted. Historic uses of the area include attempts at homesteading, cattle drives, as well as a route for settlers traveling west. The most recent use of the area has facilitated the nuclear technology age with research and development of nuclear power and the subsequent storage of SNF. The information these surveys has yielded provided baseline data that have been used to develop a predictive model that aids in the identification of areas where densities of sites are highest and also where the potential impacts to significant archaeological resources would increase (Ringe, 1993a,b). Although this model does not replace inventories required by the compliance requirements, this predictive model is crucial to the identification and early mitigation of areas highly likely to be archaeologically sensitive. Other cultural resources, such as those associated with settlement (remnants of homesteads), emigration (historic trails), cattle drives (remnants of camps), scenic vistas (landscapes and viewsheds significant to the Shoshone–Bannock Tribes), military, and nuclear technology (buildings and structures) have been, and are in the process of being, identified and evaluated for historical significance and eligibility for listing on the National Register of Historic Places.

3.9.2 Historical Resources

The southeastern portion of Idaho where INEEL is located is rich with cultural resources that reflect the settlement and development of the region by aboriginal people and the Shoshone–Bannock Tribes, as well as Euroamerican explorers and settlers. As the westward expansion entered the region, resources were left behind that provide a record of historic uses and development of the area. Many of these cultural resources exist within the INEEL boundaries. The region is etched with historic trails used by settlers who attempted to homestead the area. Many of these trails were also used for cattle drives and, in the late 1800s, as stage and freight routes to support mining towns in central Idaho (Miller, 1995). As homesteaders attempted to settle and farm the area along the Big Lost River in the late 1800s and early 1900s, irrigation efforts in the high desert climate failed. Homesteads were abandoned, and Euroamerican settlement and development of the region ceased.

At the start of World War II, terrain of the desert region proved to be useful to the Federal government. The military used different areas, such as the Central Facilities Area, as test-firing and bombing ranges. The most significant development of the area occurred in 1949 when the National Reactor Testing Station, later to become INEEL, was established by the government. INEEL was instrumental in the development of nuclear power, with 52 first-of-a-kind reactors constructed since 1949 (Miller, 1995). Many historic sites within INEEL document early development of nuclear power, including the Experimental Breeder Reactor-1, which is listed on the National Register of Historic Places and is a national historic landmark. INTEC, originally named as the Idaho Chemical Processing Plant, was one of the first facilities constructed at INEEL in the 1950s. INTEC was instrumental in the early development of processes and facilities for managing nuclear fuels and waste products. Among the first-in-the-world accomplishments at INTEC are the reprocessing of highly enriched pure uranium on a production scale and solidification of liquid HLW on both plant and production scales (DOE, 2002a, Section 4.4). INTEC comprises many structures and buildings that supported the nuclear waste processing and storage operations. Of the buildings and structures used in this period of nuclear technology, 38 are of historical significance and are potentially eligible for listing on the National Register of Historic Places (DOE, 2002a, Section 4.10) for their association with nuclear reactor testing or postnuclear reactor test research. The location of the proposed Idaho Spent Fuel Facility is just outside the INTEC complex on an open, previously disturbed 3.2-ha [8-acre] parcel of land immediately east of the INTEC perimeter fence, north of its coal-ash bury pit, and northeast of the coal-fired power plant. The new proposed facility and its associated construction laydown area would be located within a small group of office buildings, warehouses, and trailers built in the 1980s, which are not considered historic structures. An associated construction laydown area would be located on a previously disturbed 4.1-ha [10-acre] lot east of the proposed Idaho Spent Fuel Facility site.

3.9.3 Archaeological Resources

Archaeological surveys and investigations conducted in southeastern Idaho have provided evidence of human use of the Eastern Snake River Plain for at least 12,000 years. Investigations at a cave about 3 km [2 mi] from the INEEL boundary provided evidence of the earliest human occupation, which was radiocarbon-dated at 12,500 years before present. Furthermore, scattered remains of Euroamerican settlement sites, as well as campsites associated with livestock drives, are located in areas throughout INEEL. Archaeological survey coverage in the vicinity of INTEC is expansive. In 1979, 45 ha [111 acres] of the area now enclosed by the INTEC perimeter fence were investigated with no identification of any cultural resources. In 1981, a cultural resource inventory of about 3.6 ha [9 acres] proposed for the coal-fired steam generation plant was conducted immediately south of the proposed Idaho Spent Fuel Facility construction area on the east side of the facility, as well as several additional project areas to the south and west. No cultural resources were identified in any of these areas. However, one historic homestead was identified in an undisturbed area some distance to the north. In 1985, survey coverage was significantly expanded with more than 405 ha [1,000 acres] surrounding INTEC being surveyed. Six cultural resources were identified during this survey phase, most of which were related to agricultural pursuits spurred by the Carey Land Act of 1894.

Three archaeological sites were identified in the vicinity of the proposed Idaho Spent Fuel Facility project. Two of the sites contain isolates, are both unlikely to yield any additional information, and are evaluated as ineligible for nomination to the National Register. The other site is the archaeological remains of an historic homestead site that has been evaluated as eligible for listing on the National Register of Historic Places. However, these archaeological resources are outside the areas of potential effect for the proposed Idaho Spent Fuel Facility project (Pace, 2001). Archaeological surveys previously conducted indicate that the area in the vicinity of INTEC contains only limited evidence of prehistoric use. The proposed construction and laydown areas of the proposed Idaho Spent Fuel Facility have been subject to intensive ground disturbance during the past five decades. Nonnative plant species are dominant, and no unique topographic features (buttes, river channels, sand dunes, for example) are present. These factors, along with the absence of any cultural resources, decrease the likelihood that these areas contain resources of special importance to the Shoshone–Bannock Tribes (Pace, 2001).

3.9.4 Ethnographical Resources

Ethnography, a component of cultural anthropology, is concerned with the people of an area, with their cultural systems or ways of life, and with the related technology, sites, structures, other material features, and natural resources. In addition to traditional regimes for resource use and family and community economic and social features, cultural systems include expressive elements that celebrate or record meaningful events and may carry considerable symbolic and emotional significance (National Park Service, 1998). Ethnographic resources are cultural and natural features including structures, objects, sites, landscapes, flora, and fauna that have traditional significance to contemporary people and communities.
Within the area of the proposed action, the ethnographic group that has been identified and recognized is the Shoshone–Bannock Tribes (DOE, 2002a). These people have a long and traditional association with this portion of Idaho, as detailed in the following sections. It is unknown whether other groups or individuals have ethnographic ties to INTEC and the proposed Idaho Spent Fuel Facility areas. Because these areas are located in restricted and secure land ownership and management, it is unlikely that people using the proposed Idaho Spent Fuel Facility area for traditional or other purposes would remain undetected.

3.9.4.1 Early Native American Cultures

The prehistoric archaeological record does not make clear when the ancestors of the Shoshone and Bannock people arrived in southeast Idaho; however, the Shoshone–Bannock Tribes believe that native people were created on the North American continent and, therefore, regard all prehistoric resources at INEEL as ancestral and important to their culture. Prehistoric sites are located throughout INEEL, and all demonstrate the importance of the area for aboriginal subsistence and survival. The ethnographic studies completed by early anthropologists describe the seasonal migration of the Shoshone–Bannock people across the Eastern Snake River Plain (Miller, 1995). The area now occupied by INEEL served as a travel corridor for these groups, with the Big Lost River, Big Southern Butte, and Howe Point serving as temporary camp areas providing fresh water, food, and obsidian for tool making and trade. The Shoshone–Bannock people relied on the environment for all subsistence needs and depended on a variety of plants and animals for food, medicines, clothing, tools, and building materials.

The importance of plants, animals, water, air, and land resources in the Eastern Snake River Plain to the Shoshone–Bannock people is reflected in the sacred reverence in which they hold the resources. Specific places in the Eastern Snake River Plain have sacred and traditional importance to the Shoshone–Bannock people, including buttes, caves, and other natural landforms on or near INEEL.

3.9.4.2 Native American and Euroamerican Interactions

The influence of Euroamerican culture and loss of aboriginal territory and reservation land severely impacted the aboriginal subsistence cultures of the Shoshone–Bannock people. Settlers began establishing homesteads in the valleys of southeastern Idaho in the 1860s, increasing the conflicts with aboriginal people and providing the impetus for treaty-making by the Federal government (Murphy and Murphy, 1986). The Fort Bridger Treaty of 1868 and associated Executive Orders designated the Fort Hall Reservation for mixed bands of Shoshone–Bannock people. A separate reservation established for the Lemhi Shoshone was closed in 1907, and the Native Americans were forced to migrate to Fort Hall Reservation across the area now occupied by INEEL.

The original Fort Hall Reservation, consisting of 729,000 ha [1.8 million acres], has been reduced to about 220,320 ha [544,000 acres] through a series of cessions to accommodate the Union Pacific Railroad and the growing city of Pocatello. Other developments, including the flooding of portions of the Snake River Bottoms by the construction of the American Falls Reservoir, have also reduced the Shoshone–Bannock land base (Murphy and Murphy, 1986).

The creation of INEEL also had an impact on the Shoshone–Bannock subsistence culture. Land withdrawals initiated by the U.S. Navy during World War II and continued by the Atomic Energy Commission during the Cold War all but eliminated Tribal access to traditional and sacred areas until recent years. In addition, development of facilities at INEEL during the past 50 years has impacted cultural resources of importance to the Tribes, including traditional and sacred areas and artifacts.

3.9.4.3 Contemporary Cultural Practices and Resource Management

The efforts of the Shoshone–Bannock Tribes to maintain and revitalize their traditional cultures are dependent on having continual access to aboriginal lands, including some areas on INEEL. DOE accommodates Tribal member access to areas on INEEL for subsistence and religious uses. Tribal members continue to hunt big game, gather plant materials, and practice religious ceremonies in traditional areas that are accessible on public lands adjacent to INEEL. In this respect, INEEL continues to serve as a travel corridor for aboriginal people, although traditional routes have changed due to INEEL access restrictions. DOE recognizes the unique interest the Shoshone–Bannock Tribes have in the management of INEEL resources and continues to consult with the Tribes.

The maintenance of pristine environmental conditions, including native plant communities and habitats, natural topography, and undisturbed vistas, is critical to continued viability of the Shoshone–Bannock culture. Contamination from past and ongoing operations at INEEL has the potential to affect plants, animals, and other resources that tribal members continue to use and deem significant. Excavation and construction associated with environmental restoration and waste management activities have the potential to disturb archaeological resources as well as plant communities and habitats. However, the proposed location of the Idaho Spent Fuel Facility and its associated construction laydown area would occur on highly disturbed areas. Due to the degree of previous disturbance and the lack of archaeological resources, it is unlikely that any sensitive tribal resources are present at the proposed construction locations (Pace, 2001).

BLM Visual Resource Management Objectives

Class I—Preserve the existing character of the landscape. This class provides for natural ecological changes and does not preclude limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.

Class II—Retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Class III—Partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Class IV—Provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. Every attempt should be made, however, to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

3.9.5 Paleontological Resources

Survey and evaluation for paleontological remains within the INEEL boundaries have identified several fossils that suggest that the region contains varied paleontological resources. Analyses of these materials and site locations suggest that these types of resources are found in areas of basalt flows, particularly in sedimentary interbeds or lava tubes within local lava flows, and in some wind and sand deposits. Other and more specific areas that these resources are likely to occur are in the deposits of the Big Lost River, Little Lost River, Birch Creek, and Lake Terreton and playas. Vertebrate and invertebrate animal, pollen, and plant fossils have been discovered in caves, in lake sediments, and in alluvial gravels along the Big Lost River. Twenty-four paleontological localities have been identified in published data (Miller, 1995). Vertebrate fossils have included mammoth and camel remains, while a horse fossil was identified in a gravel pit near the Central Facilities Area. None of the types of resources have been identified at the proposed construction location for the proposed Idaho Spent Fuel Facility and its associated construction laydown area.

3.10 Visual/Scenic Resources

The baseline visual characteristics of the INEEL and the surrounding area, including designated scenic areas, are described in the DOE Idaho HLW and Facilities Disposition EIS (DOE, 2002a, Section 4.5).

INEEL is situated on the northwestern edge of the Eastern Snake River Plain. Volcanic cones, domes, and mountain ranges are visible from most areas on INEEL. Features of the natural landscape have a special importance to the Shoshone–Bannock Tribes, and some prominent features of the INEEL landscape are within the visual range of the Fort Hall Indian Reservation. The Bitterroot, Lemhi, and Lost River mountain ranges are visible to the north and west of INEEL. East Butte and Middle Butte can be seen near the southern boundary, while Circular and Antelope Buttes are visible to the northeast. Smaller volcanic buttes dot the natural landscape of INEEL, providing a striking contrast to the relatively flat ground surface. The viewscape in general consists of terrain dominated by sagebrush with an understory of grasses. Juniper is common near the buttes and foothills of the Lemhi range, while crested wheatgrass is scattered throughout INEEL.

Nine primary facility areas, which resemble commercial or industrial complexes, are located on the INEEL (Figure 3-2). Structures generally range in height from 3 to 30 m [10 to 100 ft], with a few emission stacks and towers that reach 76 m [250 ft].

Although many INEEL facilities are visible from public highways, most are located more than 8 km [0.5 mi] from public roads. Approximately 145 km [90 mi] of public highways cross INEEL. U.S. Highway 20, which is traveled the most by the INEEL workforce, runs east to west across the southern portion of the site. U.S. Highway 26 runs southeast and northwest intersecting Highway 20, and State Highways 22, 28, and 33 cross the northeastern portion of INEEL (Figure 3-1).

Lands within and adjacent to INEEL are subject to the BLM Visual Resource Management Guidelines (1986a). Adjacent lands are designated as a visual resource Class II area, which allows for moderate industrial growth, preserving and retaining the existing character of the landscape. Lands within the boundaries of INEEL are designated as Class III and Class IV areas, allowing for partial retention of existing character and major modifications, respectively (BLM, 1984).

Craters of the Moon National Monument is located southwest of INTEC. A wilderness area is located within the boundary of the monument and its eastern boundary is about 43 km [27 mi] from the INTEC main stack. The wilderness area must maintain Class I visual resource management objectives. Emission sources proposed for location near Class I areas must exercise consideration that the proposed source would not adversely impact values such as visibility and scenic views. The BLM is considering the Black Canyon Wilderness Study Area, located adjacent to INEEL, for wilderness designation, which, if approved, would result in an upgrade of the BLM Visual Resource Management class for the area from Class II to Class I (1986b).

3.11 Socioeconomics

Information in this section is drawn primarily from the DOE (2002a, Section 4.3). This overview of current socioeconomic conditions includes a seven-county region of influence: Bannock, Bingham, Bonneville, Butte, Clark, Jefferson, and Madison. Also included are the Fort Hall Reservation and the Trust Lands, home of the Shoshone–Bannock Tribes. Figure 3-1 shows towns and major transportation routes in the region of influence.

3.11.1 Population and Housing

Population growth in the region of influence paralleled statewide growth from 1960 to 1990, with approximate average annual rates of 1.3 and 1.4 percent, respectively (DOE, 2002a, Section 4.3). However, from 1990 to 2000, state population growth accelerated to 2.9 percent a year, compared with a region of influence growth of 1.4 percent (DOE, 2002a, Section 4.3). Table 3-16 contains population estimates for the region of influence through 2000, as well as projections for 2005 through 2025. Such projections are not certain due to variability over time of birth, death, emigration and immigration rates, and other unanticipated factors in the region. But trends indicate that region of influence population would reach almost 269,000 by 2005 and 339,700 by 2025 (DOE, 2002a, Section 4.3). For the longer time period of 2000 to 2025, the region is projected to grow by 26 percent, comparing closely with a projected growth of 25 percent for the state as a whole.

Bannock and Bonneville Counties alone accounted for 63 percent of the total region of influence population in 2000. Butte and Clark, in contrast, contain only 1.6 percent of the total. Pocatello (in Bannock County) and Idaho Falls (in Bonneville County), each with 2000 populations of about 51,000, comprise the largest cities. During 2000, INEEL employees and their families accounted for 17 percent of the Bonneville County population and comprised almost 22 percent of the Idaho Falls population (DOE, 2002a, Section 4.3). In Bannock and Madison Counties, INEEL employees and their families represent only 2 percent of the population.

Of the 90,000 housing units in the region of influence during 2000, about 6.6 percent were vacant. Included in this number are dwellings used for seasonal, recreational, or other occasional purposes. In the region of influence, rental vacancy rates ranged from 5.9 percent in Bonneville County to 14.7 percent in Butte County. Owned housing vacancy rates ranged from 1.6 percent in Madison and Bonneville Counties to 4.4 percent in Butte County (U.S. Department of Commerce, 2000a). The average rental vacancy rate for the State of Idaho was 7.6 percent, and the average owned housing vacancy rate was 2.2 percent (U.S. Department of Commerce, 2000b). Twenty-six percent of the occupied housing units in the region of influence were rental. This number compares with 25.9 percent for the state as a whole. Bonneville and Bannock Counties, which include the cities of Idaho Falls and Pocatello, had 66 percent of the housing units in the region (U.S. Department of Commerce, 2000a). Housing characteristics for the region of influence are shown in Table 3-17.

3.11.2 Employment and Income

During the 1990s, the region of influence experienced an average annual growth rate in the labor force of just under 2.4 percent (from 105,837 to 131,352), while the State of Idaho's labor force grew at an annual rate of 3.4 percent (from 100,074 to 126,058). Employment in the region of influence grew at an average annual rate of about 2.6 percent, while for the state the figure was 3.5 percent (U.S. Bureau of Labor Statistics, 2002). Tables 3-18, 3-19, and 3-20 depict historical trends in labor force, employment, and unemployment. The region of influence experienced the lowest unemployment rate (4.0 percent) in a decade in 2000. This rate was

Table 3-16. Population of the INEEL Region of Influence and Idaho: 1980–2025[a]

County	1980	1990	1995	2000	2005	2010	2015	2020	2025
Bannock	65,421	66,026	72,043	75,565	81,303	84,474	90,894	96,802	102,710
Bingham	36,489	37,583	40,950	41,735	46,214	48,016	51,666	55,024	58,382
Bonneville	65,980	72,207	79,230	82,522	89,415	92,902	99,963	106,460	112,958
Butte	3,342	2,918	3,097	2,899	3,495	3,631	3,907	4,161	4,415
Clark	798	762	841	1,022	948	985	1,060	1,129	1,198
Jefferson	15,304	16,543	18,429	19,155	20,798	21,609	23,251	24,763	26,274
Madison	19,480	23,674	23,651	27,467	26,692	27,733	29,841	31,780	33,720
Region of Influence	206,814	219,713	238,241	250,365	268,865	279,350	300,582	320,119	339,657
Idaho	944,127	1,006,749	1,164,887	1,293,953	1,277,000	1,335,000	1,395,000	1,514,000	1,725,000

DOE = U.S. Department of Energy
EISS = environmental impact statement
INEEL = Idaho National Engineering and Environmental Laboratory

[a] DOE. DOE/EIS–0287–F, “Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement.” Section 4.3. Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.

Table 3-17. Region of Influence Housing Characteristics (Year 2000)[a]					
County	Total Housing Units	Number of Owner-Occupied Units	Owned Housing Vacancy Rates (Percent)	Number of Rental Units	Rental Vacancy Rates (Percent)
Bannock	29,102	19,628	2.1	8,705	8.4
Bingham	14,303	10,746	1.7	3,038	9.4
Bonneville	30,484	21,817	1.6	7,739	5.9
Butte	1,290	878	4.4	293	14.7
Clark	521	239	3.3	127	14.2
Jefferson	6,287	5,107	1.9	960	7.0
Madison	7,630	4,286	1.6	3,133	7.0
Region of Influence	89,617	62,701	NA	23,995	NA

DOE = U.S. Department of Energy
EIS = environmental impact statement
NA = Not applicable

[a] DOE. DOE/EIS–0287–F, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Section 4.3. Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.

Table 3-18. Historical Trends in Region of Influence Labor Force[a]					
County	1980	1985	1990	1995	2000
Bannock	30,488	33,684	31,342	36,310	39,502
Bingham	15,582	16,892	18,383	20,507	21,908
Bonneville	26,966	35,103	38,632	43,422	46,479
Butte	1,862	1,579	1,447	1,542	1,596
Clark	325	538	549	623	577
Jefferson	4,865	7,131	8,078	9,158	10,269
Madison	9,103	7,802	7,406	9,695	11,021
Region of Influence	89,191	102,729	105,837	121,257	131,352
Idaho	429,000	466,000	492,619	600,493	657,712

DOE = U.S. Department of Energy
EIS = environmental impact statement

[a] DOE. DOE/EIS–0287–F, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Section 4.3. Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.

Table 3-19. Historical Trends in Region of Influence Employment[a]					
County	**1980**	**1985**	**1990**	**1995**	**2000**
Bannock	28,207	31,064	29,051	34,183	37,533
Bingham	14,419	15,534	17,320	19,363	20,896
Bonneville	25,432	33,267	37,127	41,563	44,921
Butte	1,780	1,491	1,381	1,479	1,537
Clark	295	511	533	596	549
Jefferson	4,480	6,600	7,633	8,685	9,873
Madison	8,683	7,366	7,029	9,373	10,479
Region of Influence	83,296	95,833	100,074	115,242	126,058
Idaho	395,000	429,000	463,484	568,138	625,798

DOE = U.S. Department of Energy
EIS = environmental impact statement

[a] DOE. DOE/EIS–0287–F, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Section 4.3. Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.

Table 3-20. Historical Trends in Region of Influence Unemployment Rates[a]					
County	**1980 (Percent)**	**1985 (Percent)**	**1990 (Percent)**	**1995 (Percent)**	**2000 (Percent)**
Bannock	7.5	7.8	7.3	5.9	5.0
Bingham	7.5	8.0	5.8	5.6	4.6
Bonneville	5.7	5.2	3.9	4.3	3.4
Butte	4.4	5.6	4.6	4.1	3.7
Clark	9.2	5.0	2.9	4.3	4.9
Jefferson	7.9	7.4	5.5	5.2	3.9
Madison	4.6	5.6	5.1	3.3	2.5
Region of Influence	6.6	6.7	5.4	5.0	4.0
Idaho	7.9	7.9	5.9	5.4	4.9

DOE = U.S. Department of Energy
EIS = environmental impact statement

[a] DOE. DOE/EIS–0287–F, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Section 4.3. Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.

lower than the 4.9 percent for the state, though rates varied widely in the region of influence from 2.5 percent in Madison County to 5.0 percent in Bannock County (U.S. Bureau of Labor Statistics, 1997, 2002).

Three sectors of the economy—service, government, and retail and wholesale trade—are the largest sources of employment in the INEEL region of influence. These sectors accounted for 70 percent of the jobs in the region in 1995. This employment is against the backdrop of the area's rural character and an economy that was historically based on natural resources and agriculture. As has been the case in most regions of the country, nonagricultural sectors have fueled economic growth during the past several decades. In 1995, farming and agricultural services, though important to the region of influence economy, accounted for less than 8 percent of jobs. Manufacturing and construction are also important to the area economy, accounting for about 13 percent of employment in 1995 (DOE, 2002a, Section 4.3). The State of Idaho reflects similar trends, with the service, government, and retail and wholesale trade sectors being the largest employers—62 percent of total employment. This number is followed by 19 percent in manufacturing and construction. Figure 3-13 depicts employment levels by major sectors for the region of influence.

The INEEL influence on the regional economy is apparent from the fact that in fiscal year 2001, INEEL accounted for 8,100 jobs, or about 6 percent of the total in the region of influence (DOE, 2002a, Section 4.3). INEEL is among the top five employers in the State (the state government is the largest) and is the largest in southeast Idaho. Consolidation of contracts and reduction of defense-related activities have reduced the workforce from the 12,500 employee peak experienced in 1991. The job force was projected to stabilize to about 8,000 after fiscal year 2000 (DOE, 2002a, Section 4.3). Idaho State University, American Microsystems, Inc., and local school districts are also major employers in the region.

Per capita income in the region of influence rose 17 percent between 1990 and 1995, from $14,136 to $16,550. Income levels within the area varied from $11,758 for Madison County to $22,444 in Clark County. The per capita income for Idaho in 1995 was $18,895 (DOE, 2002a, Section 4.3). Median household income also varied widely, ranging from $23,000 in Madison County to $30,462 in Bonneville County. Median household income for the state as a whole was $25,257 and for the nation $30,056.

3.11.3 Community Services

Key community services in the region of influence include education, law enforcement, fire protection, and medical services.

The 57,000 school-age children in the region are served by 17 public school districts and 5 private schools. Idaho State University/University of Idaho Center of Higher Education, Ricks College, and the Eastern Idaho Technical College are institutions of higher education.

Fifteen county and municipal police departments employ 373 sworn officers and 149 civilians (1995 figures) to provide law enforcement. Departments range in size from those in Idaho Falls and Pocatello that employ 82 police officers to those in Clark County and the Firth Police Department with 2 officers each (DOE, 2002a, Section 4.3).

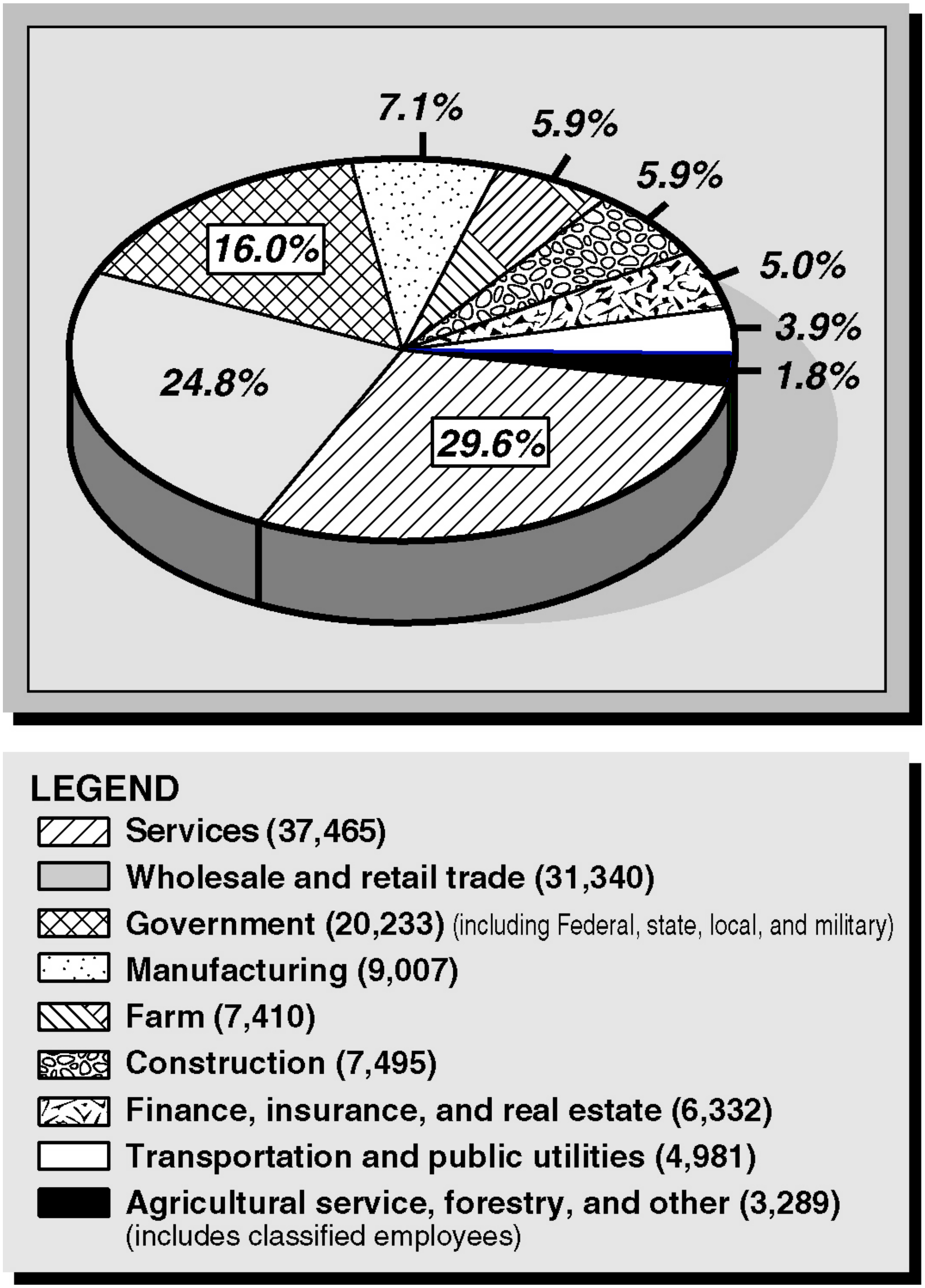


Figure 3-13. 1995 Employment by Sector in the Seven-County Region of Influence (Modified from DOE, 2002a, Section 4.3)

Eighteen municipal fire districts with about 500 firefighters (of whom about 300 are volunteers) serve the region of influence (DOE, 1995). In addition, the INEEL fire department provides 24-hour coverage for the site. Its staff includes 50 firefighters, with no less than 16 on each shift. Gingham, Bonneville, Butte, Clark, and Jefferson Counties, which surround INEEL, have developed emergency plans to be implemented in event of a radiological or hazardous materials emergency. Each emergency plan identifies facilities, including those of the INEEL, that have extremely hazardous substances and defines routes for transportation of these substances. The emergency plans also include procedures for notification and response, listings of emergency equipment and facilities, evacuation routes, and training programs.

Seven hospitals with a 1,012-bed capacity, averaging 48-percent occupancy, are in the region of influence (DOE, 2002a, Section 4.3). More than 65 percent of the hospital beds are in Bannock and Bonneville Counties. No hospitals are located in either Clark or Jefferson Counties. Although 283 physicians practice in the region, no primary-care physicians are located in Butte or Clark Counties (DOE, 2002a, Section 4.3).

3.11.4 Public Finance

INEEL employees' tax support to southeastern Idaho counties is presented in Table 3-21. These taxes help fund such local services as public schools, libraries, ambulance and other emergency services, road and bridge repairs, police, fire protection, recreational opportunities, and waste disposal. In 1998, INEEL contracts paid $1.4 million to the State of Idaho in Idaho sales taxes and an additional $0.9 million in Idaho franchise tax.

Table 3-21. INEEL Tax Support to Southeastern Idaho Counties (in Millions of 1998 Dollars) Rates[a]

County	Federal Tax	State Tax	Idaho Sales Tax	Property Tax	Total
Bannock	5.8	2.4	1.2	0.7	10.2
Bingham	10.2	4.2	2.1	1.0	17.6
Bonneville	51.0	21.0	10.7	5.9	88.6
Butte	1.7	0.7	0.4	0.1	2.9
Custer	0.7	0.3	0.2	0.04	1.2
Jefferson	5.4	2.2	1.1	0.5	9.1
Madison	1.3	0.5	0.3	0.2	2.3

DOE = U.S. Department of Energy
EIS = environmental impact statement
INEEL = Idaho National Engineering and Environmental Laboratory

[a] DOE. DOE/EIS–0287–F, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Section 4.3. Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.

3.12 Environmental Justice

Information in this section is drawn primarily from the DOE Idaho HLW and Facilities Disposition EIS (DOE, 2002a, Section 4.12). Executive Order 12898 (The White House, 1998) directs Federal agencies to make the achievement of environmental justice part of their mission. This goal is accomplished by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of Federal programs, policies, and activities on minority and low-income populations. Where appropriate, Federal agencies would also indicate the potential for disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, and Indian tribes. The following analysis is in accordance with the guidelines and procedures for compliance with the Executive Order promulgated by the Council on Environmental Quality (Council on Environmental Quality, 1997).

Demographic information from the U.S. Bureau of the Census (1992, 2000) was used to identify minority populations and low-income populations within an 80-km [50-mi] radius of INTEC.

The 80-km [50-mi] radius was selected because it was consistent with the region of influence for air emissions and because it includes portions of the seven counties that constitute the region for influence for socioeconomics. INTEC occupies the center of the circle, because the actions proposed in this EIS would be accomplished at INTEC.

3.12.1 Community Characteristics

In accordance with Council of Environmental Quality guidelines, demographic maps were prepared using the latest available census data from the U.S. Bureau of the Census. Census tracts are designated areas that encompass from 2,500 to 8,000 people. Block Numbering Areas follow the same basic criteria as census tracts in counties without formally defined tracts. Both are derived from the U.S. Bureau of the Census TIGER/Line files. Figures 3-14 and 3-15 illustrate census tract distributions for minority populations and low-income populations.

Council on Environmental Quality guidelines define minority as individual(s) who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic (Council on Environmental Quality, 1997). The Council defines these groups as minority populations when either the minority population of the affected area exceeds 50 percent, or the percentage of minority population in the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographical analysis.

In identifying low-income populations, a community may be considered either as a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect.

3.12.2 Distribution of Minority and Low-Income Populations

According to year 2000 U.S. Bureau of the Census data for census blocks wholly contained within the 80-km [50-mi] region of influence for INTEC and the proposed Idaho Spent Fuel Facility, 129,670 people resided in the area (U.S. Bureau of the Census, 2000). Of this number, 12 percent (15,546 people) were classified as minority individuals. If the major urban areas of Idaho Falls and Pocatello are excluded from the analysis, the respective figures are a population of 78,486, with minority individuals comprising 15 percent of the total. Thus, outside the primary urban areas, the population is sparse, and minority representation tends to be higher. Figure 3-14 depicts the percent of minority population by census block including those only partly contained within the 80-km [50-mi] radius of INTEC and the proposed Idaho Spent Fuel Facility. Minority composition was primarily Hispanic, Native American, and Asian peoples. The Fort Hall Reservation of the Shoshone–Bannock Tribes lies largely within the region of influence.

With regard to low-income population data, Figure 3-15, based on census tract-level information, reveals that only the Fort Hall area has a population of greater than 25 percent below the poverty level. Table 3-22 reveals data for all incorporated cities and census-designated places within the region of influence in comparison with the state as a whole. The data indicate wide differences in median household income levels—from a low of $9,375 in Atomic City (population 25) to a high of $49,135 in Lewisville (population 467). The median household income for the State of Idaho in 1999 was $37,572. Approximately 13 percent of the total population within 80 km [50 mi] of the proposed facility live below the 1999 poverty levels ($8,501 for unrelated individuals) compared to about 12 percent for the State of Idaho.

3.13 Public and Occupational Health and Safety

3.13.1 Public Health

The final EIS for disposition of HLW at INEEL (DOE, 2002a, Section 4.11) describes background radiological and nonradiological conditions in the region of the INEEL facility. The population of the Eastern Snake River Plain is exposed to radiation that comes from natural background sources and industrial sources. The major source of radiation in this region is natural background radiation. Sources of radioactivity related to INEEL activities contribute a small amount of additional exposure.

Natural or background sources of radiation include radiation from radon (a naturally occurring airborne radionuclide), cosmic rays, and radioactivity naturally present in soils, rocks, and the human body. Radioactivity still remaining in the environment as a result of worldwide atmospheric testing of nuclear weapons also contributes to the background radiation level, although in very small amounts. The natural background radiation dose that Eastern Snake River Plain residents receive is estimated at 3.6 mSv/yr [360 mrem/yr]. More than half {about

Latent Cancer Fatality

Latent cancer fatalities are a measure of the calculated number of additional cancer deaths anticipated in a population as a result of exposure to radiation. Latent cancers can occur from one to many years after the exposure takes place.

The EPA has suggested a conversion factor that for every 100-person-Sv [10,000-person-rem] of collective dose, about 0.06 individuals would develop a cancer induced by radiation exposure. If the conversion factor is multiplied by the collective dose to a population, the result is the number of latent cancer fatalities in excess of what would be expected without the radiation exposure.

Because these results are statistical estimates, values for expected latent cancer fatalities can be, and often are, less than 1 for cases involving low doses or small populations.

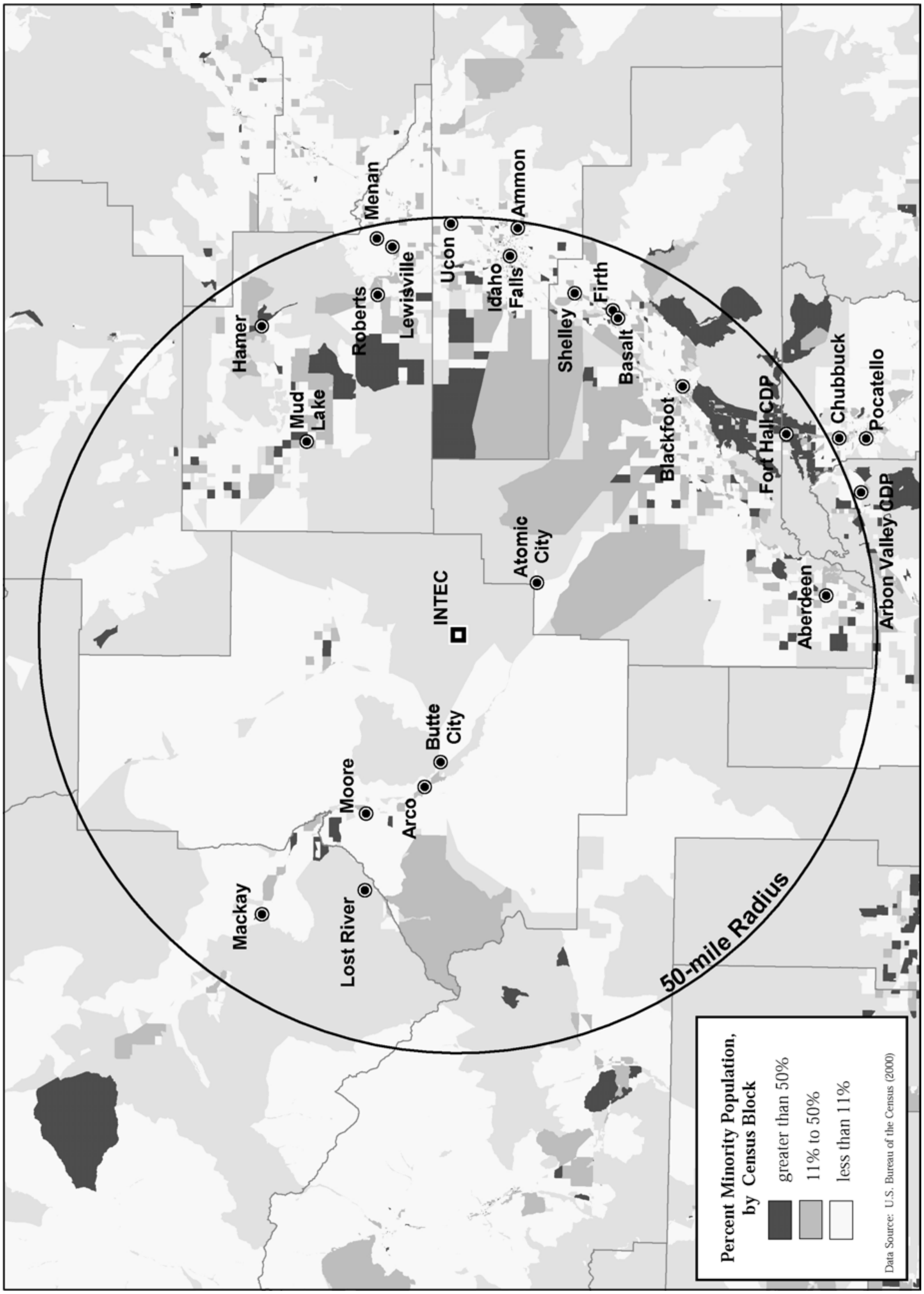


Figure 3-14. Minority Population Distribution within 80 km [50 mi] of the Proposed Idaho Spent Fuel Facility

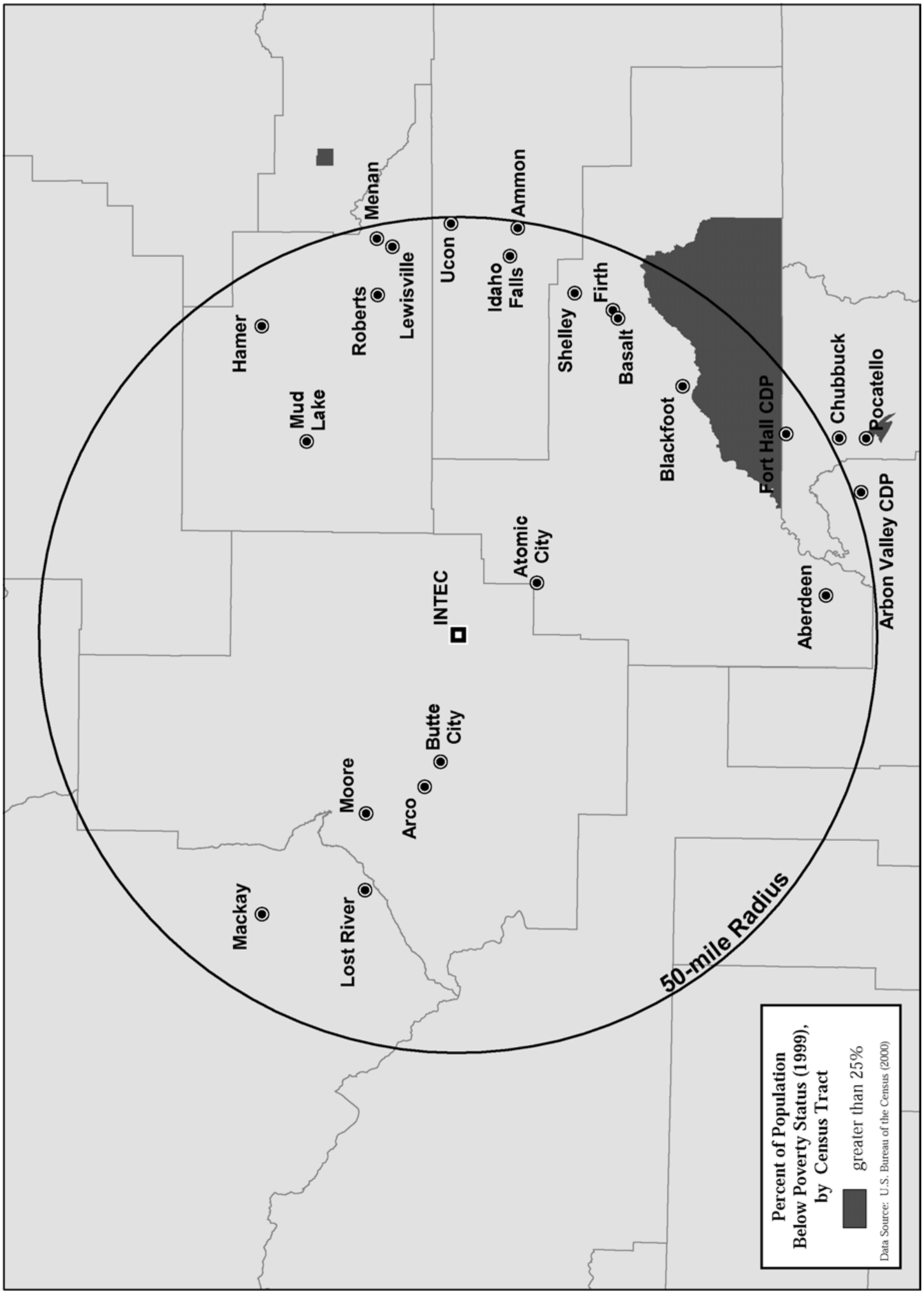


Figure 3-15. Low-Income Population Distribution within 80 km [50 mi] of the Proposed Idaho Spent Fuel Facility

Table 3-22. Population and Selected Socioeconomic Statistics for All Incorporated Cities and Census-Designated Places within 80 km [50 mi] of the Proposed Idaho Spent Fuel Facility[a]

Incorporated City or Census-Designated Places	Total Population		Nonminority Population		Minority Population		Median Household Income (1999)		Individuals Below Poverty Level (1999)		Families Below Poverty Level (1999)	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Aberdeen	1,840	NA	1,220	66.3	620	33.7	$28,625	NA	375	20.5	65	14.9
American Falls	4,111	NA	3,353	81.6	758	18.4	$30,955	NA	702	17.3	134	12.7
Ammon	6,187	NA	5,930	95.8	257	4.2	$47,820	NA	340	5.6	54	3.4
Arbon Valley Census-Designated Places	627	NA	548	87.4	79	12.9	$36,818	NA	78	13.5	13	8.0
Arco	1,026	NA	976	98.1	50	4.9	$27,993	NA	232	22.6	55	19.6
Atomic City	25	NA	24	96	1	4.0	$9,375	NA	12	57.1	5	62.5
Basalt	419	NA	356	85.0	63	15.0	$36,719	NA	53	10.9	9	7.1
Blackfoot	10,419	NA	9,040	86.8	1,379	13.2	$33,004	NA	1,478	14.6	312	11.5
Butte City	76	NA	69	90.8	7	9.2	$17,250	NA	23	30.7	4	25.0
Chubbuch	9,700	NA	8,905	91.8	795	8.2	$41,688	NA	1,160	12.0	232	9.1
Firth	408	NA	287	70.3	121	29.7	$23,239	NA	93	25.7	16	20.0
Fort Hall Census-Designated Places	3,193	NA	965	30.2	2,228	69.8	$30,313	NA	847	27.2	172	22.6
Hamer	12	NA	5	41.7	7	58.3	$24,167	NA	0	0.0	0	0.0
Idaho Falls	50,730	NA	46,717	92.1	4,013	7.9	$40,512	NA	5,403	10.9	1,028	7.8
Lewisville	467	NA	406	86.9	61	13.1	$49,135	NA	38	7.5	12	9.6
Lost River	26	NA	22	84.6	4	15.4	$31,667	NA	2	6.9	0	0.0
Mackay	566	NA	558	98.6	8	1.4	$23,807	NA	106	18.4	20	13.0
Menan	707	NA	616	87.1	91	12.9	$34,406	NA	85	11.9	14	7.3
Moore	196	NA	192	98.0	4	2.0	$28,984	NA	27	13.1	6	10.0
Mud Lake	270	NA	209	77.4	61	22.6	$28,194	NA	62	27.8	13	21.7
Pocatello	51,466	NA	47,513	92.3	3,953	7.7	$34,326	NA	7,688	15.4	1,398	10.7
Roberts	647	NA	322	49.8	325	50.2	$31,071	NA	132	18.9	17	12.6
Shelly	3,813	NA	3,429	89.9	384	10.1	$39,318	NA	369	9.6	79	7.9
Ucon	943	NA	899	95.3	44	4.7	$39,375	NA	96	9.8	17	7.2
State of Idaho	1,293,953	100.0	1,177,304	91.0	116,649	9.0	$37,572	NA	148,732	11.8	28,131	8.3

NA = not applicable

[a] U.S. Bureau of the Census. "2000 Census of Population and Housing." Washington, DC: U.S. Department of Commerce, Bureau of the Census. 2000.

2 mSv/yr [200 mrem/yr]} of this natural radiation dose (Table 3-23) is attributed to the inhalation of radioactive particles formed by radon decay (DOE, 2002a).

Industrial sources of radiation include radiation released from activities occurring within the INEEL site. These activities can release radioactivity either directly, such as through stacks or venting, or indirectly, such as resuspension of radioactivity from disturbing contaminated soils. Previous environmental documentation on the site indicates airborne emissions represent the primary pathway of concern for potential public health impacts (DOE, 2002a, Section 4.11). While a potential exists for groundwater contamination, significant public health impacts are not expected because of the long distances between the site and public areas. Both nonradiological and radiological emissions are described in detail in Section 3.7.

While ongoing health impact studies are being conducted by the Centers for Disease Control and Prevention (DOE, 2002a), prior environmental documentation (DOE, 2002a) has included estimates of radiological and nonradiological impacts from facility operations to the population in the vicinity of the site. Table 3-24 provides dose and latent cancer fatality probability results from annual exposure to routine airborne releases in 1995, 1996, and 1999 for the maximally exposed offsite individual. The estimated doses are well below the 0.1 mSv/yr [10 mrem/yr] limit provided in 40 CFR Part 61. The estimated dose to the surrounding population and number of latent cancer fatalities from annual exposures in 1995, 1996, and 1999 are provided in Table 3-25. The number of latent cancer fatalities estimated in the population for the next 70 years from the annual estimated exposure levels is less than 1. Lifetime increased fatal

Table 3-23. Sources and Contributions to the U.S. Average Individual Radiation Dose[a,b]

Source	Effective Dose Equivalent (mSv/yr)	Effective Dose Equivalent (mrem/yr)
Natural Background Radiation		
Cosmic radiation	0.27	27
Rocks and soil (external)	0.28	28
Internal to body	0.40	40
Radon (internal/inhalation)	2.0	200
Subtotal	≈2.95	≈295
Humanmade Background Radiation		
Weapons test fallout	<0.01	<1
Consumer products	0.10	10
Diagnostic X-rays	0.39	39
Nuclear medicine	0.14	14
Subtotal	0.64	64
TOTAL	≈3.6	≈360

[a] Arnett and Mamatey. "Savannah River Site Environmental Report for 2000." WSRC–TR–2000–0329. Aiken, South Carolina: Westinghouse Savannah River Company. 2001.
[b] National Council on Radiation Protection and Measurements. "Ionizing Radiation Exposure of the Population of the United States: Recommendations of the National Council on Radiation Protection and Measurements." NCRP Report No. 93. Bethesda, Maryland: National Council on Radiation Protection and Measurements. 1987.

Table 3-24. Annual Dose to Individuals from Exposure to Routine Airborne Releases at INEEL[a]

Maximally Exposed Individual	Annual Dose (mrem)	Latent Cancer Fatality Probability
Onsite Worker (1998)[b]	0.27	1.1×10^{-7}
Offsite Public Individual (1995)	0.018	9.0×10^{-9}
Offsite Public Individual (1996)	0.031	1.5×10^{-8}
Offsite Public Individual (1999)	0.008	4.0×10^{-9}

DOE = U.S. Department of Energy
EIS = environmental impact statement
INEEL = Idaho National Engineering and Environmental Laboratory

[a] DOE. DOE/EIS–0287–F, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Section 4.11. Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.
[b] Maximum dose at any onsite area from permanent facility emissions for noninvolved onsite worker.

NOTE: To convert millirems (mrem) to millisieverts (mSv), multiply by 0.01.

Table 3-25. Estimated Increased Health Effects Because of Routine Airborne Releases at INEEL[a]

Year	Population Dose (person-Sv)	Estimated Number of Latent Cancer Fatalities
1995	8×10^{-4}	4.0×10^{-5}
1996	2.4×10^{-3}	1.2×10^{-4}
1999	3.7×10^{-4}	1.8×10^{-5}

DOE = U.S. Department of Energy
EIS = environmental impact statement
INEEL = Idaho National Engineering and Environmental Laboratory

[a] DOE. DOE/EIS–0287–F, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Section 4.11. Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.

NOTE: To convert person-Sv to person-rem, multiply by 100.

cancer risk to the offsite population from groundwater pathway exposures was also estimated in a prior EIS to be 1 in 170 million (DOE, 1995).

Health risks to the public from routine nonradiological airborne emissions at INEEL have been previously estimated (DOE, 1995). These estimates considered exposures to a maximally exposed offsite individual and the population within 80 km [50 mi] of the site. With EPA dose response values (EPA, 1993, 1994) being used in the calculations, no adverse health impacts for noncarcinogenic constituents in air emissions (including fluorides, ammonia, and hydrochloric and sulfuric acids) were projected. Offsite excess cancer risk from carcinogenic emissions (e.g., arsenic, benzene, carbon tetrachloride, and formaldehyde) ranged from 1 in 1.4 million to 1 in 625 million. Consideration of potential health impacts from drinking water from INTEC wells and distribution systems indicates EPA maximum contaminant levels and State of

Idaho drinking water limits have not been exceeded for volatile organic compounds. Risks from chemical carcinogens were estimated at less than 1 occurrence in 1 million (DOE, 2002a) and 0 for noncarcinogenic chemical contaminants.

3.13.2 Occupational Health and Safety

Occupational health conditions at the INEEL facility have been previously described in DOE (2002a). Occupational radiological exposures are typically maintained at levels well below DOE occupational exposure limits through the implementation of radiation protection procedures that emphasize maintaining exposures as low as is reasonably achievable (DOE, 2002a). Effects of long-term occupational exposures are also the subject of ongoing investigations conducted by the Centers for Disease Control and Prevention, an agency of the U.S. Department of Health and Human Services.

Routine exposure measurements of workers have been used to assess potential health effects. Radiation workers at INEEL can be exposed to radiation internally (from inhalation and ingestion) and externally (from direct exposure). In general, the largest fraction of occupational dose received by INEEL workers is external radiation from direct exposure (DOE, 2002a). The average occupational dose at INEEL between 1997 and 2000 was 0.84 mSv [84 mrem], a value well below the annual occupational dose limits of 50 mSv [5,000 mrem] in 10 CFR Part 20.

Nonradiological occupational exposures are controlled through the implementation of industrial hygiene and occupational safety programs. Recordable case rate for injury and illness incidences at INEEL varied from an annual average of 3.1 to 3.7 per 200,000 work hours from 1992 to 1996. During this time, lost workday cases ranged from 1.3 to 1.8 per 200,000 work hours (DOE, 1997b). The recordable case rate for injury and illnesses for INEEL workers is less than that for DOE and its contractors at other facilities, which varied from 3.5 to 3.8 per 200,000 work hours. Two fatalities occurred at INEEL between 1992 and July 1998, one occurred in a construction fall and the other resulted from carbon dioxide asphyxiation caused by a misactivation of fire-suppression systems during maintenance.

3.14 Waste Management

Waste generated during the construction and operation of the proposed Idaho Spent Fuel Facility will be handled under the existing waste management system at INEEL. Existing waste management activities at INEEL have been described in previous environmental documentation (DOE, 2002a). The following paragraphs describe sources, generation rates, and volumes for wastes, including solid waste, hazardous waste, mixed low-level radioactive waste, low-level radioactive waste, transuranic radioactive waste, and HLW.

INEEL has programs and physical or engineered processes in place to reduce or eliminate waste generation and to reduce the hazard, toxicity, and quantity of waste generated. Waste is also recycled to the extent practicable before, or in lieu of, its storage or disposal. In addition, INEEL has reduced the volume of radioactive wastes through more intensive surveying, waste segregation, and administrative and engineering controls. These programs and their results have been described in various documents including site-treatment plans (DOE, 1998) and annual progress reports (DOE, 1997c).

A variety of wastes are generated at INEEL. Table 3-26 provides a summary of waste volumes for individual waste types at INEEL. Industrial and commercial solid waste is disposed of at the

Table 3-26. Summary of Waste Volumes Awaiting Treatment and Disposal at INEEL[a,b]

Waste Type	Current Inventory	Annual Generation (m^3)
Industrial Solid	—[c]	43,000
Hazardous Waste	None[d]	120
Mixed Low-Level Waste	2,100 m^3	160
Low-Level Waste	980 m^3	2,900
Transuranic Waste[e]	65,000 m^3	—
High-Level Waste (calcine)	4,400 m^3	—
Mixed Transuranic Waste/Sodium-Bearing Waste	3,785,000 L	—

DOE = U.S. Department of Energy
EIS = environmental impact statement
INEEL = Idaho National Engineering and Environmental Laboratory

[a] DOE. DOE/EIS–0287–F, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Section 4.7. Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.
[b] Does not include waste already disposed of at the Radioactive Waste Management Complex or other locations.
[c] Dash indicates no information available.
[d] Waste is shipped offsite before any significant inventory buildup.
[e] A portion of the 65,000 m^3 of transuranic waste retrievably stored at the Radioactive Waste Management Complex may be reclassified as alpha mixed low-level waste. It has been estimated that about 40 percent of the 65,000 m^3 is alpha mixed low-level waste, and 60 percent is actually transuranic waste.

NOTE: To convert meters cubed (m^3) to yards cubed (yd^3), multiply by 1.3079; to convert liters (L) to gallons (gal), multiply by 0.264.

INEEL Landfill Complex in the Central Facilities Area. About 91 ha [225 acres] are available for solid-waste disposal at the landfill complex. The capacity is sufficient to dispose of INEEL waste for 30 to 50 years. Recyclable materials are segregated from the solid-waste stream at each INEEL facility. The average annual volume of waste disposed of at the landfill complex from 1988 through 1992 was 52,000 m^3 [68,000 yd^3] (EG&G, Idaho, Inc., 1993). For 1996 and 1997, the volume of waste was about 45,000 and 54,000 m^3 [58,850 and 70,625 yd^3], respectively. The average annual volume of waste disposed of from 1998 through 2001 was about 43,000 m^3 [56,240 yd^3] (DOE, 2002a).

The INEEL hazardous waste management strategy is to minimize generation and storage and use private sector treatment and disposal. Approximately 120 m^3 [157 yd^3] of hazardous waste are generated at the site each year. Hazardous waste is treated and disposed at offsite facilities and is transported there by the commercial treatment contractor. The waste is packaged for shipment according to waste acceptance criteria at the receiving facility. The waste generator normally holds waste in a temporary accumulation area until it is shipped directly to the offsite commercial treatment facility.

About 2,100 m^3 [2,750 yd^3] of mixed low-level waste are presently at the INEEL site (DOE, 2002b). In addition to the current volume of mixed low-level waste in inventory at the site, about 160 m^3 [209 yd^3] of mixed low-level waste are generated annually (DOE, 2002b). Several mixed waste treatment facilities exist at the INEEL.

About 170,000 m^3 [222,340 yd^3] of low-level waste have been disposed at the Radioactive Waste Management Complex (DOE, 1995, 1997d). Currently, about 980 m^3 [1,280 yd^3] of low-level waste are in inventory at INEEL (DOE, 2002a). All onsite-generated low-level waste is stored temporarily at generator facilities until it can be shipped directly to the Radioactive Waste Management Complex for disposal. DOE expects to stop accepting contact-handled and remote-handled low-level wastes at the Radioactive Waste Management Complex in 2020 (DOE, 2002a).

Approximately 65,000 m^3 [85,000 yd^3] of transuranic and alpha-contaminated mixed low-level wastes are retrievably stored, and 60,000 m^3 [78,500 yd^3] of transuranic waste have been buried at the Radioactive Waste Management Complex (DOE, 1995). The Radioactive Waste Management Complex is composed of seven Type II storage modules, each of which can hold up to 4,465 m^3 [5,840 yd^3] of waste in drums or boxes. The total storage capacity is 31, 255 m^3 40,878 yd^3]. The processing capacity of the Advanced Mixed Waste Treatment Facility is 6,500 m^3/yr [8,500 yd^3/yr], and the expected duration of facility operation is 30 years (DOE, 1999). All 65,000 m^3 [85,000 yd^3] of the retrievably stored wastes were considered to be transuranic waste when first stored at INEEL. In 1982, DOE Order 5820.2 changed the definition of transuranic waste. The new definition excluded alpha-emitting waste less than 100×10^{-9} curies/g [3.5×10^{-9} curies/oz] at the time of assay. Because all the waste was initially considered to be transuranic waste, the alpha-emitting wastes were co-mingled in the same containers as the transuranic waste.

DOE has not determined the final disposition of the buried transuranic waste (DOE, 1995). However, DOE currently plans to treat and repackage the retrievably-stored transuranic and alpha-contaminated low-level waste so that all the resulting waste qualifies as transuranic waste. This waste would then be certified and shipped to the Waste Isolation Pilot Plant in New Mexico for final disposition. The Record of Decision from the Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement was issued in January 1998 (DOE, 1998), and the first shipments of transuranic waste from the INEEL to the Waste Isolation Pilot Plant occurred in April and August 1999. Since the October 1988 ban by the State of Idaho on shipments of transuranic waste to INEEL, DOE has shipped only small amounts of transuranic waste generated on the site to the Radioactive Waste Management Complex for interim storage.

From 1952 to 1991, DOE processed SNF and irradiated targets at the INTEC. The resulting liquid mixed HLW was stored in the Tank Farm. Mixed transuranic waste/sodium-bearing waste generated from the cleanup of solvent used to recover uranium and from decontamination processes at the INTEC is also stored in the Tank Farm. Although not directly produced from SNF processing, mixed transuranic waste/solid sodium-bearing waste at INEEL has been historically managed as HLW because of some of its physical properties. For purposes of analysis, INEEL has assumed that solid sodium-bearing waste is mixed transuranic waste in prior EISs (DOE, 2002a).

At present, about 4,400 m^3 [5,750 yd^3] of HLW calcine are stored at INTEC. INEEL no longer generates liquid mixed HLW because SNF processing has been terminated (DOE, 1995). All liquid mixed HLW produced from past processing has been blended and reprocessed, through calcination, to produce granular calcine. Mixed transuranic waste/solid sodium-bearing waste is generated from incidental activities associated with operations at INTEC (DOE, 1996b). Currently, about 3,800,000 L [1,000,000 gal] of mixed transuranic waste/solid sodium-bearing waste are in storage at INTEC, and this amount is expected to be reduced to about 3,028,000 L [800,000 gal] by the time waste processing begins (Barnes, 1999).

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4 ENVIRONMENTAL IMPACTS

This section presents the potential impacts of the construction and operation of the proposed Idaho Spent Fuel Facility. For the proposed action, the environmental impact statement (EIS) considers impacts from construction activities, normal operational events, reasonably foreseeable accidents, and cumulative impacts. Cumulative impacts are discussed separately in Section 4.14. Impacts from the no-action alternative are presented in Section 4.15. The safety aspects of the proposed Idaho Spent Fuel Facility will be evaluated by the U.S. Nuclear Regulatory Commission (NRC) in more detail in the safety evaluation report to be prepared by NRC (see Section 1.4).

In constructing the proposed Idaho Spent Fuel Facility, Foster Wheeler Environmental Corporation (FWENC) would prepare the site adjacent to the Idaho Nuclear Technology and Engineering Center (INTEC). This preparation would include clearing and grading, extension and realignment of existing utilities, and addition of any necessary roads. After site preparation, there would be excavation for the foundations and below-grade facilities, erection of the buildings, connection of the INTEC utilities to the facility, and addition of any final landscaping. Potential operational impacts would include emissions from routine operations, transfer from current storage locations, and occurrence of credible accidents and external events. Because the current storage location for the spent nuclear fuel (SNF) is at the INTEC facility, the transfer distances would be short and conducted according to existing U.S. Department of Energy (DOE) procedures.

4.1 Land Use Impacts

If the FWENC construction authorization is approved, the proposed Idaho Spent Fuel Facility would be constructed on a previously disturbed site currently in use as a construction laydown area adjacent to the southeast corner of INTEC. This property is classified as least productive (FWENC, 2003a). Construction equipment would be used to grade the site and excavate the foundation for the facility. Explosives would not be used to establish below-grade areas. During construction, equipment delivering cement and other construction materials would access the site. In addition to the 3.2-ha [8-acre] site for the facility, a 4.1-ha [10-acre] plot northeast of the site would be used as a construction laydown area. Because it is not part of the proposed Idaho Spent Fuel Facility, the only construction activities here would be some grading and leveling, as for a parking lot. The construction laydown area would have similar restrictions and effects on land use as the proposed Idaho Spent Fuel Facility site itself.

NRC Environmental and Safety Reviews

The focus of an EIS is a presentation of the environmental impacts of the proposed action. In addition to meeting its responsibilities under the National Environmental Policy Act (NEPA), NRC prepares a safety evaluation report to analyze the safety of the proposed action and assess its compliance with applicable NRC regulations.

The safety and environmental reviews are conducted in parallel. Although there is some overlap between the content of a safety evaluation report and the EIS, the intent of the documents is different. To aid in the decision process, the EIS provides a summary of the more detailed analyses included in the safety evaluation report. The EIS does not address accident scenarios, rather it addresses the environmental impacts that would result from the accident. Much of the information describing the affected environment in the EIS also is applicable to the safety evaluation report (e.g., demographics, geology, and meteorology).

The proposed Idaho Spent Fuel Facility does not have an independent electrical transmission corridor for power distribution. Electrical power for operations would be supplied from the INTEC distribution system. The INTEC distribution system would be connected to the proposed Idaho Spent Fuel Facility site boundary through a small substation. The final leg of the connection would route underground supply cables about 61 m [200 ft] to the proposed Idaho Spent Fuel Facility. Because the connection to the distribution system and routing path is on the proposed Idaho Spent Fuel Facility site, the impact of the transmission corridor on land use is small.

Once the proposed Idaho Spent Fuel Facility is completed, access to the site would be restricted, in accordance with 10 CFR Part 73, to activities in support of facility operations. By terms of this restricted access, the property would be unavailable for other uses such as exploration of mineral resources. No mineral resources have been found at the proposed site (Section 3.4.3). As described in Section 3.2, livestock grazing is already prohibited within 3.2 km [2 mi] of INTEC, so there would be no significant impact on grazing and hunting. Also, the nearest boundary of the Idaho National Engineering and Environmental Laboratory (INEEL) Sagebrush Steppe Ecosystem Reserve is located more than 17.6 km [11 mi] to the north of INTEC and would not be affected by the proposed facility.

Construction of the proposed Idaho Spent Fuel Facility would physically change the 3.2-ha [8-acre] tract. Because the proposed Idaho Spent Fuel Facility site (i) is only a small portion of the 2,580-km^2 [890-mi^2] INEEL and (ii) has been previously disturbed, the physical changes are minor. As outlined previously, these changes would restrict land use and would have a small impact during construction and operation of the proposed Idaho Spent Fuel Facility.

4.2 Transportation Impacts

Potential transportation-related impacts can be caused by construction activities, SNF transfer from interim storage to the proposed Idaho Spent Fuel Facility, and the eventual transfer of SNF to a geologic repository for final disposal. Transportation of solid radioactive waste to an approved disposal site is also an option under the proposed action that is the responsibility of DOE. DOE has already assessed the potential impacts of such transfers in a prior environmental impact assessment (DOE, 2002a) and record of decision (DOE, 2000). The peak workforce for construction of the proposed Idaho Spent Fuel Facility is estimated at 250 workers (FWENC, 2003b). These additional workers would not increase the total INEEL workforce beyond previous levels when the facility had greater numbers of employees (FWENC, 2003b). Given available road capacity (discussed in Section 3.3) and the relatively small number of additional construction workers, the impacts to the local transportation infrastructure from construction are expected to be small. Potential impacts from SNF transfer and geologic disposal are discussed in the following sections.

4.2.1 SNF Transfer from Interim Storage to the Proposed Idaho Spent Fuel Facility

Most SNF for the proposed Idaho Spent Fuel Facility is presently being stored at the adjacent INTEC, which is inside the boundary of the INEEL facility. The SNF for the proposed Idaho Spent Fuel Facility that remains to be shipped to INTEC consists of about 500 fuel elements from training, research, and isotope reactors built by General Atomics (TRIGA). The environmental impacts of transporting these remaining TRIGA elements from their foreign sites of origin to United States ports of entry were previously assessed by DOE (1996a) and summarized in a record of decision (DOE, 1996b). The environmental impacts of shipping the same fuel from the United States ports of entry to INEEL were also previously assessed by DOE in a separate EIS (DOE, 1995). Both assessments found small environmental impacts from planned transportation of TRIGA fuel. Because transportation impacts have been previously evaluated, no new assessment of impacts associated with SNF shipments is necessary for this EIS.

Details of proposed systems and operations for fuel transfer to the proposed Idaho Spent Fuel Facility from INTEC are provided in the applicant's Safety Analysis Report (FWENC, 2003c). Fuel transfer is expected to occur using the DOE-supplied casks (Peach Bottom PB–1 and PB–2 casks) loaded onto trailers (flatbed and lowboy, depending on cask type) over a distance less than 800 m [2,600 ft] between the two facilities (FWENC, 2003c, Appendix A). The casks are expected to provide the necessary geometric control and configuration, confinement, and shielding of the SNF to ensure the radiation protection and criticality safety requirements are met at the proposed Idaho Spent Fuel Facility. Detailed descriptions of cask design, testing, and prior certification information also are provided in the applicant's Safety Analysis Report (FWENC, 2003c, Appendix A). A conservative shielding analysis using a Peach Bottom cask loaded with TRIGA fuel (highest photon flux of all fuel types included in the proposed action) estimated the dose rate at contact surface of the package to be less than 0.1 mSv/hr [10 mrem/hr] and 0.034 mSv/hr [3.4 mrem/hr] at 0.3 m [1 ft] (FWENC, 2003c, Appendix A). Dose estimates that include transfer operations are provided in the occupational health impacts section (4.12.1.2.2). That section indicates worker dose estimates would be below the annual occupational dose limit in 10 CFR Part 20 {50 mSv/yr [5,000 mrem/yr]}. Although dose estimates provide insight for potential radiation exposures during operations, all occupational radiation exposures would be maintained below the limits of 10 CFR Part 20 by implementing a compliant radiation protection program (FWENC, 2003c, Section 3.3)

The transporter is a tractor with administratively controlled petroleum fuel content and speed of travel to reduce the chance of fire or transport accidents (FWENC, 2003c, Appendix A). Scenarios and estimated consequences for potential off-normal events and accidents, including those that could impact transfer operations, are discussed in Sections 4.12.2 and 4.12.3. Because the transfer of fuel from INTEC to the proposed Idaho Spent Fuel Facility occurs completely within the boundaries of the site (i.e., INEEL), there are no significant offsite dose or transportation impacts from proposed normal transfer operations.

Factors such as the restricted access onsite location, limited speed and distance traveled, low dose rate from the shielded packages, and administrative controls (including a radiation protection program that addresses 10 CFR Part 20 requirements) provide confidence that transfer operations can be conducted safely with small adverse environmental impacts.

4.2.2 Shipment of SNF to a Proposed Geologic Repository

In accordance with the 1995 Settlement Agreement among DOE, the State of Idaho, and the U.S. Navy, it is anticipated that SNF would be transferred from the proposed Idaho Spent Fuel Facility to a geologic repository by 2035. The specific timing of the removal would depend on DOE having a repository constructed and ready to receive SNF and on the schedules developed by DOE to ship SNF from current storage locations throughout the United States to a repository.

General aspects of the removal would require transfer of the SNF from its interim storage at the Idaho Spent Fuel Facility and loading the SNF either onto trucks or specially designed railroad cars for transport to a geologic repository. As part of the DOE contract with FWENC, the storage containers for the proposed Idaho Spent Fuel Facility are to be designed for direct shipment to a repository, and no intermediate fuel repackaging is anticipated. Generic environmental impacts of transporting SNF to a geologic repository are analyzed in a series of DOE EISs (DOE, 1999a, 2001a, 2002b) prepared for a proposed repository at Yucca Mountain, Nevada. As necessary, the EIS is to be updated by DOE to support a license application to NRC. As described by requirements in 10 CFR 51.109, NRC is required to adopt the DOE EIS to the extent practicable. At the time of publication of this EIS, there is no license application before NRC for a geologic repository.

4.3 Geological and Soils Impacts

The waste processing activities for the proposed Idaho Spent Fuel Facility would take place in a new facility adjacent to INTEC, an area dedicated to industrial use at INEEL for more than 40 years. No mineral deposits or unique geologic resources have been found in or adjacent to the INTEC area. Thus, no impacts are expected to these resources during construction or normal facility operations. Most impacts to soils are expected to be associated with routine construction activities such as excavating, earthmoving, and grading. Waste management facilities would be designed with safeguards to minimize impacts (e.g., spills of toxic substances) to soils during normal facility operations. Because the facilities would be enclosed, no significant operational impacts to geologic resources are anticipated.

4.4 Water Resources Impacts

4.4.1 Water Quality Impacts

The proposed Idaho Spent Fuel Facility would be constructed on the edge of the Big Lost River flood plain southeast of the main channel. The nearest boundary of the proposed Idaho Spent Fuel Facility is about 1,200 m [4,000 ft] from the Big Lost River. Other nearby surface water bodies include sewage treatment lagoons in the INTEC area and two percolation ponds south of INTEC. Because the treatment lagoons and percolation ponds are artificial and not intended to support aquatic life, the impact on water quality is not examined for purposes of this section. The proposed Idaho Spent Fuel Facility site is 140 to 146 m [460 to 480 ft] above the Snake River Plain Aquifer.

Construction of the proposed Idaho Spent Fuel Facility would involve preparing the land, erecting buildings, and grading. These phases of construction would have small impact on the surface and subsurface hydrology. Site preparations include scraping and excavating to establish grade and foundations. Each of these phases creates different impacts (direct and indirect) for the surface and subsurface hydrology. Removal of surface material would typically establish conditions for erosion. However, the proposed Idaho Spent Fuel Facility site is in a high, cool desert environment with aeolian, alluvial, and lacustrine sediments overlying basaltic lava flows. Therefore, rainwater is unlikely to erode subsurface soil. The surface soils removed would be staged onsite for use in establishing the final grade. This soil stockpile could erode and be carried to the Big Lost River or into the Snake River Plain Aquifer. Migration of soils into the aquifer is not likely because the loose soil would fill in the natural pathway through the alluvium and underlying rock.

Migration of loose soils to the Big Lost River could add to existing sediments and affect the natural flow of the river. This is unlikely, however, because the river is about 1,200 m [4,000 ft] from the proposed Idaho Spent Fuel Facility boundary, and the soil would settle on the surface before reaching the river. During construction, water would be distributed to control fugitive dust. This water, like other small amounts of water on the site, would evaporate or seep into the ground, probably not reaching the Big Lost River, and would have no significant effect on the aquifer.

During construction, physical changes of the land could affect the nearby water bodies and the subsurface aquifer. These effects, however, would be mitigated for construction activities through the implementation of a generic storm water pollution prevention plan (DOE, 1998) and a site-specific plan, written in accordance with U.S. Environmental Protection Agency (EPA) Administered Permit Programs, The National Pollutant Discharge Elimination System (40 CFR Part 122), and site-specific requirements. The generic storm water pollution prevention plan (DOE, 1998) includes an assessment of drainage and runoff, an evaluation of the Endangered Species Act and the National Historic Preservation Act impacts, identification of erosion and sediment controls during construction, assessment of permanent storm water management controls, and identification and control of other potential sources of pollution. Once construction is complete, unpaved areas of the property would be covered with gravel or similar material to minimize erosion and the need for excess pesticides and fertilizers to maintain adequate erosion control and minimize combustible vegetation buildup. The industrial operations at the proposed Idaho Spent Fuel Facility are exempt from storm water permit requirements because the proposed facility is not included in sectors or subsectors identified by EPA as requiring a permit (FWENC, 2003a).

The proposed Idaho Spent Fuel Facility does not require construction of any new groundwater wells or percolation ponds. During operation, the facility would use water from existing INEEL wells. There are no planned process discharges, and storm water discharge from industrial operations would be regulated by the existing INEEL storm water pollution prevention plan (DOE, 2001b). Accordingly, there would be no discharge of radionuclides into the planned process discharge. It is anticipated that impacts on surface and groundwater resources would be small.

4.4.2 Water Use impacts

Construction activities at the proposed Idaho Spent Fuel Facility site would require a supply of water for making concrete, controlling fugitive dust, and potable water for consumption and sanitary facilities. For dust suppression, one water truck is estimated to use an average of one full tank every 2 days to maintain the 3.2-ha [8-acre] site and 4.1-ha [10-acre] construction laydown area grounds sufficiently wet to minimize fugitive emissions. Average water truck capacity is 15,000 L [4,000 gal]. Assuming that water would be needed for about 200 work days per year, construction of the proposed Idaho Spent Fuel Facility is estimated to require 1.5 million L [396,300 gal] of water during the first year. It is also estimated that during the second year of construction, this water usage will be reduced by half because the building foundation and principal structures will have been erected, and need for the entire construction laydown area will diminish.

The estimated concrete needed for the proposed Idaho Spent Fuel Facility is about 9,260 m^3 [12,115 yd^3]. Adding 5 percent for discarded concrete results in an estimated concrete quantity of 9,725 m^3 [12,720 yd^3]. Based on a typical concrete mix design, 136 L [36 gal] of water is required for 0.8 m^3 [1 yd^3] of concrete. Given these assumptions, the estimated water needed for concrete is about 1.74 million L [460,000 gal]. Adding 10 percent for cleaning equipment, waste, and such results in an estimated water quantity of 1.91 million L [502,000 gal]. The average INEEL annual site water consumption from 1987 to 1991 was 7.4 billion L/yr [2.0 billion gal/yr] (DOE, 1995, Volume 1, Appendix B, Section 4.13.1). A Water Rights Agreement between DOE and the State of Idaho allows up to 43 billion L/yr [11.4 billion gal/yr] (FWENC, 2003b). This means that the total estimated water usage for dust suppression and concrete during construction of the proposed Idaho Spent Fuel Facility is less than 0.05 percent of the average annual INEEL water consumption and about 0.008 percent of the allowed water use limits.

During operations, the proposed Idaho Spent Fuel Facility would consume about 142,028 L [37,520 gal] of potable water each month (FWENC, 2003a). Because this water consumption is limited to drinking water, hygiene, and sewage disposal, the quantity would remain relatively constant during the year. This quantity represents a small amount (0.1 percent) of the water consumption relative to the more than 7.4 billion L [2.0 billion gal] used each year at the INEEL facility, and the water use impacts are expected to be small.

4.5 Ecological Impacts

Construction and operation of the proposed facility are not expected to have a significant adverse impact on the immediate and surrounding ecological resources. There are no known wetlands, endangered species, or critical habitats at the proposed facility location, so, no important or unique species habitats, both terrestrial and aquatic, would be lost or impacted by construction or operation of the proposed facility (FWENC, 2003a, Appendix A). Secondary impacts on wildlife would be small, including those from noise, heat release, radionuclide release, construction traffic, human activity, and the presence of new buildings. A discussion of the potential environmental impacts is included as part of the license application in FWENC (2003a).

The proposed activities are not expected to disturb any benthic communities or habitats. Potential increases in surface runoff would be mitigated through good construction practices. The proposed action does not involve dewatering any wetlands or using dredge spoils as fill material, so, guidelines for appropriate actions associated with such activities are not applicable. No wetlands and streams or associated vegetation would be disturbed by construction or operation of the proposed facility.

It is anticipated that normal construction practices to minimize soil erosion would be followed. The proposed facility would potentially impact 7.3 total ha [18 acres]; 3.2 ha [8 acres] at the proposed site and 4.1 ha [10 acres] at the nearby construction laydown area. Both the proposed facility site and construction laydown area would use previously disturbed lands that do not presently support native vegetation (FWENC, 2003a).

In preparing this EIS, the NRC completed consultation as required by Section 7 of the Endangered Species Act (see Appendix B). In letters dated April 21, 2003 (NRC, 2003a) and June 3, 2003 (NRC, 2003b), the NRC requested the U.S. Fish and Wildlife Service concurrence on the NRC finding of “no effect” on endangered and threatened species or critical habitat. The U.S. Fish and Wildlife Service concurred with this finding in a letter dated June 10, 2003 (U.S. Fish and Wildlife Service, 2003).

4.6 Air Quality Impacts

The description of impacts to air quality from the construction and operation of the facility is found in several documents. One source for this information is the applicant's Environmental Report (FWENC, 2003a). Two other sources include the DOE programmatic SNF EIS (DOE, 1995) and Belanger, et al. (1995). Frequently, the impact of the proposed Idaho Spent Fuel Facility was not examined individually, but as part of Alternative B of the DOE SNF management activities at INEEL (DOE, 1995). The proposed Idaho Spent Fuel Facility is one of eight projects that compose Alternative B. The equivalent name for the proposed Idaho Spent Fuel Facility in the DOE programmatic SNF EIS (DOE, 1995, Volume 2, Part B, Appendix C) is the Dry Fuel Storage Facility, Fuel Receiving, Canning/Characterization, and Shipping Facility.

Any impacts to air quality from the construction and operation of the proposed facility are expected to be small and below regulatory limits. This proposed facility is exempt from the need for a National Emissions Standard for Hazardous Air Pollutants application because the State of Idaho regulations do not classify the proposed facility as a major facility for nonradioactive pollutants, and expected radionuclide emissions represent less than 1 percent of the site boundary dose limit and would not exceed regulatory constraints (FWENC, 2003a, Section 12.2). INEEL occupies parts of five counties that are either in attainment or unclassified with respect to the EPA National Ambient Air Quality Standards (DOE, 2002a, Section 4.7.2). Therefore, a conformity determination is not required under Section 176(c)(1) of the Clean Air Act. As appropriate, FWENC will provide documentation of the calculated emissions to the Idaho Department of Environmental Quality and the EPA to demonstrate compliance and to address requirements of the INEEL operations permit under Title V of the Clean Air Act.

4.6.1 Construction

4.6.1.1 Nonradiological Impacts

Potential impacts to nonradiological air quality from construction activities would include fugitive dust and exhaust emissions from support equipment. Modeling assessments from the DOE programmatic SNF EIS (DOE, 1995, Volume 2, Part A) showed that the construction-related air quality impact should be small, temporary, and localized.

Estimates from FWENC (2003a, Section 4.1) are that 13.6 metric tons [15 tons] of dust and particulates would be generated during the construction phase. Watering, routinely and effectively used in construction projects to reduce fugitive dust generation, would mitigate construction dust. Watering is expected to reduce the estimated 13.6 metric tons [15 tons] of fugitive dust and particulates to about 8.2 metric tons [9 tons] (FWENC, 2003a, Section 4.1).

Fugitive dust estimates for Alternative B of the projects described in the DOE programmatic SNF EIS (DOE, 1995, Volume 2, Part A) can be used to demonstrate that fugitive dust emissions from the proposed Idaho Spent Fuel Facility would be less than the appropriate standards. Table 4-1 contains the estimated particulate concentration emission levels for all eight projects that constitute Alternative B. The annual average concentrations of both PM_{10} and total particulates are below the applicable standard at the INEEL site boundary and public road locations. Similarly, the 24-hour average concentrations of both PM_{10} and total particulates are below the applicable standard at the INEEL site boundary and public road locations (Belanger, et al., 1995, Section 7-2).

Table 4-1. Impacts at Public Access Locations from Projected Construction Fugitive Dust Emissions for Alternative B Spent Nuclear Fuel Program, Including the Proposed Idaho Spent Fuel Facility[a]

Pollutant	Averaging Time	Construction Fugitive Dust Emissions (μg/m^3)		Applicable Standard (μg/m^3)
		Site Boundary	Public Roads	
PM_{10}	24 hours	3.5	49	150
PM_{10}	Annual	0.007	0.09	50
Total Particulates	24 hours	5.4	77	150
Total Particulates	Annual	0.1	0.1	50

DOE = U.S. Department of Energy

[a] Belanger, R., J. Raudsep, and D.A. Ryan. DOE/ID–10497, "Technical Support Document for Air Resources Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs." Section 7-2. Idaho Falls, Idaho: Science Applications International Corporation. 1995.

NOTE: To convert μg/m^3 to oz/ft^3, multiply by 1×10^{-9}.

Construction vehicle emissions estimates for Alternative B can be used to demonstrate that construction vehicle emissions from the proposed Idaho Spent Fuel Facility would be less than the appropriate standards. Table 4-2 contains the estimated construction vehicle emissions for all eight projects that compose Alternative B. All the average concentrations for carbon dioxide, nitrogen dioxide, and sulfur dioxide are below the applicable standards at the INEEL site boundary and public road locations (Belanger, et al., 1995, Section 7-2).

Mobile source impacts, including the INEEL fleet light- and heavy-duty vehicles, privately owned vehicles, heavy-duty commercial vehicles, and the INEEL bus fleet operations were also evaluated by DOE. It was concluded that increased vehicular traffic due to any of the alternatives for SNF management at INEEL would be negligible compared to existing traffic. The peak cumulative impacts from any alternative, which includes existing conditions plus alternative impacts, were predicted to occur at the INEEL gate. These peak estimated impacts were estimated to be about 5–30 percent of the applicable standards and are due almost entirely to existing traffic conditions (DOE, 1995, Volume 2, Part A, Section 5.7).

4.6.1.2 Radiological Impacts

No significant impacts to radiological air quality from construction activities are expected. The soil at the site is not considered radiologically contaminated (see Section 3.4). Therefore, no resuspension of radioactivity would occur from construction activities that would disturb the soil. Sources of radiation exposure during construction are limited to background radiation and potential accidents or abnormal operations exposure from other facilities at INEEL (FWENC, 2003a, Section 4.5).

Table 4-2. Impacts at Public Access Locations from Projected Construction Vehicle Emissions for Alternative B Spent Nuclear Fuel Program, Including the Proposed Idaho Spent Fuel Facility[a]

Pollutant	Averaging Time	Construction Fugitive Dust Emissions (μg/m^3)		Applicable Standard[b] (μg/m^3)
		Site Boundary	Public Roads	
Carbon Monoxide	1 hour	10	125	40,000
Carbon Monoxide	8 hours	7.3	88	10,000
Nitrogen Dioxide	Annual	0.003	0.03	100
Sulfur Dioxide	24 hours	4.1	50	365
Sulfur Dioxide	3 hours	9.3	113	1,300
Sulfur Dioxide	Annual	0.0002	0.003	80

DOE = U.S. Department of Energy

[a] Belanger, R., J. Raudsep, and D.A. Ryan. DOE/ID–10497, “Technical Support Document for Air Resources Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs.” Section 7-2. Idaho Falls, Idaho: Science Applications International Corporation. 1995.

[b] Applicable Standards based on National Ambient Air Quality Standards, except 3-hour sulfur dioxide standard, which is a secondary standard.

NOTE: To convert μg/m^3 to oz/ft^3, multiply by 1×10^{-9}.

4.6.2 Operations

4.6.2.1 Nonradiological Impacts

The proposed Idaho Spent Fuel Facility would have only trace chemical air discharges, with no discernible environmental effects (FWENC, 2003c, Section 5.3). Sources for incidental nonradiological airborne emissions include testing or operation of the emergency diesel generator, emissions from vehicles, and use of herbicides and pesticides.

The only stationary nonradiological emission source at the facility would be a standby diesel generator for use during loss of normal electrical power (FWENC, 2003b, Section 3.1). This generator would be located outside the facility, so combustion products produced during generator operation would be discharged directly to the atmosphere. As appropriate, FWENC will provide documentation of the calculated emissions to the Idaho Department of Environmental Quality and the EPA to demonstrate compliance and to address requirements of the INEEL operations permit under Title V of the Clean Air Act.

During transport operations, vehicular traffic would increase between INTEC and the proposed Idaho Spent Fuel Facility. This activity would add to the cumulative amount of exhaust at INEEL. The vehicular exhaust is within regulatory limitations (FWENC, 2003a, Section 5.6). Mobile source impacts, including the INEEL fleet light- and heavy-duty vehicles, privately owned vehicles, heavy-duty commercial vehicles, and the INEEL bus fleet operations were evaluated.

It was concluded that increased vehicular traffic because of any of the alternatives would be negligible compared with existing traffic. The peak cumulative impacts from any alternative, which include existing conditions plus alternative impacts, were predicted to occur at the INEEL gate. These maximum impacts were estimated to be about 5–30 percent of the applicable standards and are due almost entirely to existing traffic conditions (DOE, 1995, Volume 2, Part A, Section 5.7).

4.6.2.2 Radiological Impacts

Facility operations are not expected to result in significant amounts of gaseous radioactive effluents. Because of the nature and condition of the SNF to be packaged at this proposed facility, most radioactive gases from the SNF are expected to have been released already and concentrations reduced through radioactive decay (FWENC, 2003c, Section 6.2). Therefore, the volume of releasable fission gases remaining is not expected to be significant. It is possible, however, that initial SNF handling and repackaging operations could result in the release of small amounts of radioactive gases. Initial SNF receipt and repackaging operations are scheduled to occur during the first 3 years of proposed facility operation. After the SNF is repackaged and placed into storage, it would be contained within redundant confinement boundaries. Subsequent to the initial receipt and repackaging of SNF, there would be minimal generation of gaseous radioactive waste (FWENC, 2003c, Section 6.1).

The proposed facility would be a fully enclosed building complex. Airborne contamination control zones throughout the facility would ensure that contamination is minimized and controlled. The proposed facility would be divided into four airborne contamination control zones based on varying degrees of potential contamination. The ventilation systems are designed to ensure that room pressures would establish airflow from areas of least expected contamination to most expected contamination. The ventilation system would serve to prevent accidental release of radioactive material to the environment and to help keep personnel exposure to radiological hazards as low as is reasonably achievable (ALARA). Gases released within the facility would be passed through high efficiency particulate air (HEPA) filters before being discharged through the facility ventilation exhaust stack to remove airborne particulates and provide monitoring of gaseous effluents. The HEPA filters, housed in metal enclosures, would be type B nuclear grade and meet the requirements of American National Standards Institute (ANSI) N509 and ANSI N510 (FWENC, 2003c, Section 3.3). The applicant's Safety Analysis Report (FWENC, 2003c, Section 4) provides a detailed description of the ventilation system and its components.

4.7 Noise Impacts

Because the proposed Idaho Spent Fuel Facility is to be located more than 13 km [8 mi] from the nearest INEEL boundary and more than 16 km [10 mi] from the nearest community, noise generated during its construction is not likely to travel off the site at levels that would affect the general population. Noise impacts would be small and limited to those resulting from the transportation of personnel and materials to and from the site that would affect nearby communities and from onsite sources that could affect wildlife near those sources. The vehicles that transport workers, INEEL employees, and materials on roads and rails would represent only a small portion of the current noise levels of traffic (FWENC, 2003a; DOE, 2002a). In addition, noise generated during construction of the facility would be temporary.

Most potential impacts on noise would occur during construction of the facility. Because the proposed Idaho Spent Fuel Facility is enclosed, the potential impacts of noise from operations would be substantially the same as or less than those for construction of the facility.

As described in Section 3.8, INEEL complies with Occupational Safety and Health Administration regulations (29 CFR 1910.95) in conducting industrial operations and construction activities. Any INEEL personnel exposed to an 8-hour time-weighted average of 85 dBA or greater must be issued hearing protection (DOE, 2002a). The regulations also require that any exposure to impulse or impact noise should be limited to 140 dBA peak sound pressure level. Studies of the effects of noise on wildlife indicate that intermittent noise levels over 100 dBA do not affect wildlife productivity [Bureau of Land Management (BLM), 1986; Lehto, 1993]. Therefore, the impacts of noise on both humans and wildlife would be small.

4.8 Cultural, Historical, Archaeological, Ethnographical, and Paleontological Resources

The proposed Idaho Spent Fuel Facility would be located within INEEL boundaries, adjacent to INTEC. Types of resources analyzed in the area include archaeological and historic resources, as well as paleontological sites. Ethnographic concerns focused on resources significant to the Shoshone–Bannock Tribes, who have long inhabited the area. Cultural resources in the area related to the Tribes are mainly archaeological. The Shoshone–Bannock Tribes place cultural and religious significance on all components of the natural setting, and this philosophy must be respected in the analysis of impacts. Nontraditional uses of the area have an impact on the natural and cultural settings traditionally used by the Shoshone–Bannock Tribes for cultural and religious purposes. Because these settings continue to be important to the Tribes, nontraditional uses of the land/area affect the purity of the natural and sacred environment.

Impacts to the cultural resources within the project area were assessed by identifying known and potential cultural resources in the areas that would be affected by the actions of the alternative. Furthermore, construction-related activities that could directly or indirectly affect cultural resources were evaluated to determine if these activities would have an adverse impact. There are no known cultural resources identified within the proposed Idaho Spent Fuel Facility site and its associated construction laydown area. However, the adjacent INTEC facility contains 38 buildings and structures that are potentially eligible for listing on the National Register of Historic Places. The construction activities at the proposed Idaho Spent Fuel Facility site may have some impacts, and the subsequent relocation of the SNF from locations within INTEC could also have impacts to some cultural resources.

In preparing this EIS, NRC completed consultation as required by Section 106 of the National Historic Preservation Act (see Appendix B). In a letter dated December 4, 2002 (NRC, 2002), NRC requested the State Historic Preservation Officer views on identification efforts. In a letter dated April 17, 2003 (NRC, 2003c), NRC presented its finding of "no historic properties affected," and the Idaho State Historic Preservation Officer agreed with this finding in a letter dated June 4, 2003 (Idaho State Historical Society, 2003).

4.8.1 Impacts to Historical Resources

There are no historic resources within the boundaries of the proposed Idaho Spent Fuel Facility and its associated construction laydown area that would be affected by the construction of the support buildings and the associated road system. Thus, because there are no historic resources, there would be no direct or indirect impacts within the area of construction for the proposed Idaho Spent Fuel Facility.

The adjacent INTEC site contains 38 buildings and structures that have been evaluated as potentially eligible for listing on the National Register of Historic Places. The construction activities of the proposed Idaho Spent Fuel Facility and the subsequent transfer of SNF from the current INTEC storage location will not affect these potentially historic structures, with the exception of one, which currently stores some of the SNF that will be transferred to the proposed Idaho Spent Fuel Facility. The Fuel Receiving and Storage building (CPP–603) was constructed in 1951 to receive and store SNF and waste fission products. Construction of the proposed facility will provide updated and safer storage for the SNF, so the existing Fuel Receiving and Storage building will be in a more ready state for decontamination and removal once transfer of the SNF has been completed. A Memorandum of Agreement between the Idaho Field Office of DOE, Idaho State Historic Preservation Officer, and Advisory Council on Historic Preservation (signed in 1998), pursuant to 36 CFR Part 800, stipulated the procedures required to meet compliance requirements in Section 106 of the National Historic Preservation Act (16 USC §47 OF) for removal of the Fuel Receiving and Storage building.

4.8.2 Impacts to Archaeological Resources

Extensive archaeological surveys and investigations have been conducted in the area for the proposed Idaho Spent Fuel Facility. Three sites in the vicinity have been identified and recorded, one of which is eligible for listing on the National Register of Historic Places. All three sites, however, are located outside areas that would be affected by construction activities for the proposed Idaho Spent Fuel Facility. Ground disturbance associated with the proposed Idaho Spent Fuel Facility and other temporary support facilities would be extensive but localized. The proposed construction sites have had a high degree of previous ground disturbance and no known archaeological sites have been identified in the proposed Idaho Spent Fuel Facility location or its associated construction laydown area. Thus, there would not be any impacts to archaeological resources at the proposed construction site and associated laydown area because of construction activities. Furthermore, because the area has been subject to intensive archaeological survey with negative results, it is highly unlikely that archaeological resources would be discovered during construction activities. Within the boundaries of INTEC, the ground has been subject to intensive disturbance during the past 50 years. It is unlikely that any archaeological sites exist in the heavily disturbed areas that would be used during the transfer of SNF to the proposed Idaho Spent Fuel Facility, so it is unlikely that there would be any impacts to archaeological resources caused by activities related to the proposed facility.

All ground disturbing activities would be monitored. If archaeological resources were discovered, work would cease until the site could be evaluated and mitigation measures applied, which would include notification of and consultation with the State Historic Preservation Officer, the Advisory Council on Historic Preservation (if necessary), and the Shoshone–Bannock Tribes. In the unlikely event that human remains were found, provisions would apply as outlined in the Native American Graves Protection and Repatriation Act (Pace, 2001).

4.8.3 Impacts to Ethnographical Resources

The Shoshone–Bannock Tribes believe the resources of the natural world have a spiritual and sacred significance in the traditional and contemporary ways that land is used and respected. The Tribes view all elements of the environment such as earth, water, air, plants, and animals, to be one entity as they relate to the protection of Native American cultural resources and land. Nontraditional uses of the area are considered to be infractions of the natural and cultural settings when these uses can be seen or heard from sacred or traditional-use areas. The open topographic nature of the Eastern Snake River Plain permits uninterrupted viewsheds, providing the potential for visual impacts to many sacred and traditional use areas. The location of the proposed Idaho Spent Fuel Facility and its associated construction laydown area is adjacent to INTEC, a highly developed area constructed 50 years ago. Hence, placement of the proposed Idaho Spent Fuel Facility would not introduce a built environment into a pristine natural setting.

The tallest structures {24 m [80 ft]} would be similar to or smaller than existing structures at INTEC, so the effects on the viewshed would be small.

The area has been subject to intensive ground disturbance throughout the past 50 years. The lack of archaeological resources and the highly disturbed nature of the areas indicate that no sensitive tribal resources are present. Vegetation is sparse and nonnative plant species are dominant. Also, no unique topographic features are present. These factors indicate the improbability that these areas contain resources significant to the Shoshone–Bannock Tribes. Therefore, it is unlikely there would be impacts to archaeological resources significant to the Shoshone–Bannock Tribes.

Access to this area by Tribal members would continue to be restricted. Construction of the proposed Idaho Spent Fuel Facility would not change the status of restricted access, so there would not be any new impacts that would occur from the proposed action. The construction of the proposed Idaho Spent Fuel Facility and the subsequent transfer of SNF would occur on restricted and secure property that currently facilitates the same type of land use. For these reasons, it is improbable that any ethnographic resource other than the Shoshone–Bannock Tribes would continue to be affected by restricted access.

4.8.4 Impacts to Paleontological Resources

The area closest to the proposed Idaho Spent Fuel Facility site where paleontological remains were discovered was in the alluvial gravels of the Big Lost River. This site, however, is some distance from the proposed Idaho Spent Fuel Facility construction areas. The likelihood of the existence of paleontological resources at the proposed Idaho Spent Fuel Facility location is extremely low, because this area has had a high level of ground disturbance. Furthermore, no paleontological resources have been discovered within the areas of INTEC that are associated with the proposed action. There has been a high level of ground disturbance within the INTEC boundaries during the past 50 years, and it is unlikely any paleontological resources are present. In the unlikely event that resources are discovered during the construction phase of the proposed Idaho Spent Fuel Facility or in the course of loading and transporting SNF at these areas, work would cease until consultations with the appropriate entities and proper mitigation measures are complete. Because there are no known paleontological resources at the proposed Idaho Spent Fuel Facility site and its associated construction laydown area, or within the areas of INTEC relevant to this project, it is unlikely that there would be any significant impacts to paleonotological resources.

4.9 Visual/Scenic Impacts

Most of the proposed action would take place inside a perimeter security fence adjacent to INTEC, an area that has been highly altered by development and dedicated to industrial use for almost 50 years. Two potential impacts to aesthetic and scenic resources include the addition of buildings and construction and process emissions that could alter the view.

The industrialized area of INTEC has a BLM Visual Resource Management rating of Class IV (DOE, 2002a, Section 5.2.4). The tallest structure planned for the proposed Idaho Spent Fuel Facility would be the exhaust emissions stack at about 24 m [80 ft] (FWENC, 2003c). The height of this stack is approximately the same order or less than existing stacks at INTEC (FWENC, 2003a).

Construction activities at the proposed Idaho Spent Fuel Facility would produce fugitive dust and exhaust emissions from construction equipment that could affect visibility temporarily in localized areas; however, these emissions would not be visible from lands adjacent to INEEL or beyond and would not exceed the Class III objectives. Construction activities would be limited in duration, and FWENC would use water to minimize both erosion and dust. After construction, roads would be graded and disturbed land would be landscaped to further reduce dust (FWENC, 2003a). Fuel-handling and storage operations would be contained in an enclosed building and are not anticipated to produce dust particulate emissions. For this reason, operations are likely to have less of a visual impact than are construction activities. In addition, the proposed facility would be constructed next to INTEC, an existing industrial complex. DOE previously evaluated visual and aesthetic impacts for planned waste management activities at INTEC and determined the impacts would not be significant (DOE, 2002a, Section 5.2). The proposed Idaho Spent Fuel Facility is about 13.7 km [8.5 mi] from the nearest INEEL boundary. The proposed facility is also much smaller than INTEC, so it is unlikely there would be significant visual impacts.

4.10 Socioeconomical Impacts

No permanent residents or communities are within 16 km [10 mi] of the proposed Idaho Spent Fuel Facility site, but several INEEL facilities are within this distance (Figure 4-1). Institutional control would continue to restrict access to INEEL lands, thus, the population within 16 km [10 mi] of the proposed Idaho Spent Fuel Facility site is unlikely to change throughout the life of the facility.

The DOE programmatic SNF EIS (1995) presented the environmental impacts of implementing the SNF management approach, including a generic analysis of the activities associated with a facility similar to the proposed Idaho Spent Fuel Facility. This environmental analysis indicates the impacts of a dry fuel storage facility, fuel receiving, canning/characterization, and shipping facility would be small in most areas, including impacts to land use, socioeconomics, water and air resources, ecology, cultural and historical resources, and cumulative impacts.

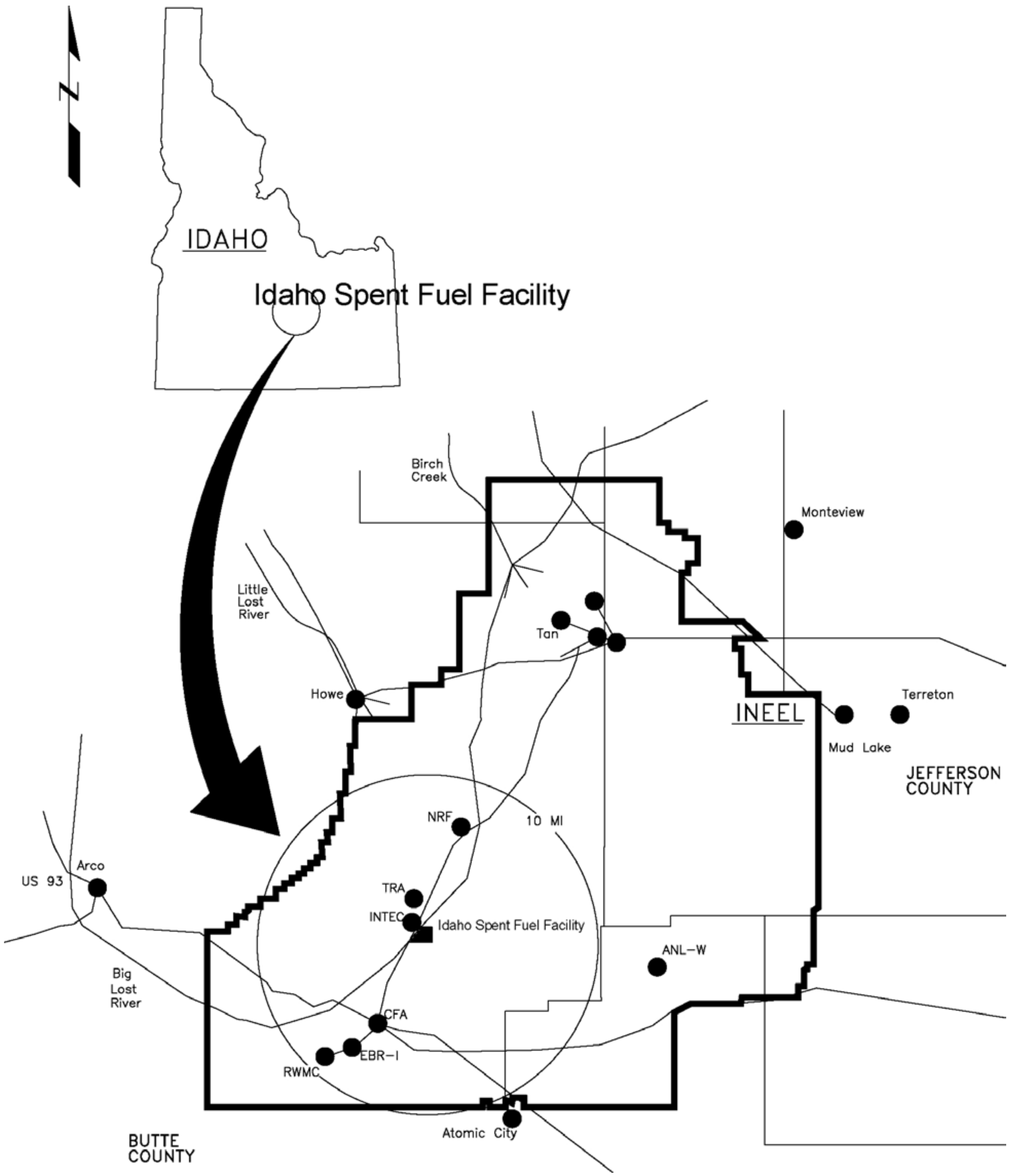

Figure 4-1. INEEL Facilities and Surrounding Communities (Modified from FWENC, 2003a, Section 8)

The 2-year construction phase would employ a maximum of 250 workers. These employees constitute about 3 percent of the current INEEL workforce of about 8,100. Thus, proposed Idaho Spent Fuel Facility construction would not have significant economic or social impacts, because most workers would likely come from the existing INEEL workforce.

Operation of the proposed Idaho Spent Fuel Facility would require nearly 60 employees for the first 3 years—when fuel receipt and packaging occur. Once this phase of operations is completed, storage operations would likely require fewer staff. Most operations personnel would come from the local workforce.

Impacts on small and isolated communities will vary in socioeconomic and demographic characteristics and future connection to the proposed Idaho Spent Fuel Facility. In the case of employment opportunities, the facility would be but one of many employers, implying a lack of dependence on any one facility within the region of influence.

4.11 Environmental Justice Impacts

As addressed in Section 3.12 of this EIS, Executive Order 12898 (The White House, 1998) directs Federal agencies to make achieving environmental justice part of their mission and to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations.

The minority population near INEEL is predominately Hispanic, American Indian, and Asian. On the basis of 2000 census data for blocks wholly contained within the region of influence, these groups constitute 12 percent of the population. The low-income population composes 13 percent of the total population within the 80-km [50-mi] radius, based on analysis at the tract level (U.S. Bureau of the Census, 2000).

The earlier 1995 DOE programmatic SNF EIS regarding the agency SNF management and environmental restoration and waste management programs assessed the environmental justice issue for the area surrounding INEEL (DOE, 1995). The DOE EIS Project Office reviewed concerns expressed by the Shoshone–Bannock Tribes on the Fort Hall Reservation and engaged in consultations with Tribal officials and INEEL officials "... to fully understand, evaluate, and consider these comments" (DOE, 1995, Volume 2, Part B, Section 5.20). The concerns included

- Tribal values as they relate to nature, ties to the land, and religious beliefs; and
- Potential impacts not only to such resources on INEEL (once inhabited by the Shoshone–Bannock Tribes) as Native American archaeological sites important to religious and cultural heritages, but also features of the natural landscape, air, water, or animal resources that remain of special significance.

Impacts could occur from disturbing the land or changing the environmental setting of sacred or traditional-use areas, pollution, noise, and contamination. Potential mitigation measures discussed in the DOE programmatic SNF EIS (DOE, 1995) included

- Involving Tribal representatives in project planning to avoid sensitive areas;

- Locating new facilities in areas with similar visual settings;
- Avoiding Native American archaeological sites and traditional-use and sacred areas;
- Monitoring gathering areas and game animals for operational effects; and
- Restoring native vegetation to areas of ground disturbance.

In the event that avoidance was "... not feasible, data recovery at archaeological sites (for example, archiving artifacts) and restoration of alternative hunting or gathering areas may be substituted after consultation with the Tribes" (DOE, 1995, Section 5.20).

Another initiative included DOE and the U.S. Navy working with the Shoshone–Bannock Tribes to impart clearer understanding of potential impacts of various alternatives, including postulated facility and transportation accidents and those from normal operations. A management agreement among the DOE Idaho Operations Office, the Federal Advisory Council on Historic Preservation, the State of Idaho, and the Tribes with respect to cultural resources at INEEL was an outgrowth of the consultations.

The conclusion of the DOE programmatic SNF EIS was "… the potential impacts calculated for each discipline under each of the proposed INEEL environmental restoration and waste management alternatives, including spent nuclear management, are small and do not constitute a disproportionately high and adverse impact on any particular segment of the population, minorities or low-income communities included; thus, they do not present an environmental justice concern" (DOE, 1995, Section 5.20). Noted elsewhere in the report are environmental justice implications of low-probability accident scenarios. "Whether or not such [accident] impacts would have disproportionately high and adverse effects with respect to any particular segment of the population, minority and low-income populations included, would be subject to natural motive forces including random meteorological factors" (DOE, 1995, Volume 2, Part A, Section 5.20). In the case of the Fort Hall Reservation, both weather and geologic features favor low probability of receipt of adverse effects, though higher probability when compared with more distant locations.

The summary of DOE (2002a) cites recognition of concerns of the Shoshone–Bannock Tribes and consequently reports early and frequent involvement of the Tribes with DOE during preparation of the EIS. This involvement included ensuring that Tribal issues and concerns were considered in hearings before and during the scoping period, briefings and open discussions at Tribal facilities, and a public hearing on the Fort Hall Reservation. DOE entered into an Agreement in Principle with the Tribes that provided a consultation process under NEPA auspices. The agreement also included a commitment for the Tribes to obtain resources and expertise to enable effective review or involvement in DOE activities.

Construction and operation of the proposed Idaho Spent Fuel Facility would have some local and regional economic benefits, such as using regional workers for construction of the proposed facility and increasing sales of materials for regional suppliers throughout construction. Minorities and low-income populations would benefit to the extent they are linked to this economy. Because the construction and operation of the proposed Idaho Spent Fuel Facility would be consistent with current and anticipated activities at INEEL, the social and economic impacts associated with the proposed facility are not significant.

DOE determined that facility operations and foreseeable accidents associated with a dry fuel storage facility (proposed Idaho Spent Fuel Facility) present no significant risk or impact to any surrounding population, including minority and low-income populations (DOE, 1995, Volume 1, Appendix L). In a larger context, the proposed facility would be a step in the process of preparing the SNF for removal from Idaho. If the SNF is placed in dry storage, it would be in a more stable environment independent of support systems needed to maintain storage. This would benefit all people in the region of influence by ensuring that the SNF would not harm the environment and people in the area. For these reasons, it is unlikely there will be any disproportionately high adverse human health or environmental effects on low-income or minority populations.

4.12 Public and Occupational Health and Safety Impacts

Potential impacts to radiological air quality were examined for normal, off-normal, and accident conditions. For off-normal operations and accidents, the various structures, systems, and components (SSCs) of the facility were evaluated for postulated internal accidents or natural phenomena associated with the facility for both the repackaging and storage phases. Table 4-3 summarizes the criteria for radiological protection design for normal, off-normal, and accident conditions applicable for the restricted area (area enclosed by the facility peripheral fence), the controlled area (INEEL site), and outside the controlled area (outside INEEL) (FWENC, 2003c, Section 3.3). Personnel at the proposed Idaho Spent Fuel Facility that supervise and/or operate equipment or controls will be trained in accordance with applicable NRC regulations (FWENC, 2003c, Appendix B). A summary of the results of the public and occupational health and safety impacts of the proposed Idaho Spent Fuel Facility is provided in this EIS. The impacts are described in more detail and evaluated against the NRC regulatory limits in the safety evaluation report being prepared by NRC as part of its evaluation of the FWENC license application.

There are potential hazards that may affect safe operation of the proposed facility because of the transport, handling, storage, and disposal of radioactive materials. These hazards are classified into off-normal events and accidents based on frequency of occurrence (NRC, 2000a). Off-normal events are expected to occur with moderate frequency or once per calendar year [Design Event II, according to ANSI/American Nuclear Society (ANS) 57.9 (ANSI/ANS, 1984)]. Accidents occur more infrequently, if ever, during the lifetime of the facility. Effects of natural events such as earthquakes, tornadoes, floods, and such are considered to be accidents.

Off-normal operations and accidents potentially could expose members of the general public to additional levels of radiation or radiological effluents beyond those associated with routine operations. The analyses presented in this EIS are not intended to substitute for the detailed evaluation of safety issues that will be presented in the NRC safety evaluation report. The NRC staff, as documented in the safety evaluation report, are currently evaluating the effects of natural phenomena and human-induced hazards on the proposed Idaho Spent Fuel Facility. Natural phenomena being considered include earthquake, flood, volcanic hazards, wildfire, high wind, tornado, and tornado-generated missiles of the maximum severity expected at the proposed site during the lifetime of the proposed facility. These events bound the natural phenomena expected to occur at the proposed facility. Similarly, human-induced events include a potential aircraft crash and explosion at the proposed site and are considered bounding for the proposed facility during its lifetime.

Table 4-3. Radiological Protection Design Criteria[a]		
Location	**Normal and Off-Normal Conditions**	**Accident Conditions**
Restricted Area	ALARA in accordance with 10 CFR 72.126(d) 50 mSv/yr [5,000 mrem/yr] TEDE in accordance with 10 CFR 20.1201 10 mSv/yr [1,000 mrem/yr] TEDE in accordance with proposed Idaho Spent Fuel Facility administrative control limits	ALARA in accordance with 10 CFR 72.126(d)
Controlled Area	1 mSv/yr [100 mrem/yr] TEDE in accordance with 10 CFR 20.1301	50 mSv [5,000 mrem] TEDE for any design basis accident in accordance with 10 CFR 72.106(b)
Outside of Controlled Area	0.25 mSv/yr [25 mrem/yr] TEDE in accordance with 10 CFR 72.104(a)	50 mSv [5,000 mrem] TEDE for any design basis accident in accordance with 10 CFR 72.106(b)

ALARA = as low as is reasonably achievable
FWENC = Foster Wheeler Environmental Corporation
TEDE = total effective dose equivalent

[a] FWENC. "Safety Analysis Report, Idaho Spent Fuel Facility." Section 3.3. NRC Docket No. 72-25. ISF–FW–RPT–0033. Rev. 3. Morris Plains, New Jersey: FWENC. 2003.

The probability that the natural phenomena would be more severe than those events evaluated in the safety evaluation report and in this EIS is extremely low. Such events at the proposed facility are not credible during its lifetime. Because these events are not credible, they are not considered in this EIS or the safety evaluation report. Information evaluated in this section is based on data provided by the applicant. The analyses summarized in this EIS are intended only to identify and bound the types of environmental impacts that could result from off-normal events or credible accidents.

4.12.1 Normal Operations

4.12.1.1 Nonradiological Impacts

Worker safety for nonradiological exposures would be maintained at the proposed Idaho Spent Fuel Facility through implementation of a health and safety program in accordance with applicable Occupational Safety and Health Administration Standards in 29 CFR Part 1910 and 29 CFR Part 1926. The health and safety program includes an integrated safety management system (conforming to 48 CFR 970.5204-2) that provides a graded approach to environmental safety and worker health and safety. The program would include review, approval, and control measures for all chemicals introduced into the proposed Idaho Spent Fuel Facility.

Chemical usage at the Idaho Spent Fuel Facility is shown in Table 4-4. Herbicides and pesticides will be present in small volumes and applied in accordance with manufacturer recommendations (FWENC, 2003a, Section 5.3). The chemicals listed can be used safely by applying standard chemical safety practices, and, therefore, no significant environmental impacts are expected. For normal operating conditions, no chemical discharges are planned from the proposed Idaho Spent Fuel Facility (FWENC, 2003a). Therefore, no public chemical exposures are expected from the proposed Idaho Spent Fuel Facility, and no additional chemical monitoring programs are necessary to ensure safety and protect the environment. Chemical wastes associated with the proposed Idaho Spent Fuel Facility are discussed in Section 4.13 on waste management impacts.

4.12.1.2 Normal Operations—Radiological Impacts

In general, radiation can deliver a dose through external or internal pathways. Direct radiation from a radioactive source, irradiation from radioactive fallout on the ground surface, and immersion in a passing airborne radioactive material are external radiation pathways. Inhalation of airborne radioactive material and ingestion of contaminated food and water are internal radiation pathways. The radiological dose assessments consider these external and internal pathways.

Mitigation measures for radiological impacts would be in place during facility operations. Areas where loose radioactive contamination can be generated would be maintained at a negative pressure relative to other areas of the proposed Idaho Spent Fuel Facility. In these areas, air would flow from clean areas into areas of potential contamination to confine any radioactive contamination. In addition, ventilation airflow would be channeled through HEPA filters to remove radioactive particulates from the air stream before it is exhausted into the atmosphere through the stack. An atmospheric release of radioactivity diffuses as air moves with the wind. This natural process of diffusion reduces the radioactive concentration in air as it travels downwind. The applicant's Safety Analysis Report (FWENC, 2003c, Section 2.3.4) provides a more detailed discussion of the local and regional diffusion estimates.

Radiological impacts are addressed separately for the public and workers in the next two subsections.

4.12.1.2.1 Public Health and Safety Impacts

The primary pathway for offsite exposure to radiation is from air emissions during operations of the proposed Idaho Spent Fuel Facility. The INEEL site boundary serves as the controlled area boundary per 10 CFR Part 20 and 10 CFR Part 72. Using the EPA CAP–88 model for atmospheric dispersion, the highest offsite dose was calculated to be 3×10^{-7} mSv/yr [3×10^{-5} mrem/yr] at the southern boundary of the INEEL site (FWENC, 2003a, Section 5.2.2).

Tables 4-5 and 4-6 present the estimated doses to the maximally exposed individual (MEI), based on the applicant's safety analysis report (FWENC, 2003c, Section 7.4.2). The estimated dose to the hypothetical MEI is an insignificant fraction (less than 0.00063 percent) of the

Table 4-4. Proposed Chemical Uses and Quantities for the Proposed Idaho Spent Fuel Facility[a]

Chemical	Use at Idaho Spent Fuel Facility	Annual Quantity
Propylene Glycol[b]	Chilled water anti-freeze	568 L
Refrigerant (R-22)[b]	HVAC systems	147 kg
Sodium nitrite	Chilled water corrosion inhibitor	95 L
Herbicides and pesticides	Weed and pest control	Indeterminate
Liquid nitrogen	Laboratory	95 L
Argon (compressed gas)[b]	Purging	28 m^3
Helium (compressed gas)[b]	Purging and backfilling of SNF canisters and storage tubes	28 m^3
Miscellaneous lubricants and hydraulic fluids[b]	Various	568 L
Oxy-acetylene welding gases[b]	Miscellaneous welding/repairs	14 m^3 each gas
Diesel fuel	Standby generator/Cask delivery truck	3,785 L
Transformer fluid[b]	Transformers	2,270 L
Sulfuric acid[b]	Batteries	< 455 kg

FWENC = Foster Wheeler Environmental Corporation
HVAC = heating, ventilation, and air conditioning

[a] FWENC. "Safety Analysis Report, Idaho Spent Fuel Facility." NRC Docket No. 72-25. ISF–FW–RPT–0003. Rev. 2. Morris Plains, New Jersey: FWENC. 2003.
[b] Quantity reflective of system volume capacity, not actual usage

NOTE: To convert liters (L) to gallons (gal), multiply by 0.244; to convert kilogram (kg) to pounds (lb), multiply by 2.205; to convert m^3 to ft^3, multiply by 0.0283.

0.1-mSv/yr [10-mrem/yr] regulatory dose limits and natural background of about 3.6 mSv/yr [360 mrem/yr].

After transfer operations are complete, direct radiation from the storage vault is the primary source of radiation dose to the public. The annual dose during the storage period is conservatively estimated (by neglecting the attenuation of the external radiation) to be 6×10^{-7} mSv [6×10^{-5} mrem] at the INEEL site boundary.

Table 4-5. Comparison of the Estimated Annual Dose to the Public with the Relevant Regulatory Limits and Natural Background		
Quantity	**Dose[a] (mSv)**	**Dose[a] (mrem)**
Estimated annual dose to maximally exposed individual from Idaho Spent Fuel Facility operations[b]	Less than 0.00000063	Less than 0.000063
Total estimated annual dose to maximally exposed individuals from all nearby facility operations (including Idaho Spent Fuel Facility)	Less than 0.0032	Less than 0.32
EPA individual airborne radiation protection standard (40 CFR 61.92)	0.10	10
NRC ALARA constraint for air emissions to individual members of the public (10 CFR 20.1101)	0.10	10
NRC annual limit to a real member of the public (10 CFR 72.104)	0.25	25
NRC annual limit for individual members of the public (10 CFR 20.1301)	1.0	100
Regional annual natural background to an individual resident[c]	3.6	360

ALARA = as low as is reasonably achievable
DOE = U.S. Department of Energy
EPA = U.S. Environmental Protection Agency
NRC = U.S. Nuclear Regulatory Commission

[a] The doses presented represent the total effective dose equivalents, which correspond to the dose equivalent to the whole body. In general, organ dose limits also apply. Organ dose limits can be exceeded only when the whole-body dose limit is exceeded or, in limited circumstances, when doses are close to, but just less than, the whole-body dose limit.
[b] Including ingestion of contaminated animal products
[c] DOE. DOE/ID–12082(96), "Idaho National Engineering and Environmental Laboratory Site Environmental Report for Calendar Year 1996." Idaho Falls, Idaho: DOE, Idaho Operations Office. 1997.

4.12.1.2.2 Occupational Health and Safety Impacts

The proposed Idaho Spent Fuel Facility fence serves as the restricted area boundary, within which external and internal occupational doses to personnel are monitored per 10 CFR Part 20. Based on the applicant safety analysis report (FWENC, 2003c, Section 7.6.1.4), Table 4-7 shows that anticipated annual occupational dose during construction is less than 0.0032 mSv [0.32 mrem]. Construction activities would occur before receipt of SNF and involve only potential preexisting contaminants. Because soil contamination surveys of the proposed site have revealed no preexisting contamination (see Section 3.4.2), the anticipated annual occupational doses would be far less than the occupational limit and the regional natural background. The total collective dose during the entire construction period is conservatively estimated at 1.6 person-mSv [160 person-mrem].

Table 4-6. Radionuclides That Contribute to Calculated Dose at Frenchman's Cabin[a,b]

Radionuclide	mSv/yr [mrem/yr]	Percent of Total
Tritium	1.43×10^{-3} [1.43×10^{-5}]	51.6
Iodine-129	7.74×10^{-4} [7.74×10^{-6}]	27.9
Barium-137m	2.32×10^{-4} [2.32×10^{-6}]	8.4
Plutonium-238	1.61×10^{-4} [1.61×10^{-6}]	5.8
Krypton-85	1.53×10^{-4} [1.53×10^{-6}]	5.5
Americium-241	7.91×10^{-6} [7.91×10^{-8}]	0.3
Others	1.2×10^{-5} [1.2×10^{-7}]	0.5

FWENC = Foster Wheeler Environmental Corporation

[a] Frenchman's Cabin is located outside the Idaho National Engineering and Environmental Laboratory boundary, about 19.6 km [12.3 mi] southwest of the proposed Idaho Spent Fuel Facility.
[b] FWENC. "Safety Analysis Report, Idaho Spent Fuel Facility." Section 5.2. NRC Docket No. 72-25. ISF–FW–RPT–0033. Rev. 3. Morris Plains, New Jersey: FWENC. 2003.

Table 4-7. Comparison of the Anticipated Annual Occupational Dose during Construction with the Relevant Regulatory Limits and Natural Background

Quantity	Dose[a] (mSv)	Dose[a] (mrem)
Anticipated annual occupational dose during construction	less than 0.0032	less than 0.32
NRC annual occupational limit (10 CFR 20.1201)	50	5000
Regional annual natural background to an individual resident[b]	3.6	360

DOE = U.S. Department of Energy
NRC = U.S. Nuclear Regulatory Commission

[a] The doses presented represent the total effective dose equivalents, which correspond to the dose equivalent to the whole body. In general, organ dose limits also apply. Organ dose limits can be exceeded only when the whole-body dose limit is exceeded or, in limited circumstances, when doses are close to, but just less than, the whole-body dose limit.
[b] DOE. DOE/ID–12082(96), "Idaho National Engineering and Environmental Laboratory Site Environmental Report for Calendar Year 1996." Idaho Falls, Idaho: DOE, Idaho Operations Office. 1997.

The occupational dose estimates for workers involved with the proposed fuel-handling operations are presented in FWENC (2003c, Table 7.4-2). When necessary, temporary shielding would be used to keep the occupational doses ALARA. The estimated maximum total annual dose to the whole body of an individual worker would be 9.1 mSv [910 mrem], which is less than the 50-mSv [5,000-mrem] occupational limit stipulated in 10 CFR Part 20. For the same conditions, the maximum organ dose received by an individual worker would not exceed the occupational organ dose limit stipulated in 10 CFR Part 20. When the fuel-handling operations are complete, the occupational doses from long-term monitoring activities would be reduced considerably during the storage period. The total estimated annual occupational dose to an individual from all inspections that require workers to enter Radiological Control Areas would not exceed the occupational limits established in 10 CFR Part 20.

For noninvolved workers present at the INEEL site during proposed fuel-handling operations, the annual dose from stack emissions would be 6.6×10^{-6} mSv [6.6×10^{-4} mrem] at the boundary of the proposed Idaho Spent Fuel Facility boundary (by neglecting the attenuation of external radiation). The annual dose because of direct radiation is conservatively estimated as 0.012 mSv [1.2 mrem] at the site boundary for an entire year. These doses are a small percentage of the 1.0-mSv [100-mrem] annual limits to a member of the public. The annual collective dose to noninvolved workers within a radius of 8 km [5 mi] was calculated as 6.68×10^{-5} person-mSv [6.68×10^{-3} person-mrem] from stack effluent (FWENC, 2003c, Table 7.6-2). Collective dose represents the summation of the dose for an entire population, whereas the dose to an individual is typically a small fraction of the collective dose. Even if all the collective doses were to be received by a single noninvolved worker located at the INEEL site, the dose would still be much less than the limits for individual workers or members of the public (see Tables 4-3 and 4-5, respectively).

4.12.2 Off-Normal Operations

Off-normal and accident design events identified by ANSI/ANS 57.9, as applicable to facility operations at the proposed Idaho Spent Fuel Facility, were considered in the applicant's safety analysis report (FWENC, 2003c). NRC Regulatory Guide 3.48 (1989) specifies that the four event types in ANSI/ANS 57.9 be addressed. Of these design events, Design Events II consist of off-normal events expected to occur routinely or to occur about once per year.

Five categories of Design Events II (off-normal events) are evaluated in FWENC (2003c, Section 8.1):

- Transfer cask events (Section 8.1.1,);
- Fuel packaging events (Section 8.1.2);
- Fuel storage events (Section 8.1.3);
- Waste handling events (Section 8.1.4); and
- Other events (Section 8.1.5).

The off-normal events identified were selected as the bounding cases for the larger population of credible events identified during design of the facility. The analyses include the cause of the postulated event, the method of detection of the event, an analysis of the impacts of the event, and the corrective actions to be taken to recover from the event. The results of the applicant's evaluation for these off-normal events (FWENC, 2003c, Section 8.1) are summarized in Table 4-8. The table shows evaluation of 19 postulated events in the five categories of

Table 4-8. Off-Normal Event Evaluated[a]				
Safety Analysis Report Section Number	**Description**	**Effects and Consequences[b]**	**Estimated Dose (mrem)[b]**	**Corrective Action[b]**
8.1.1.1	Misventing of Transfer Cask	Increased dose inside Transfer Tunnel	Less than 0.1 mSv [10 mrem] to operator; negligible at controlled area boundary	Decontaminate area, determine cause, and implement corrective action
8.1.1.2	Cask Drop Less Than Design Allowable Height	NA	No radiological consequences	NA
8.1.2.1	Attempt to Lower Fuel Container into Occupied Fuel Station	No adverse consequences	No radiological consequences	Determine cause and implement corrective action
8.1.2.2	Attempt to Load Fuel Element into Full Idaho Spent Fuel Basket	No adverse consequences	No radiological consequences	Determine cause and implement corrective action
8.1.2.3	Failure of Fuel Element During Handling	Delay in operations while fuel recovery is performed	No radiological consequences outside FPA area	Cease operations, recovery actions, determine cause, and implement corrective action
8.1.2.4	Drop of Fuel Element During Handling	Delay in operations while fuel recovery is performed	No radiological consequences outside FPA area	Cease operations, recovery actions, determine cause, and implement corrective action
8.1.2.5	Fuel Container Binding or Impact During Handling	Delay in operations to replace Idaho spent fuel storage container	No radiological consequences	Cease operations, recovery actions, determine cause, and implement corrective actions
8.1.2.6	Malfunction of Idaho Spent Fuel Canister Heating System	Increase in fuel temperature, no adverse consequences	No radiological consequence	Repair heater
8.1.2.7	Malfunction of Idaho Spent Fuel Canister Vacuum Drying/ Helium Fill System	Delay in operations, possible increase in fuel temperatures, no adverse consequences	No radiological consequences	Repair equipment, determine cause, and implement corrective action
8.1.2.8	Loss of Confinement Barrier	Increased radiation dose to onsite workers because of decontamination efforts	Potential spread of particulate into adjacent areas of FPA; nonmechanistic dose at the controlled area boundary is 0.0002 mSv [0.02 mrem]	Repair equipment, determine cause, and implement corrective action

Table 4-8. Off-Normal Event Evaluated[a] (continued)

Safety Analysis Report Section Number	Description	Effects and Consequences[b]	Estimated Dose (mrem)[b]	Corrective Action[b]
8.1.3.1	Binding or Impact of Idaho Spent Fuel Canister During Hoisting/Lowering Operations	No adverse consequences	No radiological consequences	Determine cause and implement corrective action
8.1.3.3	Extended Operation with Idaho Spent Fuel Canister in CHM	Increase in fuel temperature	No radiological consequences	Repair equipment, determine cause, and implement corrective action
8.1.3.4	Malfunction of Storage Area Vacuum Drying/Helium Fill System	Increase in fuel temperature	No radiological consequences	Repair equipment, determine cause, and implement corrective action
8.1.3.5	Partial Air Inlet/Outlet Vent Blockage	Increase in fuel temperature	No radiological consequences	Clear obstructions from inlet/outlet
8.1.4.1	Breach of Waste Package in the Solid Waste Area	Increased radiation dose to onsite workers because of decontamination efforts	Minimal dose consequences from decontamination efforts: 0.1 DAC	Repair equipment, determine cause, and implement corrective action
8.1.4.2	High Dose Rate to Solid Waste Area	Increased radiation level in unoccupied waste enclosure, negligible worker exposure	Negligible worker exposure, no offsite consequences	Return material to FPA, determine cause, and implement corrective action
8.1.5.1	Ventilation System Failures	Increased fuel temperatures, no significant release, negligible worker exposure, no offsite exposure	No significant release or exposure, no offsite radiological consequences	Repair equipment or determine cause, implement corrective action
8.1.5.2	Loss of External Power Supply for a Limited Duration	Increased fuel temperatures	No radiological consequences	Restore power source; manual and backup power available but not required

Table 4-8. Off-Normal Event Evaluated[a] (continued)

Safety Analysis Report Section Number	Description	Effects and Consequences[b]	Estimated Dose (mrem)[b]	Corrective Action[b]
8.1.5.3	Off-Normal Ambient Temperatures	No adverse consequences	No radiological consequences	None required; HVAC designed for extremes

CHM = Canister Handling Machine
DAC = derived air concentration-hour
HVAC = heating, ventilation, and air conditioning
FPA = Fuel Processing Area
FWENC = Foster Wheeler Environmental Corporation
NA = not applicable
NRC = U.S. Nuclear Regulatory Commission

[a] FWENC. "Safety Analysis Report, Idaho Spent Fuel Facility." NRC Docket No. 72-25. ISF–FW–RPT–0033. Rev. 3. Morris Plains, New Jersey: FWENC. 2003.
[b] Effects and consequences, estimated dose, and corrective actions will be evaluated and reported in the NRC safety evaluation report.

NOTE: To convert millirems (mrem) to millisieverts (mSv), multiply by 0.01.

off-normal events previously listed. Related sections in FWENC (2003c) where the events have been addressed are also listed in the table. Of these potential events, only misventing the transfer cask was found to result in a dose to the workers. No significant radiological consequences to the public at the confinement area boundary resulted from the postulated off-normal events. In the event of misventing of the transfer cask, a worker near the cask could receive a dose by inhaling contaminated atmosphere (FWENC, 2003c, Section 8.1.1). The dose was evaluated to be less than 0.1 mSv [10 mrem]. This value is well below the 10 CFR Part 20 occupational dose limit of 50 mSv/yr [5,000 mrem/yr]. Workers might also receive a dose from the exterior surface of a storage container contaminated in the Fuel Processing Area or during transfer of SNF to the Canister Closure Area (FWENC, 2003c, Section 8.1.3), breach of a waste package in the solid waste area (FWENC, 2003c, Section 8.1.4), transfer of a high-dose-rate object into the solid waste area (FWENC, 2003c, Section 8.1.4), and failure of the ventilation system (FWENC, 2003c, Section 8.1.5). Worker exposures to these events are estimated to be negligible. Any decontamination efforts required would result in low air concentration (0.1 derived air concentration) for the workers.

In the safety evaluation report being prepared for this license application (see Section 1.4), NRC is developing a more detailed evaluation of the impacts to the public and occupational health and safety because of off-normal operations. The safety evaluation report will provide an evaluation of the ability of the proposed Idaho Spent Fuel Facility to meet the NRC standards for protection against radiation (10 CFR Part 20) and licensing requirements for an independent spent fuel storage installation (ISFSI) (10 CFR Part 72). In preparing the safety evaluation report, NRC will evaluate adequacy of the facility design, safety features, and operations. This review also will include the emergency response plans and corrective actions to mitigate radiological consequences to the public and recovery from the postulated off-normal events.

4.12.3 Accident Analysis

FWENC (2003c) provides an evaluation of the radiological impacts of Design Events III and IV (NRC, 1989) that could potentially result from the proposed facility operations. Design Events III are infrequent events that could be expected to occur during the lifetime of the facility. Design Events IV are the events postulated to establish a conservative design basis for SSCs important to safety. Accidents evaluated in FWENC (2003c) are generally the same as those assessed for off-normal operations:

- Transfer cask events (Section 8.2.1);
- Fuel packaging events (Section 8.2.2);
- Fuel storage accidents (Section 8.2.3); and
- Other Events (Section 8.2.4).

In the safety evaluation report being prepared for this license application, NRC is developing a more detailed evaluation of the impacts to the public and occupational health and safety because of operational accidents. The safety evaluation report will provide an evaluation of the ability of the proposed Idaho Spent Fuel Facility to meet the NRC standards for protection against radiation (10 CFR Part 20) and licensing requirements for ISFSI (10 CFR Part 72).

The applicant evaluation of Design Events III and IV in the four accident categories previously listed is summarized in Table 4-9. The table provides a description of the accidents, estimated dose, postulated cause of the event, corrective actions taken, and effects and consequences,

Table 4-9. Accident Analysis for the Proposed Idaho Spent Fuel Facility[a]				
Safety Analysis Report Section No.	**Description**	**Effects and Consequences**	**Estimated Dose (mrem)**	**Corrective Action**
8.2.1	**Transfer Cask Events**			
8.2.1.1	Vehicular Collision with Transporter	No adverse consequence	No radiological consequences	Event is bounded by transportation evaluation of Peach Bottom cask
8.2.1.2	Transfer Cask Drop During Hoisting Operations	Needs evaluation	Needs evaluation	Transfer cask will be handled with single-failure proof crane, but transfer cask trunnion does not appear to satisfy single-failure proof NRC guidance, and will be evaluated further in the safety evaluation report
8.2.1.3	Transfer Cask Tipover	No adverse consequence	No radiological consequences	Not a credible event; system designed to prevent the event
8.2.1.4	Cask Trolley Collision Events	No adverse consequence	No radiological consequences	Collision prevented by limit switches and cask designed to withstand impact
8.2.2	**Fuel Packaging Events**			
8.2.2.1	Drop of DOE Fuel Container During Handling	No adverse consequence	No radiological consequences	Not a credible event; DOE fuel container will be handled by FHM designed to the requirements of single-failure proof system
8.2.2.2	Drop of Idaho Spent Fuel Basket During Handling	No adverse consequence	No radiological consequences	Not a credible event; spent fuel basket will be handled by FHM designed to the requirements of single-failure proof system
8.2.2.3	Canister Trolley Movement in Raised Position	No adverse consequence	No radiological consequences	Not a credible event; trolley movement before lowering of storage container prevented by interlock
8.2.3	**Fuel Storage Accidents**			
8.2.3.1	Idaho Spent Fuel Canister Drop	No adverse consequence	No radiological consequences	Not a credible event; drop events prevented by single-failure proof design of CHM and interlocks
8.2.3.2	Transverse Movement of the CHM with an Idaho Spent Fuel Canister Partially Inserted	No adverse consequence	No radiological consequences	Not a credible event; CHM movement prevented by interlock and seismic design

Table 4-9. Accident Analysis for the Proposed Idaho Spent Fuel Facility[a] (continued)				
Safety Analysis Report Section No.	**Description**	**Effects and Consequences**	**Estimated Dose (mrem)**	**Corrective Action**
8.2.4	**Other Postulated Accidents**			
8.2.4.1	Adiabatic Heatup	No adverse consequence	No radiological consequences	Periodically inspected to keep inlet and outlet vents free from blockages Applicant conducted nonmechanistic analysis considering 50-percent blockage, and the evaluated temperature of basket and vault storage is below maximum allowable Applicant should conduct an analysis with 100-percent blockage scenario
8.2.4.2	Loss of Shielding	No increase in exposure rate expected	No radiological consequences	No significant shielding concern; prevented by administrative control, design, and radiation monitoring
8.2.4.3	Building Structural Failure onto Structures, Systems, or Components	No adverse consequence	No radiological consequences	Not considered credible Building structures would be designed using regulatory guidance and codes Lifting devices would be designed as single-failure-proof devices or with added design margins
8.2.4.4	Fire and Explosion	No adverse consequence	No radiological consequences	Radiologically controlled areas are enveloped by fire-rated barriers to minimize potential for offsite release Impact of INTEC facility, storage yards, fuel storage tanks, and access roads to independent SNF facility was evaluated

Table 4-9. Accident Analysis for the Proposed Idaho Spent Fuel Facility[a] (continued)				
Safety Analysis Report Section No.	**Description**	**Effects and Consequences**	**Estimated Dose (mrem)**	**Corrective Action**
8.2.4.5	Maximum Hypothetical Dose Accident	Dose well below the 5 mSv [5,000 mrem] limit	Nonmechanistic dose at the controlled area boundary: .00003 mSv [0.003 mrem] TEDE storage area container leakage release 0.0002 mSv [0.02 mrem] TEDE FPA HEPA filter release	Evaluated hypothetical events that result in nonmechanistic offsite dose for the purposes of demonstrating compliance with 10 CFR 72.106(b)

CHM = Canister Handling Machine
DOE = U.S. Department of Energy
FHM = Fuel Handling Machine
FPA = Fuel Packaging Area
FWENC = Foster Wheeler Environmental Corporation
HEPA = high efficiency particulate air
INTEC = Idaho Nuclear Technology and Engineering Center
RAI = request for additional information
SNF = spent nuclear fuel
TEDE = total effective dose equivalent

[a] FWENC. "Safety Analysis Report, Idaho Spent Fuel Facility." NRC Docket No. 72-25. ISF–FW–RPT–0033. Rev. 3. Morris Plains, New Jersey: FWENC. 2003.

NOTES:
- In preparing the safety evaluation report, NRC will evaluate adequacy of the facility design, safety features, and operations. This review also will include the emergency response plans and corrective actions to recover from the postulated accident.
- To convert millirems (mrem) to millisieverts (mSv), multiply by 0.01.

including related sections in FWENC (2003c) where the events have been addressed. The potential events analyzed include vehicular collision; storage cask drop and tipover; drop events for fuel container, fuel basket, and SNF canister; trolley collision; adiabatic heatup caused by blockage of inlet and outlet vents; fire and explosion; loss of radiation shielding; and building structural failure. None of the events is estimated to be likely, and no radiological consequences to the public and workers are expected because the SSCs associated with these events are designed to withstand the hypothetical events.

Included in the various accident scenarios analyzed in FWENC (2003c, Section 8.2) is the maximum hypothetical dose accident for the purpose of demonstrating compliance with the dose limits specified in 10 CFR 72.106(b). This hypothetical, beyond design basis accident was selected to serve as a worst-case scenario to bound the consequences of any credible accident at the facility involving the release and subsequent atmospheric dispersion of radioactive material. For the proposed Idaho Spent Fuel Facility, two maximum hypothetical dose accidents were evaluated representing each of the two operational phases. For the repackaging phase of the operation, the maximum hypothetical dose accident involved a Fuel Packaging Area HEPA filter release. For the storage phase of the operation, the maximum hypothetical dose accident involved a storage area container leakage release. A detailed description of the conditions for each maximum hypothetical dose accident is presented in the applicant's safety analysis report (FWENC, 2003c, Section 8.2.4). A detailed evaluation of the maximum hypothetical dose estimates will be included in the safety evaluation report being developed by NRC. The resulting dose for the Fuel Packaging Area HEPA filter and the storage area container leakage release at the closest INEEL boundary is 2×10^{-4} mSv [2×10^{-2} mrem] and 3×10^{-5} mSv [3×10^{-3} mrem] total effective dose equivalent. These calculated dose results are well below the 50-mSv [5,000-mrem] accident dose limit of 10 CFR 72.106. Figures 4-2 and 4-3 provide dose estimates for distances closer to the proposed facility for the bounding Fuel Packaging Area HEPA filter release. The dose rates calculated for the nearer locations show the resulting dose rates for workers at nearby facilities would be well below accepted regulatory limits.

4.12.4 External Events

4.12.4.1 Flooding Hazards

The proposed Idaho Spent Fuel Facility would not discharge effluent as part of normal activities. The only potential impact to water resources at the site would be the result of the effects of a probable maximum flood (the largest flood likely to occur). The probable maximum flood at the site would occur from a failure of Mackay Dam on the Big Lost River (Koslow and Van Haaften, 1986). The potential impact on INEEL facilities by a maximum flood was assumed caused by a probable maximum flood resulting in the overtopping and rapid failure of Mackay Dam. The sequence of events that lead to a probable maximum flood includes a probable maximum precipitation event consisting of a 48-hour general storm, preceded 3 days earlier by an antecedent storm with a magnitude of 40 percent of the 48-hour storm. The postulated precipitation events would cause overtopping flow across the dam. The overtopping of the Mackay Dam is assumed to result in dam failure.

The probable maximum flood is considered conservative, because the last flood of similar magnitude occurred nearly 12,000 years ago during a wet climate cycle. The probable maximum flood scenario has flows estimated at 1,890 m^3/s [66,830 ft^3/s] with a water velocity ranging from 0.2 to 0.9 m/s [0.6 to 3.0 ft/s] on INEEL. This flood would result in shallow, slow-moving, flood water within the INTEC-controlled area with a flood elevation at the proposed Idaho Spent Fuel Facility site of about 1,500.0 m [4,921 ft], and water velocities of about 0.3 to 1 m/s [1 to 3 ft/s].

Debris bulking was not considered in the flow volumes for the probable maximum flood. Other than natural topography, the primary choke points for probable maximum flood flows are the diversion dam on INEEL and the culverts on Lincoln Boulevard to the west of INTEC. The probable maximum flood would quickly overtop and wash out the diversion dam; essentially, there would be no effect on flows downstream of the dam. The Lincoln Boulevard culverts are capable of passing about 42 m^3/s [1,500 ft^3/s] of waterflow (Berenbrock and Kjelstrom, 1998). Because of the relatively flat topography in the vicinity of INTEC, debris plugging at the culverts would have little effect on the probable maximum flood elevation at INTEC (DOE, 2002a, Section 4.8) or at the proposed Idaho Spent Fuel Facility.

The effects of hydrostatic and hydrodynamic forces on potentially affected SSCs have been considered in the proposed design (FWENC, 2003c). In general, these forces are insignificant compared with other normal, off-normal, or accident loads on the affected SSCs. This evaluation concludes that the structural integrity of the proposed Idaho Spent Fuel Facility confinement boundary would be maintained. The calculated time for the probable maximum

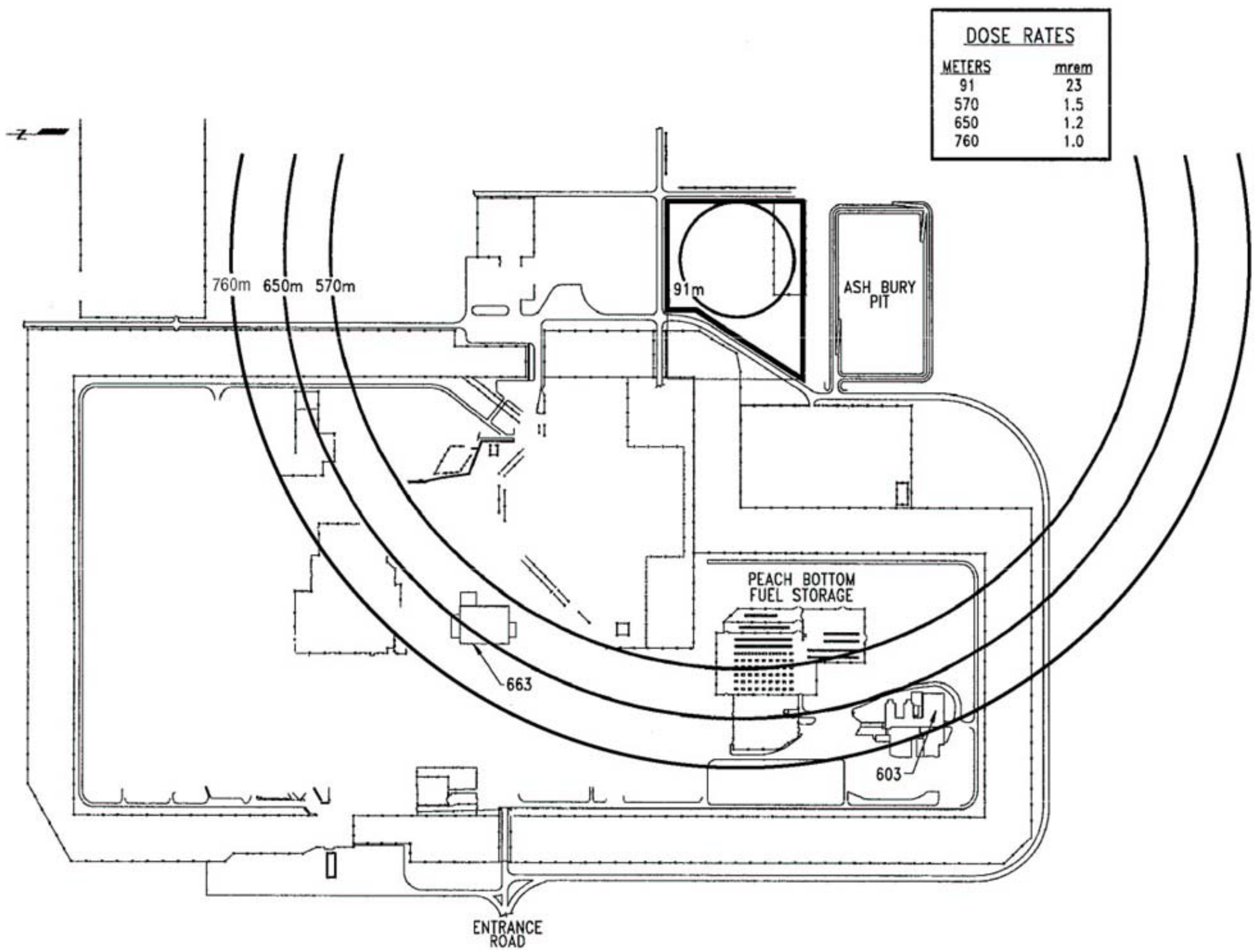

Figure 4-2. INTEC Area Maximum Radiological Dose for Maximum Hypothetical Dose Accident (from FWENC, 2003c, Section 8.3). To Convert Meters to Feet, Multiply by 0.3048; to Convert mrem to mSv, Multiply by 0.01.

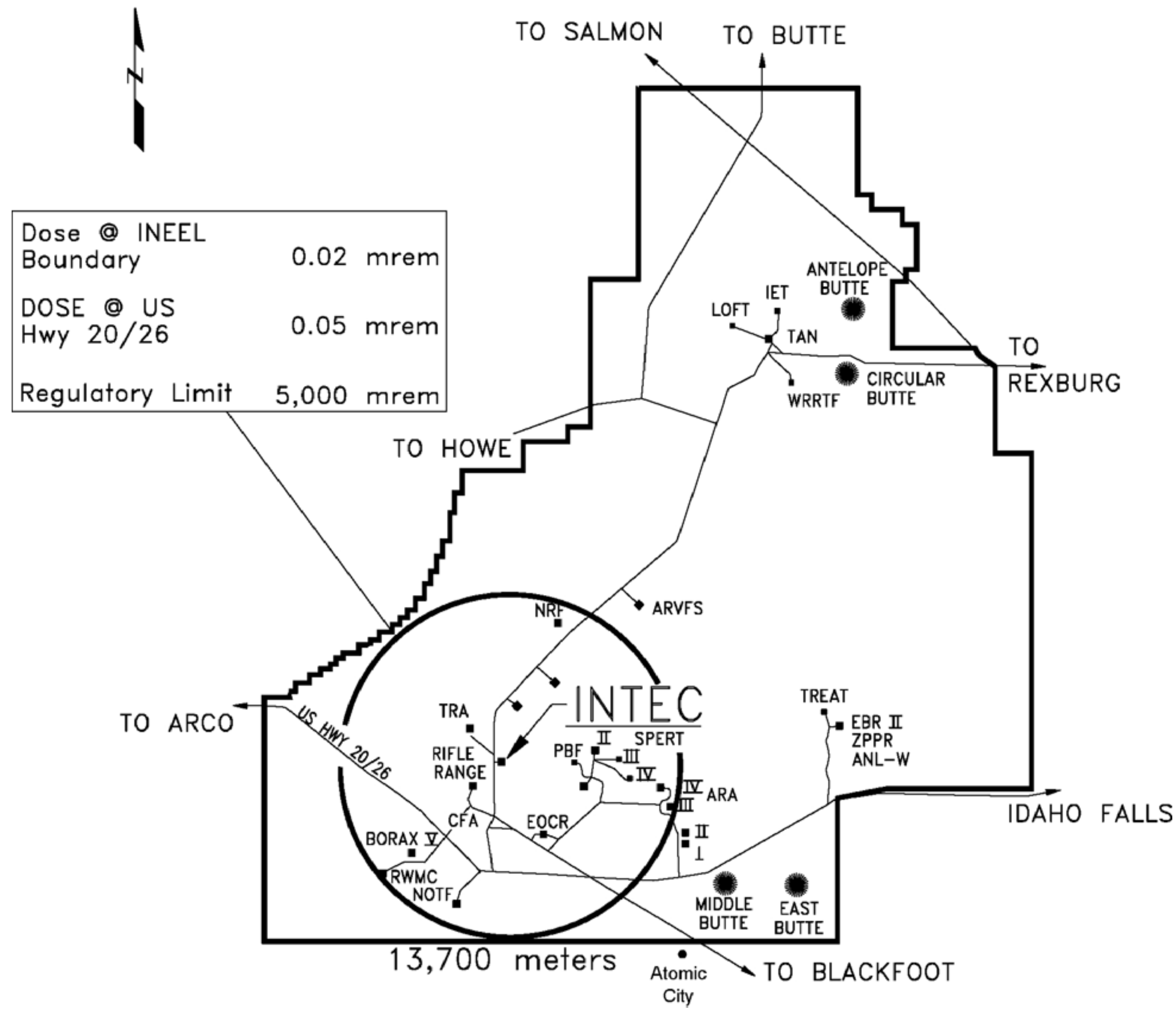

Figure 4-3. INEEL Area Maximum Radiological Dose for Maximum Hypothetical Dose Accident (Modified from FWENC, 2003c, Section 8.3). To Convert Meters to Feet, Multiply by 0.3048; to Convert mrem to mSv, Multiply by 0.01.

flood wave to reach the proposed Idaho Spent Fuel Facility is at least 13.5 hours, providing sufficient time to implement preplanned flood control measures. These measures include putting any ongoing processing sequences into a secure configuration and securing waste containers. The Storage Area and the Fuel Processing Area are designed to prevent the ingress of floodwater. Penetrations and construction joints below the elevation of the probable maximum flood in these areas will be sealed to prevent leaks. The final graded ground surface elevation at the proposed Idaho Spent Fuel Facility is planned for 1,498.7 m [4,917 ft] (FWENC, 2003a, Section 2.4). The elevations of the various facility areas communicable with the floodwater and associated pathways are provided in Table 4-10.

Flooding hydrostatic forces have been considered in the equipment designs for these areas, therefore, any uplift would not damage equipment. Equipment such as the cask trolley, canister trolley, and liquid waste storage tank and the building structures include flooding loads in their design bases.

4.12.4.2 Aircraft Impact Hazards

Aircraft usually fly around the INEEL boundary. INEEL has in place a Federal Aviation Administration advisory prohibiting flights at altitudes below 1,800 m [6,000 ft] above mean sea level. Commercial airports near the INEEL facilities include (i) Idaho Falls Regional Airport, about 70 km [43 mi] away; (ii) Pocatello Regional Airport about 79 km [49 mi] away; (iii) Burley Municipal Airport, about 134 km [83 mi] away; and (iv) Joslin Field–Magic Valley Regional

Table 4-10. Elevation[a] of the Proposed Idaho Spent Fuel Facility Relative to the Probable Maximum Flood[b]

Area	Elevation[a]	Outside Portal Elevation	PMF Elevations Above Area Floor (m)
Cask Receipt Area	1,497.54	Below PMF	~2.31
Transfer Tunnel	1,497.33	Below PMF	~2.51
Solid Waste Storage/Solid Waste Processing Area	1,498.85	Below PMF	~0.99
Liquid Waste Storage Tank Area	1,498.09	Below PMF	~1.75
HVAC Exhaust Room	1,498.85	Below PMF	~0.99

FWENC = Foster Wheeler Environmental Corporation
HVAC = heating, ventilation, and air conditioning
PMF = maximum probable flood

[a] Meters above sea level
[b] FWENC. "Safety Analysis Report, Idaho Spent Fuel Facility." NRC Docket No. 72-25. ISF–FW–RPT–0033. Rev. 3. Morris Plains, New Jersey: FWENC. 2003.

NOTE: To convert to meters (m) to feet (ft), multiply by 3.2808.

Airport, approximately at Twin Falls 176 km [109 mi] away. Two small nearby airports serve as a home base for aircraft. These two airports are usually used by general aviation aircraft. Twelve single-engine aircraft are based at Arco–Butte County Airport, about 32 km [20 mi] west of the proposed facility site. Howe Airport is located about 32 km [20 mi] north of the proposed site. Four single-engine aircraft are based there. In addition, several unpaved landing strips are near the INEEL facilities, used primarily for recreational and emergency purposes by private and crop-dusting aircraft. The landing strips nearest the proposed site are located about 16 km [10 mi] south-southeast and 20 km [12 mi] south-southwest. These airports are all at significant distances from the INEEL facilities and, therefore, any flights near the INEEL facilities would be in a cruise mode at heights more than 305 m [1,000 ft] above the surface. Based on NUREG–0800 (NRC, 1997, Section 3.5.1.6), any landing and departure operations at these airports would have a negligible crash hazard to the proposed facility.

There are air taxi flights between Idaho Falls and Boise and between Idaho Falls and Salmon. The Idaho Falls Regional Airport has nearly 41,000 annual operations. Approximately 51,000 annual operations take place at the Pocatello Airport. Most traffic is either to Boise or Salt Lake City. Burley Municipal Airport has about 33,800 operations in a year. Approximately 36,800 annual operations take place at Joslin Field–Magic Valley Regional Airport at Twin Falls.

Approximately 98 percent of the traffic at Arco–Butte County airport is general aviation aircraft composed of private and crop-duster aircraft. This airport operates about 100 air taxi and commuter flights in a year. One hundred percent of traffic at Howe Airport is by general aviation aircraft mostly used for crop dusting.

Most aircraft used in crop dusting around the INEEL facilities do not cross the INEEL boundary. They use the boundary for turning the aircraft. However, aircraft need to be moved across INEEL a few times a year. Approximately 60 to 100 overflights per year by crop dusting and other similar aircraft traditionally have been permitted by the INEEL Flight Department (Lee, et al., 1996).

Air taxi flights from Idaho Falls Regional Airport use Federal Aviation Administration-approved vector 269 while flying to Pocatello, Burley, and Twin Falls. Approximately six flights take place in a day. These flights approach about 30 km [19 mi] of the proposed facility (Lee, et al., 1996). On average, two to three air taxi flights are flown between Idaho Falls and Boise each day. The edge of this airway nearest the proposed facility site is about 15 km [9 mi] (FWENC, 2003b).

General aviation aircraft flying from Pocatello to Salmon come within about 15 km [9 mi] of the proposed facility. Only a small number of flights travel this route annually (Lee, et al., 1996).

Military training routes near the proposed facility (VR1300, IR302, and IR305) are used by the Idaho Air National Guard for terrain masking (FWENC, 2003b). Hazardous activities such as practice bombing or laser firing are not conducted in these routes. Approximately 435 annual sorties are flown on these routes.

4.12.4.3 Volcanic Hazards

Lava flows from volcanoes located up topographic gradient from the INTEC site could present a hazard to the INTEC site if not mitigated. One proposed mitigation strategy for lava-flow hazards is the construction of 6.1-— [20-ft-] high compacted earthen berms to divert potential lava flows away from the INTEC area. The berms would be constructed from 104,000 m^3 [136,000 yd^3] of soil from areas immediately adjacent to the INTEC area. Construction of these berms would occur only after the onset of a potentially hazardous volcanic eruption. Thus, in the unlikely event of a future lava-flow eruption, construction of a diversionary berm would adversely impact 104,000 m^3 [136,000 yd^3] of soils adjacent to the proposed Idaho Spent Fuel Facility. This potential soil impact appears small compared to the impact of a naturally occurring lava flow, which would bury significantly more soil if the flow extended to the vicinity of INTEC.

4.12.4.4 Seismic Hazards

One geologic hazard that must be considered in the safe design of nuclear facilities is the strong shaking of the ground during an earthquake. Earthquakes occur when energy stored within the earth, usually in the form of strain accumulated in rocks, is released suddenly. This energy is transmitted to the surface of the earth by earthquake waves. The accumulation of strain in the rocks results from plate tectonic forces deep in the earth. Because the INEEL site rests within an active tectonic province in the Western United States, there is the possibility that the site could undergo ground shaking from an earthquake. The potential destructive force of an earthquake at any site on the Earth depends on several factors, including size of the earthquake (usually measured by earthquake magnitude), duration of shaking, and how far away the site is from the earthquake epicenter.

To ensure that critical facilities, including nuclear facilities, remain safe during and after an earthquake, the SSCs important to safety are designed to withstand vibratory ground motions from earthquakes. An important part of the design process is to accurately estimate the range of vibratory ground motions that could occur. Ground motion is most often expressed as ground acceleration in units of *g* (1*g* is the acceleration of gravitational attraction for standard conditions). Ground motions are determined for a range of spectral frequencies between 0.5 and 100 Hz (oscillations per second). These estimates of ground accelerations are based on observations of past earthquakes from the historical seismic record, inferences about the location and magnitude of prehistoric earthquakes based on the geologic record; and detailed models of how the energy from earthquakes is attenuated as it travels from the earthquake source to the site.

According to 10 CFR 72.122(b)(2), SSCs important to safety must be designed to withstand the effects of natural phenomena, including earthquakes. For sites west of the Rocky Mountains where a license application was submitted prior to October 16, 2003, such as the proposed Idaho Spent Fuel Facility, 10 CFR 72.102(b) requires that seismicity be evaluated by techniques described in Appendix A of 10 CFR Part 100. This appendix defines the safe shutdown earthquake as the earthquake that produces the maximum vibratory ground motion at the site and requires the SSCs be designed to withstand these ground motions.

Originally, this assessment of the safe shutdown earthquake was based on a deterministic approach assuming a 100-percent chance that the earthquake will occur. In recent years, however, geologists, seismologists, and engineers recognized that how frequently an earthquake occurs is also important to the definition of the safe shutdown earthquake. Thus, the NRC regulations applicable to the siting of a nuclear power plant were modified at 10 CFR 100.23(d)(1) to allow for the use of a probabilistic seismic hazard analysis (PSHA). In PSHA, the range of ground motions possible at a site is calculated as a function of how likely these ground motions are. This likelihood is expressed either as an annual probability that the ground motion would be exceeded or as its reciprocal, the ground motion return period. Geologic and seismologic inputs necessary to develop a PSHA include (i) interpretation of the seismic sources from which probability distribution functions of earthquake parameters (e.g., maximum magnitude and source-to-site distance) can be obtained, (ii) earthquake recurrence parameters (e.g., slip rate or activity rate), and (iii) ground motion attenuation. On September 16, 2003, NRC issued an amendment to 10 CFR Part 72. The amended section, 10 CFR 72.103 in conjunction with Regulatory Guide 3.73 (NRC, 2003d), establishes the PSHA approach as an acceptable approach to developing the design earthquake for an ISFSI. Regulatory Guide 3.73 (NRC, 2003d) establishes the reference probability for the design earthquake at 5×10^{-4}/yr, which is approximately equal to the 2,000-year return period ground motion. For applications submitted before October 16, 2003, 10 CFR 72.102 requires an ISFSI license applicant to perform a seismic hazard assessment using a deterministic approach. As part of the safety evaluation report prepared for the Three-Mile Island Unit 2 ISFSI at INTEC, however, NRC granted an exemption and allowed a PSHA approach, including facility design based on the 2,000-year return period mean ground motion (SECY–98–071). In its November 2001 license application for the proposed Idaho Spent Fuel Facility (FWENC, 2003e), FWENC submitted a request for an exemption similar to that granted for the Three-Mile Island Unit 2 ISFSI. The adequacy of the proposed seismic hazard and design methodology relative to requirements in 10 CF 72.103 is evaluated in the NRC safety evaluation report.

Inputs to the original PSHA, used to assess earthquake ground motions at the Three-Mile Island Unit 2 ISFSI at the INTEC facility (Woodward-Clyde Federal Services, 1996), were also used for the hazard assessment at the proposed Idaho Spent Fuel Facility. For INTEC, the 2,000-year return period mean peak horizontal acceleration (ground acceleration at 100 Hz) was estimated at 0.13*g*. In 2000, the seismic hazards at five INEEL facility sites, including INTEC, were recalculated to account for new ground motion attenuation models. These new attenuation models were developed by URS Woodward-Clyde Federal Services for INEEL and first applied in the earthquake hazard assessment for the Naval Reactor Fuel ISFSI facility, 10.5 km [6.7 mi] northeast of the proposed Idaho Spent Fuel Facility. The new attenuation models predicted 12–23 percent lower ground motions compared with 1996 estimates.

In preparing a safety evaluation for the Three-Mile Island Unit 2 ISFSI at the INTEC facility and for the review of the Naval Reactor Fuel ISFSI site, NRC evaluated previous DOE seismic hazard analyses (Brach, 1999; Stamatakos, et al., 2001). These reviews concluded that the analyses and information provided reasonable assurance that adequate geologic and seismological data were used in developing seismic hazard analyses. Because the proposed Idaho Spent Fuel Facility is located within the same seismotectonic setting as the Three-Mile Island Unit 2 ISFSI and Naval Reactors Spent Fuel ISFSI site and because there have been no significant earthquakes since the Three-Mile Island Unit 2 ISFSI safety analysis report and Naval Fuel ISFSI evaluation were published, no additional update to the seismic hazard was deemed necessary. The design earthquake at the proposed Idaho Spent Fuel Facility is, therefore, based on the 2,000-year return period ground motions from the existing seismic hazard assessment for INEEL.

The primary structural steel members, concrete structures, and footings for the areas encompassed by the Cask Receipt Area, the Transfer Area, and the Storage Area are designed to withstand the forces and accelerations associated with the design earthquake. The storage tube assemblies, including the container storage tubes, shield plugs, and lids, which provide the vault storage positions, have also been designed to withstand these forces. In addition, the primary structural steel members of the Cask Receipt Area, Transfer Area, and Storage Area have been designed using the same seismic criteria and load combinations as important to safety structures. These structures would not adversely impact the SNF container or the SNF after a seismic event. The wall and roof panels and secondary support structures are not designed to withstand the design earthquake and may require repair or replacement after the event. These building components are not, however, required to remain intact during the event and do not provide configuration control, confinement, support or structural protection for the SNF. Failure of these systems would not result in damage to the SNF container or the SNF, and would not adversely impact public health and safety.

Based on the analyses provided in the safety analysis report (FWENC, 2003c), the systems important to safety for the proposed Idaho Spent Fuel Facility would withstand the accident loads with no unacceptable consequences and no significant release of radioactive material. The design basis ground motions are not expected to breach confinement or damage in-process or stored fuel or fuel containers. There are no postulated radiological releases or adverse radiological consequences from these design basis ground motions. These design basis ground motions do not involve a change to the fuel or structural integrity configuration. Therefore, no changes to the criticality, confinement, or retrievability of SNF are expected, and the impacts of the design basis ground motions are small.

4.12.4.5 Extreme Wind and Wind-Generated Missiles

The proposed facility is to be constructed at the INEEL site, about 43° 34' north latitude and 112° 55' west longitude. Based on the analysis presented in Ramsdell and Andrews (1986), the geographic region encompassing the INEEL site is one of the areas in the United States with a low tornado hazard occurrence. NRC Guidance (1997) specifies that any event with an annual probability of occurrence less than 1×10^{-7} need not be considered.

The applicant, based on Ramsdell and Andrews (1986), estimated the characteristics of potential tornadoes at the proposed site. The average probability of any tornado striking this region is about 6×10^{-7} per year. The probability of a tornado with intensity F2 or higher {wind speed higher than 180 km/h [113 mph]} is about 1.69×10^{-7} per year. The estimated maximum wind speed at INEEL is 274 km/h [171 mph] (tornado category F3) with a probability of 1×10^{-7}.

The Fujita or F scale, is commonly used to classify tornadoes. In this scale, intensity of the tornadoes ranges from F0–F5 in order of increasing intensities. Each intensity class has a range of wind speed associated with it, as shown below.

F Scale	Wind Speed km/h [mph]
F0	64–116 [40–72]
F1	117 and 180 [73 and 112]
F2	181 and 253 [113 and 157]
F3	254–332 [158–206]
F4	333–418 [207–260]
F5	Higher than 419 [260]

Lawrence Livermore National Laboratory developed a probabilistic tornado wind hazard model for the continental United States (Boissonnade, et al., 2000) on behalf of DOE. This model formed the basis of the tornado missile criteria in DOE (2002d). Based on Boissonnade, et al. (2000,), the estimated tornado wind speed at INEEL at an annual probability of exceedence of 10^{-7} (one chance in 10 million) is 459 km/h [285 mph], assuming tornado intensity distribution based on the contiguous United States; however, the estimated tornado wind speed reduces to 330 km/h [205 mph] when assuming the tornado intensity distribution applicable to the NRC Region III, which encompasses the proposed facility. The NRC and Center for Nuclear Waste Regulatory Analyses (CNWRA) staffs have requested additional information from FWENC on the design-basis tornado for the proposed facility, based on site-specific hazard information.

The applicant considered Spectrum II missiles, as defined in Section 3.5.1.4, Missiles Generated by Natural Phenomena, NUREG–0800 (NRC, 1997) as the representative tornado-generated missiles for the proposed site. These missiles include

- 52-kg [115-lb] wooden plank traveling at 58 m/s [190 ft/s];
- 130-kg [287 lb] 15-cm [6-in.] diameter Schedule 40 steel pipe traveling at 10 m/s [33 ft/s];
- 4-kg [9-lb] 2.54-cm [1-in] diameter steel rod traveling at 8 m/s [26 ft/s];
- 510-kg [1,124-lb] utility pole traveling at 26 m/s [85 ft/s];
- 340-kg [750-lb] 0.3-m [12-in] diameter Schedule 40 steel pipe traveling at 7 m/s [23 ft/s]; and
- 1,810-kg [4,000-lb] automobile traveling at 41 m/s [134 ft/s].

The applicant concluded, however, that the utility pole and the 0.3-m [12-in] diameter steel pipe are not credible missiles, citing DOE Standard DOE/STD–1020–1994 (1994), because heavier missiles will not be generated by a wind speed less than 322 km/h [200 mph]. Similarly, the applicant has excluded an automobile as a potential tornado-generated missile for the proposed facility, citing Coats and Murray (1985), because automobiles will not be picked up or sustained aloft by tornado events with wind speeds less than or equal to 322 km/h [200 mph]. The NRC and CNWRA staffs have requested additional information from FWENC on tornado-generated missiles.

FWENC (2003c) analyzed the potential for a tornado missile to strike a safety-related structure causing radiological release at different locations of the proposed facility: (i) Outside Cask Receipt Area, (ii) Inside Cask Receipt Area, (iii) Inside Transfer Tunnel, (iv) Fuel Packaging Area, (v) Canister Closure Area, (vi) Canister Handling Machine on the Second Floor of the Storage Area, (vii) Storage Area, and (viii) Solid/Liquid Waste Area. Outside the Cask Receipt Area, the DOE transfer cask would provide protection against tornado missiles. While the DOE transfer cask is inside the Cask Receipt Area, it would provide the same protection against tornado missiles. SNF would be handled by the crane in the proposed facility about 15 percent of the time each year. The annual frequency at which the crane would be handling SNF while a tornado may potentially occur was estimated to be less than 10^{-7} in the Safety Analysis Report (FWENC, 2003c, Section 8.2.5.4) and, therefore, not considered credible according to NRC Regulatory Guide 1.117 (1978). Hence, this crane would not be required to be designed to withstand the design basis tornado and associated tornado missiles. As an added precaution, any handling of SNF would be suspended when tornado watches or tornado warnings are in effect (FWENC, 2003b). The Transfer Tunnel would be constructed with a minimum 0.9-m [3-ft] thick reinforced concrete that would be able to provide the necessary protection from tornado missiles, based on NRC (1997). Similarly, within the Transfer Area, the Fuel Packaging Area and Canister Closure Area would be isolated and enclosed by 1.2- and 0.9-m [4- and 3-ft] thick reinforced concrete walls. Therefore, it is anticipated the tornado missiles would not be a credible hazard for these locations. The Canister Handling Machine has been designed to withstand the effects of tornado wind and pressure. Although it is likely that this machine will withstand the effects of wind-generated missiles associated with a design basis tornado, this has not been explicitly designed into the system. However, the annual frequency at which the Canister Handling Machine would be handling SNF while a tornado may potentially occur is estimated to be less than 10^{-7} in the Safety Analysis Report (FWENC, 2003c, Section 8.2.5.4). This frequency of occurrence is not considered credible according to NRC Regulatory Guide 1.117 (1978) and, therefore, the Canister Handling Machine would not be required to be designed to withstand the design basis tornado and associated tornado missiles. The Storage Area would be enclosed by reinforced concrete walls up to 9.1 m [30 ft] tall around the perimeter, with a thickness of 0.9 m [3 ft]. Therefore, it is anticipated tornado missiles would not be a credible hazard there either. The Solid/Liquid Waste Storage Areas would be vulnerable to tornado missiles and wind pressure at some locations. FWENC (2003c) stated the offsite dose would remain below the regulatory limit even if there are gross failures of the protective barriers.

4.12.4.6 Wildfires

The INEEL site has a desert ecosystem with shrub-steppe vegetation. Wildfires occur within the INEEL property boundary. Large fires in 1994, 1995, 1996, 1999, and 2000, as shown in Figure 3-9, burned about 56,700 ha [140,000 acres] (DOE, 2002a). DOE has an active program to monitor the affected areas and the recovery of desert vegetation. Although evacuating personnel from the INEEL facilities when a fire approached too closely was necessary on some occasions, the INEEL Fire Department, with assistance from other area fire departments such as BLM, successfully fought the fire on every occasion so that none of the INEEL facilities was affected. The proposed Idaho Spent Fuel Facility would be constructed adjacent to INTEC on a previously disturbed site. Vegetation covers less than 5 percent of the surface area of this site. Therefore, potential for wildfires fueled by this vegetation is low (FWENC, 2003a). Unpaved areas of the property would be covered with gravel or similar material to further minimize the buildup of vegetation when construction is complete.

Outside the controlled boundary of the proposed Idaho Spent Fuel Facility, the INEEL Fire Department would provide fire response in accordance with the emergency plan (FWENC, 2003b, Section 4.3). A qualified fire protection engineer would develop the overall fire protection program and also would design and select necessary equipment. The INEEL Fire Department would provide periodic site-specific training and fire drills. Personnel at the Idaho Spent Fuel Facility would be provided with general training; however, emergency response staff would have specialized training in accordance with FWENC (2003d). Therefore, based on the small amount of available fuel and the rapid response of the fire fighting team, it is anticipated that wildfires would not be a credible hazard to the proposed facility.

4.13 Waste Management Impacts

Generation of gaseous, liquid, and solid low-level radioactive waste is expected during the first 3 years of SNF receipt, transfer, and repackaging operations at the proposed Idaho Spent Fuel Facility (FWENC, 2003c, Section 6).

SNF that would be stored at the proposed Idaho Spent Fuel Facility is predominantly from the Peach Bottom and Shippingport reactors that ceased operations in 1974 and 1982. The nature and condition of the SNF have provided a means for radioactive gases to escape. Furthermore, the storage time has allowed for some decay of radioactive gases. Nonetheless, some release of radioactive gas is possible during handling and repackaging in areas such as the Transfer Tunnel, Fuel Packaging Area, and Canister Closure Area. Based on the expected radionuclide inventory of SNF to be received at the proposed Idaho Spent Fuel Facility, the primary gaseous radionuclides of concern are iodine-129, krypton-85, and tritium (FWENC, 2003c, Chapter 6).

The proposed heating, ventilation, and air-conditioning system (HVAC) would serve to prevent accidental release of radioactive material into the environment and maintain worker exposures ALARA. Any gases released within the proposed Idaho Spent Fuel Facility would be passed through HEPA air filters to remove particulates and allow monitoring of radioactive gases before discharge through the exhaust stack. Evaluation of potential radiological impacts from normal heating, ventilation, and air-conditioning system discharges of gaseous effluents to the MEI at the controlled area boundary {about 3×10^{-7} mSv/yr [3×10^{-5} mrem/yr]} (FWENC, 2003c, Section 6) would be well below the regulatory constraint in 10 CFR Part 20 for members of the public {0.1 mSv/yr [10 mrem/yr]}.

Once repackaged, no further gaseous releases are expected from the SNF because packages would be sealed and monitored for integrity during storage. Hydrogen gas also may be produced by radiolytic decomposition of aqueous solutions. Release of hydrogen gas is possible in the liquid radioactive waste storage tank or in the SNF transfer cask where small amounts of moisture may be present with the SNF. Conservative FWENC estimates of the rate of hydrogen generation in the liquid waste storage tank (with no ventilation) indicate passive ventilation of the tank would be sufficient to maintain hydrogen concentrations below the 4-percent flammable concentration level (FWENC, 2003c, Section 6). Regarding the transfer casks, the internal atmospheric concentration of hydrogen would be sampled to ensure gas concentrations are within acceptable limits prior to removal of the cask lid (FWENC, 2003c, Section 6).

Liquid radioactive waste would not be generated during normal operations of the proposed Idaho Spent Fuel Facility, however, such waste may be generated during nonroutine decontamination activities or as a result of sprinkler or firefighting water (Table 4-11). FWENC estimates no more than 19,700 L [5,200 gal] of liquid radioactive waste would be generated each year from decontamination activities (2003c, Section 6). A liquid waste processing system would collect and temporarily store such liquid wastes in two tanks {18,900-L [5,000-gal] and 1,900 L [500 gal]} prior to transfer to a licensed treatment facility by a mobile service contractor. The larger tank would be located below grade with an effective containment volume of 36,700 L [9,700 gal] in the event of a tank failure or spill (FWENC, 2003c, Section 6). Liquid waste collection would be available in the safety shower and eye wash areas, the Solid Waste Processing Area where water may be used for decontamination, the Transfer Tunnel where decontamination water or fire sprinkler water could be generated, the Canister Closure Area where decontamination or container weld test water may be generated, the workshop where decontamination water may be generated, and the liquid waste storage area where a sump would filter and collect spilled or wash water to be transferred to the larger liquid waste storage tank. Normal decontamination activities would involve only small amounts of water for wiping with cloth or paper (no free liquid wastes would be generated).

Table 4-11. Estimated Concentrations of Principal Radionuclides in Liquid Waste[a]	
Radionuclide[b]	**Concentration (Ci/g)**
Tritium	1.11×10^{-9}
Krypton-85	7.75×10^{-9}
Strontium-90	1.33×10^{-10}
Yttrium-90	1.33×10^{-10}
Cesium-137	1.41×10^{-10}
Barium-137	1.33×10^{-10}
Plutonium-238	1.57×10^{-12}

FWENC = Foster Wheeler Environmental Corporation

[a] FWENC. "Safety Analysis Report, Idaho Spent Fuel Facility." Section 6. NRC Docket No. 72-25. ISF–FW–RPT–0033. Rev. 3. Section 6. Morris Plains, New Jersey: FWENC. 2003.
[b] Other radionuclide concentrations estimated at < 1 pCi/g

NOTE: To convert grams (g) to ounces (oz), multiply by 0.03527.

Solid waste generated at the proposed Idaho Spent Fuel Facility would be from repackaging of SNF and other process-related activities. Solid waste is classified as large canister waste, small canister waste, and process level waste. The canister waste includes large and small containers used to deliver SNF to the proposed Idaho Spent Fuel Facility. Process waste includes paper, rubber, plastic, rags, machinery parts, tools, vacuum cleaner debris, welding materials, and HEPA filters. Estimated volumes of solid waste are provided in Table 4-12.

Solid waste from the proposed Idaho Spent Fuel Facility would be characterized for disposal as low-level radioactive waste (FWENC, 2003c, Section 6) and would be handled through the solid waste processing system located in the solid waste processing area. This solid waste processing system would handle, package, and temporarily store solid waste pending transportation to the (onsite) INEEL Radioactive Waste Management Complex or available offsite locations, including the Nevada Test Site and Hanford, for disposal (DOE, 2000). Waste would be characterized, analyzed, and disposed in accordance with existing DOE and INEEL reuse, recycle, and waste acceptance criteria (DOE, 1999b). The Radioactive Waste Management Complex would accept packages with radiation limited to 500 mR/hr at 1 m [3.3 ft]; however, the general practice is to limit waste container surface radiation to below 100 mR/hr. Canister waste would be processed by surveying containers and cleaning and sectioning in the fuel processing area using specially designed saws to ensure canister waste meets a radiation limit of 50 mR/hr prior to transfer to the Radioactive Waste Management Complex for further sectioning and packaging for disposal (FWENC, 2003c, Section 6). No mixed waste is expected to be generated by the proposed Idaho Spent Fuel Facility.

The Radioactive Waste Management Complex Subsurface Disposal Area has a capacity of about 50,000 m^3 [70,000 yd^3] (FWENC, 2003b). For the past 3 years, DOE has disposed low-level radioactive waste at a rate of about 4,000 m^3 [5,000 yd^3] per year (FWENC, 2003b).

The aforementioned estimated total volume of solid waste during proposed fuel receipt and repackaging operations in Table 4-12 is about 400 m^3 [500 yd^3], representing a 3-percent annual increase in low-level waste generation. Therefore, the increase in the waste generation rate and estimated total volume of waste for the proposed action is small compared with the current waste generation rate and existing disposal capacity.

In summary, no chemical effluents or wastes are planned to be generated from the proposed Idaho Spent Fuel Facility. Small amounts of gaseous, particulate, and dilute liquid radioactive wastes are planned to be generated by the proposed Idaho Spent Fuel Facility. Control systems planned for gaseous, particulate, and liquid radioactive wastes would contain releases and limit exposures to workers and the public well below regulatory limits. Solid radioactive wastes generated at the proposed Idaho Spent Fuel Facility would consist of used waste containers and process wastes, both classified as low-level radioactive waste. The INEEL site includes a low-level radioactive waste disposal facility with the capacity to dispose of the waste generated by the proposed Idaho Spent Fuel Facility. Volumes of low-level solid waste estimated to be generated by the proposed Idaho Spent Fuel Facility are a small fraction of the annual INEEL site low-level waste generation and existing disposal capacity. INEEL and other applicable low-level radioactive waste sites have been previously assessed for environmental impacts; therefore, no significant environmental impacts are expected from solid wastes. Overall, waste management activities associated with the proposed Idaho Spent Fuel Facility are designed to limit waste volumes and maintain exposures ALARA. Only small environmental impacts are expected to result from overall waste management activities.

4.14 Cumulative Impacts

Cumulative impacts (effects) refer to the impacts on the environment that result from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but

Table 4-12. Estimated Volumes of Solid Low-Level Radioactive Waste[a]

Waste Type (m^3)	Year 1	Year 2	Year 3	Total
Canister Waste	81	81	138	300
Process Generated	37	37	28	102
Total Volume	118	118	166	402

FWENC = Foster Wheeler Environmental Corporation

[a] FWENC. “Safety Analysis Report, Idaho Spent Fuel Facility.” Section 6. NRC Docket No. 72-25. ISF–FW–RPT–0033. Rev. 2. Morris Plains, New Jersey: FWENC. 2003.

NOTE: To convert meters cubed (m^3) to yards cubed (yd^3), multiply by 1.3079.

collectively significant actions taking place during a period of time (40 CFR 1508.7). This definition encompasses the following relative to this section:

- The action refers to the construction and operation of the proposed Idaho Spent Fuel Facility to be located adjacent to INTEC at INEEL.

- The direct and indirect incremental impacts of the proposed action are a key criterion in determining if cumulative effects on localized and regional environmental and natural resources, ecosystems, and human communities need to be addressed (e.g., if the proposed action has no effects on a given resource, it is not necessary to address the existing cumulative effects that have occurred on the resource).

- For those cumulative effects that need to be addressed, it is necessary to consider the direct and indirect effects of past, present, and reasonably foreseeable future actions on the affected resources, ecosystems, and human communities (past actions can include those prior to INEEL, as well as INEEL actions since 1949; present actions include those in detailed planning, being constructed, and recently initiated; and reasonably foreseeable future actions include those beyond mere speculation, but within the timeframe for analysis).

- Direct effects are those effects caused by the proposed action, past actions, present actions, or reasonably foreseeable future actions, that occur at the same time and place as the respective actions (40 CFR 1508.8a); indirect effects are caused by the respective actions and are later in time or farther removed in distance, but are still reasonably foreseeable (indirect effects may include growth-inducing effects; other effects related to induced changes in the pattern of land use, population density; or growth rate; and related effects on air, water, and other natural systems, including ecosystems) (40 CFR 1508.8b).

- The respective actions may have been, or would be, the result of decisions made by various governmental levels (Federal, state, or local) or the private sector; further, such actions may be on INEEL lands or offsite (the key is that common resources, ecosystems, or human communities are affected).

- Cumulative effects need to be analyzed relative to a place-based perspective (the situation at INEEL) on the specific resources, ecosystems, and human communities affected.

- Each affected resource, ecosystem, and human community must be analyzed for its sustainability and capacity to accommodate additional effects, based on its own time and space parameters (Council on Environmental Quality, 1997).

A detailed methodology based on Council on Environmental Quality guidance (1997) is included in Appendix C.

4.14.1 Incremental Impacts of the Proposed Idaho Spent Fuel Facility

Section 8.1 and Table 2-1 contain a summary of the potential environmental impacts identified for construction and operation of the proposed Idaho Spent Fuel Facility. These impacts were abstracted from Sections 4.1–4.13. Detailed information on the assumptions, calculations, and qualitative descriptions of the impacts is presented in the respective earlier sections.

Based on the impact analysis, all incremental impacts of the proposed Idaho Spent Fuel Facility would be small in the context of historical, current, and planned operations at INEEL. No potential significant impacts have been identified from the construction and operation of the proposed Idaho Spent Fuel Facility; however, cumulative effects are addressed for most of the impact categories summarized previously. Cumulative effects on noise and visual/scenic qualities are not addressed because of the temporary and localized nature of the noise impacts from the facility, and the lack of visual intrusions from the facility in relation to its adjoining location to INTEC.

4.14.2 Past, Present, and Reasonably Foreseeable Future Actions

Cumulative effects assessment entails consideration of the incremental impacts of the proposed Idaho Spent Fuel Facility when added to the effects of past, present, and reasonably foreseeable future actions. Past actions can include those prior to the establishment of INEEL (or its precursor names) in 1949 and other actions implemented at INEEL prior to the current time. Examples of these past actions on INEEL lands include

- Farming and cattle and sheep grazing from 1860 through the 1940s;
- Bombing practice in the Central Facilities Area in the 1940s;
- Usage by the Shoshone–Bannock Tribes for subsistence and religious practices for many decades prior to the 1940s; and
- Development of the infrastructure and facilities at nine multiprogram areas within INEEL by the DOE (or its precursor agencies); these program areas include INTEC, Test Area North, Naval Reactors Facility, Test Reactor Area, Central Facilities Area, Power Burst Facility, Auxiliary Reactor Area, Argonne National Laboratory–West, and the Radioactive Waste Management Complex (see Figure 3-2 for the location of these areas).

The cumulative effects of past actions are summarized in Table 4-13 and described in more detail in Appendix C. Cumulative effects concerns are divided into four groups—major, modest, minor, and none. No cumulative effects concerns exist for noise because of the localized and transient nature of noise impacts. There are no cumulative effects concerns for visual and scenic issues because of INEEL compliance with current guidelines. Additional information on the rationale for the grouping of each remaining affected environment is presented in Section 4.14.3.

Current actions and reasonably foreseeable future actions include those identified in the DOE programmatic SNF EIS (DOE, 1995), the Idaho High-Level Waste (HLW) and Facilities Disposition EIS (DOE, 2002a), and the EIS on the ISFSI for Three-Mile Island Unit 2 Spent Fuel

Table 4-13. Summary of the Cumulative Effects Concerns Related to Past Actions[a]		
Affected Environment	**Category**	**Cumulative Effects Concerns**
Land Use	E	Moderate concerns because small land use changes can impact many other environmental features
Transportation	HC	Small concerns because adequate highways and onsite roads exist, along with a rail system in the region
Geology and Soils	R	Some soil contamination exists in and around the INTEC facility, thus, a small concern exists
Water Resources–Surface Water	R	Small concerns because surface water is not used as a water supply, the quality meets applicable standards, and wastewater treatment systems exist at INEEL
Water Resources–Groundwater	R	Groundwater usage is well within INEEL water rights; however, contaminated soils in the vadose zone and groundwater underlying the INTEC facility suggest a large cumulative effects concern
Ecology	E	Small concerns because the large majority of the INEEL area supports a diversity of flora, fauna, threatened or endangered species, and wetlands
Air Quality	R	Moderate concerns because atmospheric transport can be a major cumulative effects pathway; however, current radiological and nonradiological air qualities are in compliance with applicable Federal and state standards
Noise	R	No concerns because of localized and transient nature of noise sources at INEEL and in the region
Historic and Cultural	HC	Small concern with regard to eligible historic structures; major concerns because of cumulative effects on the Shoshone–Bannock Tribes of continued restricted access
Visual and Scenic	HC	No concerns because the land uses both onsite at INEEL and on the adjacent lands are compatible with the Bureau of Land Management Visual Resource Management Guidelines
Socioeconomic	HC	Large beneficial cumulative effect because the overall operations of INEEL represent a significant contribution to the regional economy
Environmental Justice	HC	Small concern because three recent impact studies indicated no disproportionately high adverse human health or environmental effects on minority or low-income populations
Public and Occupational Health and Safety	HC	Moderate concerns because of cumulative exposures to INEEL workers and to the general public living nearby; both radiological and nonradiological stressors exist
Waste Management	R	Large concerns due to the quantities of radioactive wastes and spent nuclear fuel stored at INEEL

E = ecosystems
HC = human communities
INEEL = Idaho National Engineering and Environmental Laboratory
INTEC = Idaho Nuclear Technology and Engineering Center
R = resources

[a] See Appendix C of this report.

(NRC, 1998). Table 4-14 includes the projects considered to be within the current actions and reasonably foreseeable future actions based on the earlier DOE analysis (DOE, 1995). These actions are part of the projected baseline (i.e., the future without the proposed action conditions). The project Dry Fuel Storage, Fuel Receiving, Canning/Characterization, and Shipping includes the proposed Idaho Spent Fuel Facility (DOE, 1995, Volume 2, Part B, Appendix C).

Additional onsite reasonably foreseeable future actions included in this cumulative effects assessment are listed in Table 4-15. Information related to the closure of various INTEC facilities identified in Table 4-15, including a list of facilities and their closure actions, deactivation activity period, and demolition activity period is provided in the Idaho HLW and Facilities Disposition EIS (DOE, 2002a, Section 5.4).

As part of the preparation of the Idaho HLW and Facilities Disposition EIS (DOE, 2002a), discussions were held with the City of Idaho Falls, the State of Idaho Department of Environmental Quality, and the BLM regarding anticipated future activities that could contribute to a cumulative impact on a particular resource or through a particular pathway within the geographical boundaries of the study. No specific offsite reasonably foreseeable future actions were identified for inclusion in the analysis.

4.14.3 Magnitude and Significance of Cumulative Effects

The magnitude of cumulative effects resulting from past, present, and reasonably foreseeable future actions is addressed using a three-step process: (i) the cumulative effects of past actions on selected resources, ecosystems, and human communities are discussed in Section 4.14.2 and summarized in Appendix C and Table 4-13; (ii) the cumulative effects of current actions and reasonably foreseeable future actions are included in Table 4-16; and (iii) the incremental impacts of the construction and operation of the proposed Idaho Spent Fuel Facility are summarized in Section 8.1. A discussion of the magnitude of the additive cumulative effects and their significances, is presented in this section. Prior to the discussion, however, some clarifying comments regarding Table 4-16 are in order.

- The data and information in Table 4-16 were extracted from the comprehensive systems model described in DOE (1995). The systems model included all SNF, HLW, transuranic waste, low-level waste, mixed low-level waste, hazardous waste, and industrial waste activities. The model was based on planned treatment, storage, and disposal activities at INEEL, EIS project summaries, and operating parameters of existing facilities, and was updated to reflect projects included in the DOE programmatic SNF EIS record of decision and other projects that occurred subsequent to that EIS.

- The data and information listed for the Idaho HLW and Facilities Disposition EIS (DOE, 2002a) represent the largest impact from the alternatives analysis contained in that EIS.

- In Table 4-16, column New Silt/Clay Source was included as a separate reasonably foreseeable future action because excavation of silt and clay for use in INEEL operations and remedial activities would be needed; further, these materials may be required to support facility disposition activities at INTEC (DOE, 2002a, Section 5.4).

Table 4-14. Current Actions and Reasonably Foreseeable Future Actions Identified in the DOE Programmatic EIS on SNF and Included in the Projected Baseline Conditions[a]
Borrow Source Silt Clay
Calcine Transfer Project
Central Liquid Waste Processing Facility Decontamination and Decommissioning
Dry Fuels Storage Facility, Fuel Receiving, Canning/Characterization, and Shipping
Environmental Assessment Determination for CPP–627
Experimental Breeder Reactor-II Blanket Treatment
Experimental Breeder Reactor-II Plant Closure
Expended Core Facility Dry Cell Project
Engineering Test Reactor Decontamination and Decommissioning
Fuel Processing Complex (CPP–601) Decontamination and Decommissioning
Gravel Pit Expansions (New Borrow Source)
Greater-Than-Class C Dedicated Storage
Headend Processing Plant (CPP–640) Decontamination and Decommissioning
Heath Physics Instrument Lab
High-Level Tank Farm Replacement (upgrade phase)
Increased Rack Capacity for CPP–666
Industrial/Commercial Landfill Expansion
Material Test Reactor Decontamination and Decommissioning
Mixed Low-Level Waste Disposal Facility
Nonincinerable Mixed Waste Treatment
Partnership Natural Disaster Reduction Test Station
Pit 9 Retrieval
Private Sector Alpha-Mixed Low-Level Waste Treatment
Radioactive Scrap/Waste Facility
Remediation of Groundwater Facilities
Remote Mixed Waste Treatment Facility
Radiological and Environmental Sciences Laboratory Replacement
Radioactive Waste Management Complex Modifications for Private Sector Treatment of Alpha-Mixed Low-Level Waste
Sodium Processing Plant
Test Area North Pool Fuel Transfer
Tank Farm Heel Removal Project
Treatment of Alpha-Mixed Low-Level Waste
Technical Support Annex Enclosure and Storage Project

Table 4-14. Current Actions and Reasonably Foreseeable Future Actions Identified in the DOE Programmatic EIS on SNF and Included in the Projected Baseline Conditions[a] (continued)
Vadose Zone Remediation
Waste Calcine Facility (CPP–633) Decontamination and Decommissioning
Waste Characterization Facility
Waste Handling Facility
Waste Immobilization Facility
Waste Experimental Reduction Facility Incineration

DOE = U.S. Department of Energy
EIS = Environmental Impact Statement
SNF = spent nuclear fuel

[a] DOE. DOE/EIS–0203–F, "Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement." Idaho Falls, Idaho: DOE, Idaho Operations Office. 1995.

- In Table 4-16, column Disposition of Unrelated INTEC Facilities addresses impacts of the disposition of the facilities listed in DOE (2002a, Section 5.4).

- In Table 4-16, column Percolation Pond Replacement is included because residual contamination left in place from Waste Area Group 3 activities would contribute to the source for long-term risks associated with INTEC. DOE has chosen to remediate contaminated perched water at Waste Area Group 3 using institutional controls with aquifer recharge control. This choice would entail restricting future use of contaminated perched water and future recharge to contaminated perched water and taking the existing INTEC percolation ponds out of service and replacing them with new ponds built outside the zone influencing perched water contaminant transport (DOE, 2002a, Section 5.4).

- Table 4-16 does not include summary information on impacts to transportation, noise, visual/scenic, environmental justice, public and occupational health and safety, and waste management. Noise and visual/scenic impacts are excluded because of small existing concerns and the small incremental impacts of the proposed Idaho Spent Fuel Facility. The other impacts are addressed in the following paragraphs.

For land use, existing industrial development at INEEL occupies 4,600 ha [11,400 acres] of a total resource of 230,850 ha [570,000 acres] (nearly 2 percent). Modest cumulative effects concerns are related to these past and present actions because it is recognized that even though the percentage of land use is small, such land use changes can affect other resources, ecosystems, and human communities. Implementation of all current and future actions, as shown in Table 4-16 (for the period 2000–2095), would lead to the conversion of an additional about 650 ha [1,600 acres] to industrial use. The total industrial land use would increase to 2.3 percent. Finally, the incremental impact of the proposed Idaho Spent Fuel Facility would be an additional 3.2 ha [8 acres] of land permanently converted to industrial use. Total industrial land use at INEEL would increase to about 5,270 ha [13,008 acres] (still about 2.3 percent).

Table 4-15. Summary of Current Actions and Reasonably Foreseeable Future Actions Identified in the Idaho HLW and Facilities Disposition[a]

Project	Description
Programmatic SNF EIS[b]	DOE[b] provided the scope and timetable for SNF and environmental restoration activities to be included in the cumulative impact analysis of DOE.[a]
Advanced Mixed Waste Treatment Project[c]	Retrieve, sort, characterize, and treat mixed low-level waste and about 65,000 m^3 [85,000 yd^3] of alpha-contaminated mixed low-level waste and transuranic waste currently stored at the INEEL Radioactive Waste Management Complex. Package the treated waste for shipment offsite for disposal.
Waste Area Group 3 Remediation[c]	Ongoing activities addressing remediation of past releases of contaminants at INTEC.
New silt/clay source development and use at INEEL	INEEL activities require silt/clay for construction of soil caps over contaminated sites, research sites, and landfills; replacement of radioactivity contaminated soil with topsoil for revegetation and backfill; sealing of sewage lagoons; and other uses. Silt/clay will be mined from three onsite sources (ryegrass flats, Spreading Area A, and Water Reactor Research Test Facility).
Closure of various INTEC facilities unrelated to Idaho HLW and Facilities Disposition EIS Alternatives[a]	Reduce the risk of radioactive exposure and release of hazardous constituents and eliminate the need for extensive long-term surveillance and maintenance for obsolete facilities at INTEC.
Percolation Pond Replacement	DOE intends to replace existing percolation ponds at INTEC with replacement ponds about 3,110 m [10,200 ft] southwest of the existing percolation ponds.

DOE = U.S. Department of Energy
EIS = environmental impact statement
HLW = high-level waste
INEEL = Idaho National Engineering and Environmental Laboratory
INTEC = Idaho Nuclear Technology and Engineering Center
SNF = spent nuclear fuel

[a] DOE. DOE/EIS–0250, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.
[b] ———. DOE/EIS–0203–F, "Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement." Idaho Falls, Idaho: DOE, Idaho Operations Office. 1995.
[c] Included in the baseline conditions identified in DOE[b].

Table 4-16. Maximum Impact from Other Past, Present, and Reasonably Foreseeable Projects[a,b]

Resource Area	Waste Processing[a]	Facility Disposition[a]	SNF Management[b]	New Silt/Clay Source Development and Use at INEEL[a]	Disposition of Unrelated INTEC Facilities[a]	Percolation Pond Replacement[a]	Proposed Idaho Spent Fuel Facility[c]
Land Resources/ Acres Disturbed	8.9 ha	None	545.1 ha	8.5 ha/yr and 9.7 ha/yr	None	6.9 ha	7.3 ha
Socioeconomics	Direct employment of 870 during construction, 530 during operations	Direct peak year employment of 790	Overall decrease in employment	None/use of existing workforce	Small numbers of workers drawn from existing labor pool	None/use of existing workforce	Direct employment of 250 during construction; 60 during first 3 years of operation
Air Resources	Consumption up to 40 percent of prevention of significant deterioration increment/no health-based standards exceeded	No health-based standards exceeded	Below applicable standards	Short-term elevated levels of fugitive dust and exhaust emissions	Emissions of fugitive dust/vehicle exhaust during demolition activities	Temporary emissions of fugitive dust and vehicular exhaust during construction activities	Temporary emissions of fugitive dust and vehicular exhaust during construction activities; no chemical air discharges during operations, radiological emissions are controlled by filtration and monitoring
Water Resources/ Groundwater Withdrawal and Contamination	352 million L/yr; negligible latent cancer fatality risk	Increase of 41.6 million L/yr; latent cancer fatality risk of 2.9×10^{-4} from facility disposition	Increase of 314.2 million L/yr; latent cancer fatality risk of 5×10^{-5}	Water use for dust suppression; no additional latent cancer fatality risk	Within existing water use; latent cancer fatality risk of 2×10^{-6} from closure of CPP–633	Relocation of ponds reduces potential for contaminant migration	3.41 million L during first year of construction, 1.7 million L/yr during operations; no planned liquid discharges from the facility
Ecological Resources/ Acreage Loss	8.9 ha	None	545.1 ha	8.5 ha and 9.7 ha/yr	None	1.5 ha	7.3 ha

Table 4-16. Maximum Impact from Other Past, Present, and Reasonably Foreseeable Projects[a,b] (continued)							
Resource Area	**Waste Processing[a]**	**Facility Disposition[a]**	**SNF Management[b]**	**New Silt/Clay Source Development and Use at the INEEL[a]**	**Disposition of Unrelated INTEC Facilities[a]**	**Percolation Pond Replacement[a]**	**Proposed Idaho Spent Fuel Facility[c]**
Geology and Soils	Negligible (use of existing onsite sources)	Negligible (use of existing onsite sources)	1,355,000 m^3	3,517,000 m^3 as a silt/clay source	Materials obtained from existing INEEL sources	Soil disturbance on 6.9 ha	Soil disturbance on 7.3 ha; materials obtained from existing INEEL sources
Cultural Resources	Negligible	Potential for loss of historic data on nuclear facilities	70 structures and 23 sites affected	No significant resources identified in survey of 40-acre plots at each onsite location	Potential for loss of historic data on nuclear facilities	Surveys will be conducted/ resources avoided	Two structures potentially eligible for the National Register of Historic Places are near current storage locations or proposed transfer routes; no identified cultural resources

DOE = U.S. Department of Energy
EIS = Environmental Impact Statement
HLW = high-level waste
INEEL = Idaho National Engineering and Environmental Laboratory
INTEC = Idaho Nuclear Technology and Engineering Center
SNF = spent nuclear fuel

[a] DOE. DOE/EIS–0250, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.
[b] ———. DOE/EIS–0203–F, "Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement." Idaho Falls, Idaho: DOE, Idaho Operations Office. 1995.
[c] See Table 2-1 of this report for a detailed summary.

NOTE: To convert hectares (ha) to acres, multiply by 2.471; meters cubed (m^3) to yards cubed (yd^3), multiply by 1.3079; liters (L) to gallons (gal), multiply by 0.2642.

As a result, moderate cumulative effects concerns would persist; however, these can be minimized via careful land use planning that involves land use conversions to industrial development in or near areas that have been previously used for such purposes.

For transportation and infrastructure, existing conditions include six highways and one rail line providing access to INEEL. Further, 140 km [87 mi] of paved roads are located within INEEL. These transportation components have been previously analyzed for cumulative radiological impacts because of shipments of radioactive materials to INEEL (DOE, 2002a). Another perspective is to consider the adequacy of the capacity (levels-of-service) of the transportation system for the volume of worker and shipment ingress to INEEL and egress from INEEL. From this perspective, only small cumulative effects concerns exist, and no level-of-service changes are currently needed. Further, even with the implementation of all current and planned or proposed future actions at INEEL, traffic volumes are not expected to increase. Incremental impacts of the proposed Idaho Spent Fuel Facility on traffic volume would be small; however, the transfer of currently stored SNF from INTEC to the proposed Idaho Spent Fuel Facility would be required for planned operations. The traffic volume would be low, and the transfers would be made in accordance with the requirements of the DOE orders and procedures for onsite SNF transfer. As a result, no changes are anticipated in the small cumulative effects concerns for transportation.

For geology and soils, the primary issue from past and present actions is that soils have been disturbed in areas where the land use has been converted to industrial activities. Soil losses have occurred via erosion, and some soils at specific locations have become radiologically contaminated. More specifically, some soil contamination exists in and around the INTEC facility, thus, a small cumulative effects concern exists. Surveys do not show any existing soil contamination at the proposed site for the Idaho Spent Fuel Facility. The remediation focus of many current and future actions listed in Table 4-16 would require some additional land disturbance for the extraction of silt and clay for use as borrow material and the replacement of the percolation pond at INTEC. The proposed Idaho Spent Fuel Facility would affect the soil at the 3.2-ha [8-acre] site, and to some extent, at the adjacent construction laydown area (a temporary impact). Therefore, the incremental impact of the proposed facility is not significant within the overall geological and soil resources at INEEL. Further, because of the planned remediation projects at INEEL, the current minor cumulative effects concern would be reduced.

Regarding surface water resources, only minor cumulative effects concerns exist from past and present actions. Surface water is not used as a water supply at INEEL, and its quality meets applicable standards. Current and planned actions would also not require surface water use, nor would the proposed Idaho Spent Fuel Facility. Storm water control plans would be used for current and planned actions and for the proposed Idaho Spent Fuel Facility. Wastewaters generated at INEEL are currently handled via planned treatment systems, as would such wastewater that may be generated by all current and future actions.

Past and current INEEL operations use groundwater as the water supply source. Current annual water withdrawals from the Eastern Snake River Plain Aquifer total about 7.4 billion L [2.0 billion gal], and these withdrawals are well within the allocated INEEL water rights that permit a maximum consumption of 43.2 billion L [11.4 billion gal] per year. Table 4-16 indicates that current and future actions would require a maximum of 707 million L [187 million gal] on an annual basis (an approximate 10-percent increase from current use, however, not on a continuing basis, and still well within the water rights). The incremental water use from the proposed Idaho Spent Fuel Facility is an increase of only 0.1 percent of the current water use. Thus, the cumulative effects on groundwater use would not be significant.

A potential cumulative effects concern related to past and present actions is the contaminated soils in the vadose zone and the contaminated groundwater underlying the INTEC facilities and surrounding area. Planned and future actions are focused on remediation effects, thus, the contamination would be reduced and more appropriately managed. No soil contamination has been found at the proposed site of the facility (see Section 3.4.2), and only small groundwater impacts are anticipated from construction and operation of the proposed Idaho Spent Fuel Facility located adjacent to the southeastern boundary of INTEC.

Ecological resources associated with the undisturbed land at INEEL are diverse and include 15 vegetation associations and 280 different vertebrate species (46 mammal, 204 bird, 10 reptile, 2 amphibian, and 9 fish). Seven bird species, six mammals, one reptile, and six plant species are listed as threatened or endangered, or species of concern, or other unique species. Some wetland characteristics are exhibited by about 130 areas within the INEEL boundaries. There are minor cumulative effects concerns from past and present actions because nearly 98 percent of INEEL lands still supports the diversity noted previously. Land use required for current and future actions totals 650 ha [1,600 acres] (Table 4-16), and the land requirement for the proposed Idaho Spent Fuel Facility is 3.2 ha [8 acres]. These current and future actions would cumulatively affect 651 ha [1,608 acres] and increase the disturbed land area total to 2.3 percent (the past and present actions total is nearly 2 percent). Therefore, the ecological diversity at INEEL should be maintained, and cumulative effects concerns would continue to be small.

Regarding ambient air quality, the current radiological and nonradiological air quality at INEEL is in compliance with applicable Federal and state standards. Modest cumulative effects concerns currently exist, however, because atmospheric transport of radioactivity releases can be a major pathway for the occurrence of cumulative health effects. Table 4-16 indicates that no health-based air quality standards would be exceeded by the current and future actions, although short-term elevated levels of fugitive dust and exhaust emissions would occur in localized areas. Consumption up to 40 percent of prevention of significant deterioration increments may occur from future waste processing. The incremental effects of the construction and operation of the proposed Idaho Spent Fuel Facility would not be significant when considered in relation to current and future radiological and nonradiological emission inventories at INEEL.

Regarding historical and cultural resources at INEEL, no known resources would be lost as a result of the construction and operation of the proposed Idaho Spent Fuel Facility. Past and present actions at INEEL probably have caused the loss or damage to historic buildings and cultural sites; further, the major current concern is associated with the cumulative effects of continued restricted access of the Shoshone–Bannock Tribes. As summarized in Table 4-16, some historic structures and cultural resources sites may be impacted by current and future actions. Moreover, the requirements of the National Historic Preservation Act and related Federal and state laws would be followed for all current and future actions, including the construction and operation of the proposed Idaho Spent Fuel Facility.

Environmental Impacts

The 2001 INEEL workforce was about 8,100 workers; this represents about 6 percent of the total work force in the region of influence. Thus, the operations at INEEL provide a major beneficial cumulative effect on the socioeconomic characteristics of the region. Table 4-16 indicates that waste processing activities would sustain a maximum of 870 direct jobs during the peak year (2013) of the construction phase and a maximum of 530 direct jobs during the peak year (2015) of the operations phase (DOE, 2002a). Facility disposition activities would require direct employment of up to 790 workers. Further, DOE anticipates these workers would be drawn from the existing workforce through retraining and reassignment. When the workforce of the proposed Idaho Spent Fuel Facility is considered (a construction force of 250 for 2 years and an operational force of up to 60 for the duration of the license), the incremental impacts are small in relation to the current total and anticipated workforce. Accordingly, the cumulative effects of the proposed facility on the workforce, when added to the effects of other reasonably foreseeable future actions on the workforce, will be small and within normal INEEL workforce fluctuations.

Regarding cumulative environmental justice impacts, the two recent programmatic impact studies (DOE, 1995, 2002a), along with NRC (1998), all concluded there were no disproportionate impacts. Table 4-13 lists small cumulative impact concerns, primarily because of the potential for such impacts occurring over time. Regarding disproportionate impacts, none were noted for the proposed Idaho Spent Fuel Facility; thus, there are no significant cumulative environmental justice impacts.

Current annual individual exposures to airborne releases of radioactivity from past and present actions are well below the 0.1 mSv/yr [10 mrem/yr] limit in 40 CFR Part 61 for onsite workers and the MEI and considerably below the natural background level of 3.6 mSv/yr [360 mrem/yr]. Occupational doses for INEEL workers are also considerably below the annual occupational dose limit of 50 mSv [5,000 mrem] in 10 CFR Part 20. Although the exposure levels are well below the regulatory limits, however, there are moderate cumulative effects concerns because of the human health nature of these effects. A detailed discussion of such effects from current and future actions is found in DOE (2002a). The anticipated annual exposures from current and future actions are still well below regulatory limits for INEEL workers and the MEI. Further, because many current and future actions are related to remediation, annual public exposure levels would be expected to decrease. Finally, the incremental impacts from the construction and operation of the proposed Idaho Spent Fuel Facility are also well below regulatory limits for INEEL workers and the MEI.

A variety of radioactive wastes are currently stored, generated, or both at INEEL. These wastes, resulting from past and present actions, represent a major cumulative effects concern. Many current and future actions are focused on better management and control of existing stored wastes, including reducing the potential for contamination of INEEL groundwater and air quality. The purpose of the proposed ISFSI facility is to accomplish better management and control of a portion of the SNF currently stored at INEEL (from the Peach Bottom reactor, Shippingport reactor, and TRIGA reactors). Relative to the quantities of waste materials currently stored and generated annually at INEEL, only small quantities of gaseous, liquid, and solid low-level radioactive waste would be generated from routine and nonroutine activities during SNF receipt and repackaging operations planned for the first 3 years of the proposed Idaho Spent Fuel Facility. After the SNF is repackaged and stored, no gaseous releases, or liquid or solid radioactive wastes are anticipated to be generated on a regular basis from the proposed Idaho Spent Fuel Facility.

4.15 Impacts of the No-Action Alternative

For the no-action alternative, NRC would not grant the license and the proposed facility would not be constructed. In this case, DOE would maintain current storage activities as described in the DOE programmatic SNF EIS (DOE, 1995, Volume 2, Part A, Section 5). Specific information related to the no-action alternative for a generic dry fuel storage facility is provided in the DOE programmatic SNF EIS (DOE, 1995, Volume 2, Part A, Appendix C). Under the no-action alternative, SNF stored at INEEL would be transferred and consolidated at existing facilities at INTEC, including CPP–603 Irradiated Fuel Storage Facility, CPP–749, and CPP–666. During a 3-year transition period, U.S. Navy SNF would continue to be received and stored at INTEC (CPP–666) according to the terms of the 1995 Settlement Agreement. Existing procedures and site-wide plans such as the Storm Water Pollution Protection Plan (DOE, 2001b) and the INEEL Long-Term Stewardship Strategic Plan (DOE, 2002c) would continue to be implemented by DOE and its contractors.

In the short term, no major upgrades or new facilities would be installed, and minor fuel conditioning would be necessary for maintaining safe operation. Because there would be no construction of new facilities, short-term impacts to geologic resources, land use, water resources, and ecological, visual/scenic, and cultural resources would be small and the same as those discussed in DOE (1995). Transportation and storage of the remaining TRIGA reactor fuel would continue per an existing DOE record of decision (DOE, 1996a,b). Cumulative impacts of the no-action alternative are addressed in the DOE programmatic SNF EIS (DOE, 1995). In the longer term, current storage and fuel-handling facilities at INTEC will be open and operational longer than planned. Ultimately, existing facilities will need to be modified or facilities similar to those described in the proposed action will need to be built. For example, the current storage location of Shippingport SNF at the INTEC Irradiated Spent Fuel Storage Facility (CPP–603) will be modified to expand the hot cell and add a load-out facility in lieu of the availability of the proposed Idaho Spent Fuel Facility. Long-term impacts would be similar to the proposed Idaho Spent Fuel Facility, because SNF must be repackaged before shipment can occur from INEEL to a national HLW geologic repository.

4.16 Decontamination and Decommissioning

In accordance with the 1995 Settlement Agreement among DOE, the State of Idaho, and the U.S. Navy, SNF must be removed from Idaho by 2035. It is anticipated that SNF would be transferred from the proposed Idaho Spent Fuel Facility to a geologic repository. The proposed facility would need to be decontaminated and decommissioned in accordance with the NRC radiological criteria for the license termination rule (10 CFR Part 20, Subpart E) after the fuel is removed. Current NRC criteria are presented in a consolidated decommissioning guidance document (NRC, 2003e). According to the terms of its contract with FWENC to construct and operate the proposed Idaho Spent Fuel Faculty, and by a Statement of Intent submitted to NRC (FWENC, 2003e, Appendix C), DOE is obligated to provide funding for decommissioning the proposed facility.

Decontamination and decommissioning of the proposed ISFSI are anticipated to occur many years in the future, and details of the activities are uncertain at this time. FWENC provided a conceptual plan for decommissioning the proposed Idaho Spent Fuel Facility as an appendix to its license application (FWENC, 2003e, Appendix C). The objective of the plan is to demonstrate the facility can be decommissioned in a manner both economical and safe.

Environmental Impacts

The plan describes the costs and activities required for safely removing the proposed Idaho Spent Fuel Facility from service and reducing residual radioactivity through remediation to a level that permits release of the property and termination of the NRC license. Prior to beginning decontamination and decommissioning of the site, the licensee at that time would be required to submit a detailed plan to NRC for review and approval.

The primary areas of anticipated radioactive contamination at the proposed Idaho Spent Fuel Facility are the Transfer Area, Solid Waste Processing Area, HVACs, and those portions of systems that contained radioactive fluids. Because the exterior of the storage canisters would not contact the radioactive materials, the canisters should not become contaminated. After the canisters are removed from the proposed Idaho Spent Fuel Facility Site, the Storage Area should require little or no remediation.

The decision concerning how to proceed with decontamination and decommissioning would be made during the decommissioning planning phase (FWENC, 2003e, Appendix C). The decision would be based on numerous factors, including

- NRC requirements and guidance;
- Physical condition of equipment and structures during a long-term period;
- Optimization of radiological aspects to minimize dose to workers and the public;
- Environmental impacts of the project;
- Existence of technical resources;
- Availability of waste management and disposal facilities;
- Costs; and
- Public opinion.

In its preliminary plan (FWENC, 2003e, Appendix C), FWENC assumed an approach to decommissioning the proposed Idaho Spent Fuel Facility that included decontaminating equipment and building surfaces, demolishing and completely removing contaminated buildings, and free release of as many items as possible for recycling/salvage in accordance with the NRC release criteria.

FWENC intends to select construction materials and use preventive and protective methods (ALARA principles) during operations to minimize the amount of actual decontamination required during decommissioning. Based on this approach, FWENC assumes that a majority of building surfaces and some equipment should be uncontaminated and released for unrestricted use. Equipment and surface decontamination methods would also be chosen to minimize secondary wastes and provide for the greatest amount of free-releasable items without unnecessarily inflating costs.

Decommissioning activities would likely begin with the decontamination and removal of equipment from the Transfer Area. Systems would be vacuumed or flushed, as appropriate, to remove any residual materials, and contaminated filters would be removed from equipment for safe disposal. As required by facility operation procedures, a complete history of materials processed through the Transfer Area and facility maintenance activities would be maintained along with accounts of spills and clean-up actions. This historical record would be available for making needed revisions to the decommissioning plan before final decommissioning operations begin. Based on the preliminary plan, decommissioning of the proposed Idaho Spent Fuel

Facility would be divided into two broad phases: (i) decontamination and dismantling and (ii) site restoration.

The decontamination and dismantling phase would begin after all SNF has been transferred from the proposed Idaho Spent Fuel Facility to a geologic repository. Major activities during this phase include removing contaminated systems and components, decontaminating structures, and performing a final radiation survey. The intent of this phase would be to reduce radioactivity to acceptable levels, allowing termination of the NRC license. As noted previously, based on the current design for the proposed facility, the anticipated areas of radioactive contamination would be the Transfer Area, Solid Waste Processing Area, HVACs, and those portions of systems that contained radioactive liquids. During this phase, contaminated systems and components would be handled in one of two ways: (i) they would be decontaminated and removed or (ii) they would be removed, packaged, and shipped either to an offsite processing facility or to a low-level radioactive waste disposal facility.

The site-restoration phase would begin immediately after the decontamination and dismantling phase is completed, although some site-restoration activities may occur during the decontamination and dismantling phase. The site restoration phase would involve the final disposition of SSCs. SSCs required to contain and control radioactive materials during decommissioning activities would be identified and excluded from any restoration until no longer required. These excluded systems then would be decontaminated and removed for the performance of the final site survey. Site-restoration activities not involving radioactive materials may be completed following termination of the NRC license.

FWENC developed a 24-month schedule for decommissioning (FWENC, 2003e, Appendix C) to support the preliminary decommissioning plan. During the decommissioning planning phase, a final decommissioning schedule would be created. The sequence of decommissioning activities would depend on access and material-handling restrictions or by worker exposure considerations. All activities would be planned to minimize the spread of contamination. In most parts of the facility, uncontaminated or only slightly contaminated items would be removed first to avoid contamination or further contaminating them when more highly contaminated equipment is removed. When uncontaminated equipment cannot be removed first, covers or other protection would be used to minimize the spread of contamination. The proposed Idaho Spent Fuel Facility would be equipped with cranes, hoists, forklifts, and lifting and transport systems. These systems would be used to lift and transport components and equipment to support decommissioning activities. Installed cranes, hoists, and other lifting devices would be decontaminated and dismantled when they are no longer needed to support decommissioning activities.

A final radiological survey would be performed to determine the condition of the proposed Idaho Spent Fuel Facility site after decontamination activities have been completed. This survey is to demonstrate that radiological conditions at the site meet the NRC license termination criteria. A detailed plan for the survey would be submitted to the NRC for approval prior to the final survey and submittal of the application for license termination. NRC has provided guidance for developing the final radiological survey plan (Berger, 1992; NRC, 2000b). The final survey results would be provided to NRC to support license termination. The final survey would be designed so that NRC can verify procedures, results, and interpretations.

Release of the site, facility, and materials would be based on release criteria for surface contamination, direct exposure, and soil and water concentrations consistent with the NRC requirements in 10 CFR Part 20, Subpart E. NRC has provided consolidated guidance for compliance with the site-release criteria (NRC, 1994, 2003e)

FWENC (2003e, Appendix C) provides a preliminary estimate of the decommissioning costs for the proposed Idaho Spent Fuel Facility. The costs of activities involved in radiological decommissioning as well as expenditures necessary to complete nonradiological site-restoration activities are included in the cost estimate. The costs (in 2001 dollars) for the selected decommissioning alternative have been estimated at $22,600,000 for radiological decommissioning activities and $13,200,000 for nonradiological decommissioning activities (site restoration).

The NRC requirements in 10 CFR 72.30(c) provide financial assurance methods acceptable for decommissioning. Decommissioning of the facility would remain the responsibility of DOE in accordance with its contract with FWENC. According to the terms of the contract, DOE would work to give the contract a high priority and obligate additional funds as necessary to pay the costs of decontamination and decommissioning (FWENC, 2003e, Appendix C). DOE has submitted a Statement of Intent to provide decommissioning funding assurance, and FWENC has submitted a request for exemption from the requirements in 10 CFR 72.30(c) (FWENC, 2003e, Appendix C).

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5 MITIGATION MEASURES

5.1 Mitigation Measures During Construction and Operation

The types of impacts and potential mitigation measures for the proposed action are summarized in Table 5-1, based on the generic analyses presented in the U.S. Department of Energy (DOE) programmatic environmental impact statement (EIS) (DOE, 1995, Volume 2, Part B, Appendix C). As described in Section 4, most of the impacts from the proposed action are small or negligible. Mitigation measures typically include monitoring and best-management practices, such as using water to control fugitive dust and soil-retention methods to control erosion.

5.2 Environmental Measurement and Monitoring Programs Conducted by Other Agencies

Environmental monitoring is a key aspect of mitigating potentially adverse impacts that may result from the proposed action. The proposed Idaho Spent Fuel Facility would be one of many facilities in the Idaho National Engineering and Environmental Laboratory (INEEL). The DOE Idaho Operations Office is the principal INEEL manager, responsible for site services, environmental control and management, and overall safety and emergency planning functions. The day-to-day management and operation of the facility is performed for DOE by Bechtel BWXT Idaho, LLC, a consortium of Bechtel National, Inc., BWX Technologies Company, and eight regional universities. In addition to environmental monitoring programs, site-specific surveys have been conducted for archeological, historical, and cultural resources (FWENC, 2003a).

In accordance with the organizational structure for the proposed Idaho Spent Fuel Facility, Foster Wheeler Environmental Corporation (FWENC) is responsible for the operational monitoring programs within the proposed Idaho Spent Fuel Facility site and relies on the DOE Idaho Operations Office programs for monitoring outside the boundaries of the proposed Idaho Spent Fuel Facility site (FWENC, 2003a,b). To prevent multiple organizations collecting duplicate data and using varied methodologies, the INEEL Monitoring and Surveillance Committee was formed in 1997. The Committee meets periodically to coordinate activities among organizations with a stake in operations at the INEEL facility, including DOE; Bechtel BWXT Idaho, LLC (the INEEL Management and Operations contractor); Argonne National Laboratory–West; INEEL and DOE contractors; the Shoshone–Bannock Tribes; the Idaho Department of Environmental Quality; the National Oceanographic and Atmospheric Administration; the U.S. Geological Survey; and the Environmental Surveillance, Education, and Research Program. It is expected that FWENC will participate in this Committee and share in the exchange of information related to monitoring, analytical methodologies, and quality assurance to coordinate efforts and avoid unnecessary duplication of data (FWENC, 2003a,b).

The environmental monitoring programs on the INEEL include

- Effluent Monitoring Program;
- Drinking Water Program;
- Storm Water Monitoring Program;
- Site Environmental Surveillance Program;
- Offsite Environmental Surveillance Program;

Table 5-1. Summary of Potential Impacts and Potential Mitigation Measures[a]		
Impact Area	**Potential Impact**	**Potential Mitigation**
Land Use	Land disturbance and restricted access	Land previously disturbed and already in restricted access area; no mitigation required
Geology and Soils	Disturbance of soil	Fugitive dust control; erosion control; existing INEEL Storm Water Pollution Prevention Plans
Water Resources	Water usage and runoff during construction; no liquid effluent during operations	Best management practice; existing INEEL Storm Water Pollution Prevention Plans
Ecological Resources	Endangered and threatened species; habitat fragmentation	Preactivity surveys for sensitive and protected species conducted; no endangered or threatened species identified. Consultation with appropriate Federal, state, and Tribal agencies, as appropriate
Historic, Archaeological, or Cultural Resources	No known resources at proposed Idaho Spent Fuel Facility	Surveys conducted; no resources identified. If resources identified, INEEL issues Stop-Work Order and prepares mitigation plans in consultations with affected Federal, state, and Tribal agencies; existing INEEL Cultural Resource Management Plans
Air Resources	Radiological operational emissions; toxic air pollutants; fugitive dust	Fugitive dust control, hazardous material control, and air monitoring both onsite and offsite
Public and Occupational Health and Safety	Radiological and nonradiological effects from normal operations and off-normal operations	Access control, facility design; safety analysis, emergency planning; NRC inspection and surveillance; NRC annual reporting requirements
Transportation	Potential operational exposures from onsite SNF transfers; transport of remaining TRIGA fuel elements to INEEL	Use of approved transport vehicles and containers, transport casks, qualified equipment operators, and shipment manifesting procedures
Waste Management	Industrial wastes from construction and operations; low-level radioactive waste from operations	Current waste management programs at INEEL, including waste minimization and recycling

Table 5-1. Summary of Potential Impacts and Potential Mitigation Measures[a] (continued)		
Impact Area	**Potential Impact**	**Potential Mitigation**
Socioeconomics	Up to 250 workers during peak construction; 60 workers during first 4 years of operations	Small proportion (less than 5 percent) of total INEEL workforce; minimal impacts

DOE = U.S. Department of Energy
EIS = environmental impact statement
INEEL = Idaho National Engineering and Environmental Laboratory
NRC = U.S. Nuclear Regulatory Commission
SNF = spent nuclear fuel
TRIGA = Training, Research, and Isotope Research Reactors built by General Atomic

[a] DOE. DOE/EIS–0203–F, "Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement." Vol. 2, Part B, Appendix C. Idaho Falls, Idaho: DOE, Idaho Operations Office. 1995.

- U.S. Geological Survey Groundwater Monitoring Program;
- Meteorological Monitoring Program; and
- State of Idaho/INEEL Oversight Program.

The FWENC monitoring program for the proposed Idaho Spent Fuel Facility is discussed in more detail in Section 6 of this EIS. U.S. Nuclear Regulatory Commission also will prepare a safety evaluation report to provide a detailed evaluation of compliance of the monitoring program with the applicable regulations. The environmental programs managed by other agencies at and around INEEL are described in DOE (2000) and summarized next.

5.2.1 Effluent Monitoring Program

This section summarizes the environmental monitoring programs conducted by others for the DOE Idaho Operations Office at INEEL.

5.2.1.1 Radiological Effluents

There are six airborne emission sampling points for continuous monitoring of radionuclides at INEEL, outside the proposed Idaho Spent Fuel Facility site. Of the six sample locations, two are at the Idaho Nuclear Technology and Engineering Center (INTEC), adjacent to the proposed Idaho Spent Fuel Facility site. Data from each airborne sample location are reported monthly to a centralized database, the Radioactive Waste Management Information System, operated by Bechtel BWXT Idaho, LLC.

5.2.1.2 Nonradiological Effluents

Nonradiological airborne effluents are monitored at the sources, the New Calcining Facility and at Argonne National Laboratory–West. The results are published in the INEEL Non-Radiological Waste Management Information System annual reports. Nonradiological liquid effluents are monitored from discharge points within INEEL and in Idaho Falls.

5.2.2 Drinking Water Program

Bechtel BWXT Idaho, LLC, monitors the INEEL production and drinking water wells for chemicals, radiological, and bacteriological contaminations at INEEL facilities. The program uses laboratories certified by the states where the analyses are accomplished (FWENC, 2003a). In the facilities not operated by Bechtel BWXT Idaho, LLC, and that have a production well, Argonne National Laboratory–West provides samples to INEEL for analysis. No new production wells are within the proposed Idaho Spent Fuel Facility site boundaries; therefore, FWENC will not need to provide samples for analyses.

The production well and distribution water samples are analyzed for alpha- and beta-emitting radionuclides. Tritium analyses are also performed on drinking water samples. Strontium-90 analyses are performed on samples from drinking water wells in the INTEC area, adjacent to the proposed Idaho Spent Fuel Facility site. Water samples are also tested for coliform bacteria, volatile organic compounds, inorganic contaminants (lead and copper), nitrates, and dissolved solids.

5.2.3 Storm Water Monitoring Program

As a requirement of the National Pollutant Discharge Elimination System (NPDES) General Permit, INEEL developed and implemented programs for monitoring snow melt and rain runoff for construction activities (DOE, 1998) and industrial operations (DOE, 2001). Samples are collected and analyzed in accordance with NPDES sampling standards. A site-specific storm water pollution prevention plan would be developed for construction activities at the proposed Idaho Spent Fuel Facility (FWENC, 2003a, Section 12.1).

5.2.4 Site Environmental Surveillance Program

The site environmental surveillance program has the overall responsibility for sampling air and soil as well as measuring environmental radiation at various onsite locations. Some sampling is also conducted offsite for comparison. Bechtel BWXT Idaho, LLC, maintains the database containing sampling and analytical information from this program. Sampling includes

- Low-volume air samplers;
- Atmospheric moisture samplers;
- Nitrogen dioxide/sulfur dioxide monitoring stations; and
- Environmental dosimeters.

5.2.5 Offsite Environmental Surveillance Program

The Environmental Surveillance, Education and Research Program conducts independent environmental monitoring, using offsite laboratories to perform radiological and radiochemical analyses. Samples are collected from a network of offsite, low-volume air and atmospheric moisture samplers. The program also analyzes the following samples:

- Air samples from stations in Rexburg and Blackfoot to determine concentrations of fine particulates;

- Drinking water samples from local communities;

- Milk samples from regional dairies;
- Produce samples from private gardens;
- Wheat samples from regional grain elevators;
- Potato samples from storage warehouses;
- Tissue samples from sheep grazing on the INEEL and game animals;
- Soil samples from boundary locations; and
- Radiation readings from regional thermoluminescent dosimeters.

Bechtel BWXT Idaho, LLC, also does offsite monitoring by collecting periodic precipitation samples in Idaho Falls for tritium analysis by liquid scintillation counting. The National Park Service manages the Interagency Monitoring of Protected Visual Environments (IMPROVE) program, a cooperative measurement effort governed by a steering committee composed of representatives from Federal and regional–state organizations. The IMPROVE monitoring program was established in 1985 to aid in the protection of visibility in Class I areas. Part of the program includes measuring fine suspended particles that are the primary cause of visibility degradation. The program uses two samplers: one at Craters of the Moon National Monument and Preserve and one inside INEEL (DOE, 2000).

5.2.6 U.S. Geological Survey Groundwater Monitoring Program

Since 1949, the U.S. Geological Survey has monitored INEEL ground and surface water. The U.S. Geological Survey maintains aquifer observation wells on or near INEEL. The wells are monitored for water levels and radiological and nonradiological substances. The U.S. Geological Survey collects water samples from selected onsite production wells and groundwater monitoring wells and analyzes the samples for purgeable organic compounds. Results of these studies are periodically published in U.S. Geological Survey Water Resources Investigations Reports and Open-File Reports.

5.2.7 Meteorological Monitoring Program

The National Oceanographic and Atmospheric Administration Air Resources Laboratory maintains meteorological stations in the vicinity of INEEL, which continuously measure parameters including temperature, wind direction and speed, relative humidity, and precipitation. A wind-profiling radar system on INEEL also makes continuous measurements. Data from the stations are telemetered to the National Oceanographic and Atmospheric Administration Idaho Falls facility and archived.

5.2.8 State of Idaho/INEEL Oversight Program

Since 1990, the State of Idaho has operated an environmental surveillance program that includes collection and analysis of air, precipitation, atmospheric moisture, water, soil, and milk samples taken on and around INEEL. The program also has a network of pressurized ion chambers, electric ion chambers, and environmental dosimeters.

5.3 References

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6 EFFLUENT AND ENVIRONMENTAL MEASUREMENTS AND MONITORING PROGRAMS

The proposed Idaho Spent Fuel Facility would be one of many active, proposed, and formerly operational facilities at the Idaho National Engineering and Environmental Laboratory (INEEL). The U.S. Department of Energy (DOE) Idaho Operations Office is the principal INEEL manager and has a comprehensive environmental monitoring program conducted on and around INEEL. The INEEL Monitoring and Surveillance Committee was formed to prevent multiple organizations from collecting duplicate data using varied methodologies. The environmental monitoring programs at INEEL include

- Effluent Monitoring Program;
- Drinking Water Program;
- Storm Water Monitoring Program;
- Site Environmental Surveillance Program;
- Offsite Environmental Surveillance Program;
- U.S. Geological Survey Groundwater Monitoring Program;
- Meteorological Monitoring Program; and
- State of Idaho/INEEL Oversight Program.

Further information concerning these programs is discussed in Section 5 and presented in the Foster Wheeler Environmental Corporation (FWENC) environmental report (2003a). It is expected that FWENC would participate in this committee and the associated monitoring programs. FWENC is responsible for the operational monitoring programs within the proposed Idaho Spent Fuel Facility site and relies on these DOE Idaho Operations Office programs outside the proposed Idaho Spent Fuel Facility site (FWENC, 2003a, Section 6.3).

6.1 Radiological Monitoring

FWENC would be responsible for monitoring within the proposed Idaho Spent Fuel Facility site and would rely on existing programs for monitoring outside the proposed Idaho Spent Fuel Facility site. Existing environmental programs on INEEL include the monitoring of effluents, drinking water, snow melt and rain runoff, direct radiation, air, soil, offsite produce and animal products, groundwater, surface water, and meteorology. This section describes the monitoring performed on the proposed Idaho Spent Fuel Facility site. Based on FWENC (2003b, Section 7.6.1.4), there would be no radioactive liquid discharges from the proposed facility. Radiological monitoring for the preoperational and operational periods is presented in the next two subsections.

6.1.1 Preoperational Radiological Monitoring

The preoperational radiological monitoring program would establish background information for the site. Monitoring and sampling locations for the preoperational program are shown in Figure 6-1. The background information would be compared to operational data and ultimately with decommissioning survey results. The preoperational program would measure direct radiation, airborne radionuclide concentrations within the proposed Idaho Spent Fuel Facility site boundaries, and radionuclide concentrations in the soil on the proposed site. Direct radiation would be measured at the facility fence using 10 environmental thermoluminescent

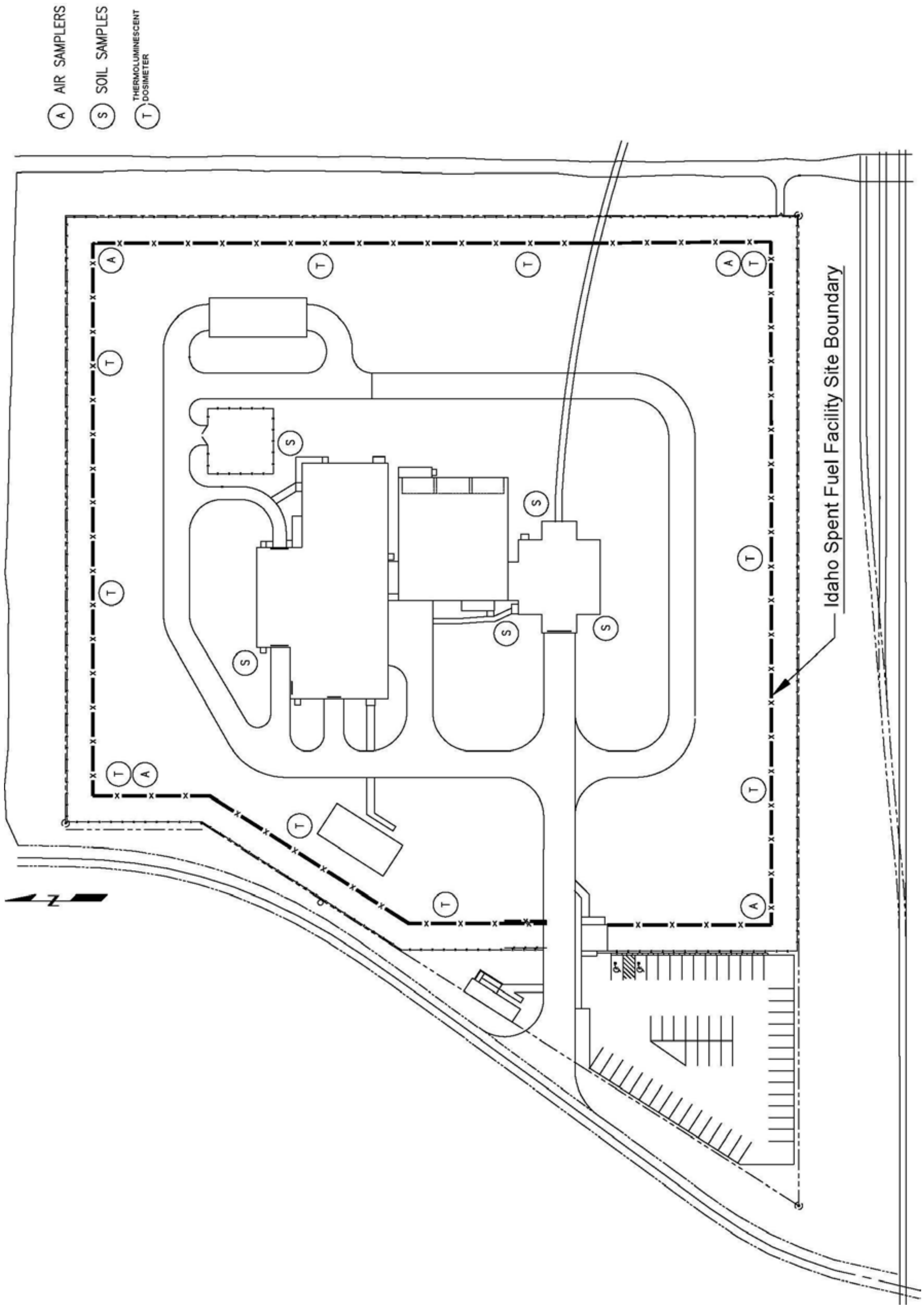

Figure 6-1. Preoperational Environmental Radiation Monitoring Locations at the Proposed Idaho Spent Fuel Facility (Modified from FWENC, 2003b)

dosimeters that would be exchanged quarterly. After dust-generating activities are complete and electric power is available, particulate air samplers would begin collecting data at four locations (oriented at 90-degree intervals from the predominant wind direction, west-southwest). The filter paper in the particulate air samplers would be collected weekly for analysis and replaced. At the start of construction, five soil samples would be collected from random locations and analyzed quarterly. Information gained during the preoperational phase of the radiological monitoring program may be used to modify the plans for operational monitoring (e.g., identify additional sampling locations).

6.1.2 Operational Radiological Monitoring

The operational monitoring program would demonstrate compliance with the exposure limits to the public in 10 CFR 72.104 and 40 CFR Part 61, Subpart H. Similar to the preoperations monitoring program, the operational program would measure direct radiation, airborne radionuclide concentrations within the proposed Idaho Spent Fuel Facility site boundaries, and radionuclide concentrations in the soil on the proposed site (Figure 6-2). The environmental thermoluminescent dosimeters at the fence would be exchanged monthly during operations. Particulate air samplers would continue to collect data at the four preoperational locations plus an additional location at the interior of the proposed Idaho Spent Fuel Facility site. The filter paper in the particulate air samplers would be collected weekly for analysis and replaced. During operations, five soil samples would be collected from random locations and analyzed quarterly. Additional sampling and analysis would be performed if routine outdoor surveys show unexpected anomalies or after any incident involving a radioactive spill.

Particulates and gaseous radionuclides are expected to constitute the proposed Idaho Spent Fuel Facility releases during operations. Specifically, the primary particulate radionuclides are cesium-137/barium-137m and strontium-90/yttrium-90. The primary gaseous radionuclides of concern are iodine-129, krypton-85, and tritium (hydrogen-3), which could be released as a result of the fuel-packaging operations conducted in the Fuel Packaging Area. Facility effluent monitoring at the proposed Idaho Spent Fuel Facility would consist of stack sampling for particulate radionuclides and stack sampling for iodine-129 and tritium. An isokinetic sampler in the stack would determine effluent concentrations.

6.2 Nonradiological Monitoring

6.2.1 Preoperational Monitoring

Preoperational monitoring was used to collect baseline data on the proposed site. Much of this baseline information is presented in Section 3 of this environmental impact statement (EIS).

Air sampling within the proposed Idaho Spent Fuel Facility during the preoperational phase would begin after dust-generating activities are complete and would not include analysis for nonradioactive constituents (FWENC, 2003a, Section 6.1).

Soil sampling of the proposed Idaho Spent Fuel Facility site was conducted in July 2000 as part of a geotechnical investigation to determine site geotechnical characteristics (FWENC, 2003a, Section 6.1). Soil samples also would be collected periodically from within the proposed Idaho Spent Fuel Facility site boundaries during the preoperational phase; however, these samples would not be analyzed for nonradioactive constituents (FWENC, 2003a, Section 6.1).

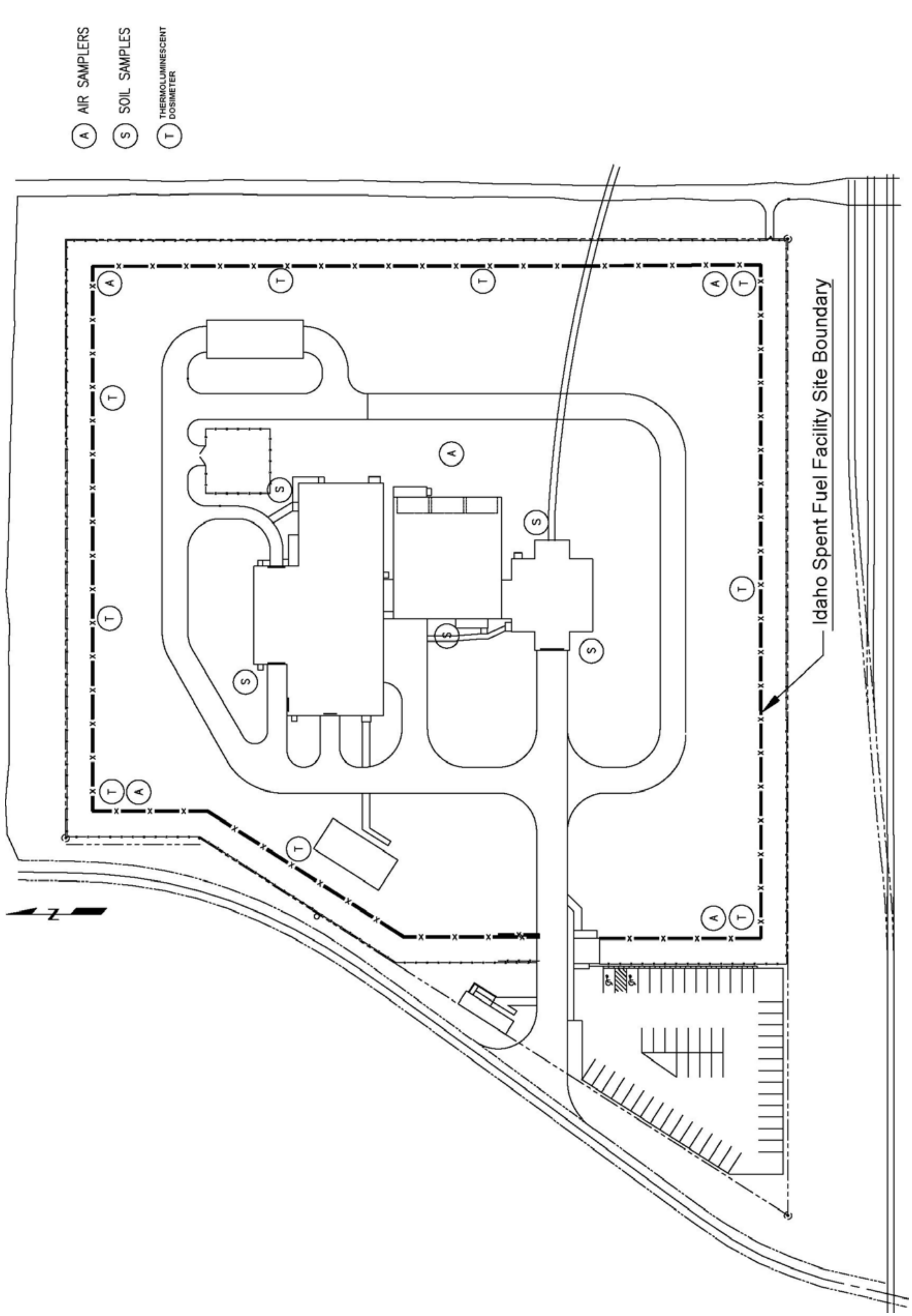

Figure 6-2. Operational Environmental Radiation-Monitoring Locations at the Proposed Idaho Spent Fuel Facility (Modified from FWENC, 2003b)

No surface or groundwater bodies are affected by the proposed Idaho Spent Fuel Facility. Therefore, the environmental monitoring programs do not need to include these areas (FWENC, 2003a, Section 6.1). Rainwater and snow melt from the proposed Idaho Spent Fuel Facility would be classified as storm water discharge and must be considered by the National Pollutant Discharge Elimination System (NPDES) permitting process. Storm water permits fall into two classifications—construction and industrial activities. For the construction storm water permit process, the DOE Idaho Operations Office filed for a construction general permit as required by Federal law (DOE, 1998). A site-specific Construction Storm Water Pollution Prevention Plan would be developed, but does not need to be submitted to the U.S. Environmental Protection Agency (EPA) (FWENC, 2003a, Section 12.1).

INEEL has undergone a variety of ecological assessments in the last 10 years. Two of the most recent were the Spent Nuclear Fuel Programmatic EIS (DOE, 1995) and the Idaho High-Level Waste and Facilities Disposition EIS (DOE, 2002). Because these assessments did not include the proposed Idaho Spent Fuel Facility site, FWENC sponsored a separate assessment by the S.M. Stoller Corporation. The parameters and results of this assessment are summarized in the applicant's environmental report (FWENC, 2003a, Section 4.3).

6.2.2 Operational Monitoring

The proposed Idaho Spent Fuel Facility would have no chemical air discharges to the environment. Nonradiological airborne effluents are monitored at the sources, the New Waste Calcining Facility, and the Argonne National Laboratory–West (FWENC, 2003a, Section 6.3). At the proposed Idaho Spent Fuel Facility, process ventilation would be filtered and discharged through the monitored exhaust stack. Air sampling within the proposed Idaho Spent Fuel Facility would be limited to radiological constituents (FWENC, 2003a, Section 6.2).

No nonradiological soil sampling within the proposed Idaho Spent Fuel Facility site would be conducted during the operation phase (FWENC, 2003a, Section 6.1).

The proposed Idaho Spent Fuel Facility, as part of INEEL, would become part of the site environmental surveillance program. This program has the overall responsibility for sampling air and soil at various onsite locations. Some sampling also is conducted offsite for comparison. Nonradiological constituents monitored in this program include nitrogen dioxide and sulfur dioxide (FWENC, 2003a, Section 6.3).

The proposed Idaho Spent Fuel Facility, as part of the INEEL, would become a part of the offsite environmental surveillance program. The Environmental Surveillance, Education and Research Program conducts environmental monitoring independent of the INEEL management and operating contractor. This program analyzes samples from stations in Rexburg and Blackfoot to determine concentrations of fine particulates. The National Park Service manages a program called Interagency Monitoring of Protected Visual Environments (IMPROVE) to measure fine particles that are the primary cause of visibility degradation. This program uses two samplers—one at Craters of the Moon National Monument and Preserve and one inside INEEL (FWENC, 2003a, Section 6.3).

The proposed Idaho Spent Fuel Facility would have no chemical liquid discharges to the environment (FWENC, 2003a, Section 5.3). Nonradiological liquid effluents are monitored from discharge points within INEEL and in Idaho Falls, Idaho. Because no liquid effluents would be discharged, no nonradiological monitoring is required of any liquid discharge at the proposed Idaho Spent Fuel Facility.

The proposed Idaho Spent Fuel Facility does not require the addition of any new water supply wells. The proposed facility would use water from the existing INEEL wells and would have minimal impact on groundwater resources (FWENC, 2003a, Section 5.6).

The INEEL management and operating contractor monitors the INEEL production and drinking water wells for chemical, radiological, and bacteriological contaminations. Facilities that the INEEL management and operating contractor do not operate and that contain a production well must provide samples for analyses to the INEEL management and operating contractor for analysis. No production wells are within the proposed Idaho Spent Fuel Facility site boundaries. Therefore, FWENC would not need to provide samples to the INEEL management and operating contractor (FWENC, 2003a, Section 6.3). Production and drinking water wells adjacent to the proposed Idaho Spent Fuel Facility site would be monitored for nonradiological constituents as part of the existing INEEL Environmental Monitoring Program.

The proposed Idaho Spent Fuel Facility, as part of INEEL, would become a part of the U.S. Geological Survey Groundwater Monitoring Program. The U.S. Geological Survey maintains aquifer observation wells on or near INEEL, which are monitored for nonradiological substances. The U.S. Geological Survey also collects water samples from selected onsite production wells and groundwater monitoring wells and analyzes the samples for purgeable organic compounds (FWENC, 2003a, Section 6.3).

As a requirement of the NPDES General Permit, INEEL developed a program for monitoring snow melt and rain runoff. The proposed Idaho Spent Fuel Facility would be exempt from the industrial activities storm water permit, because it is not included in EPA-identified sectors or subsectors requiring this permitting process (FWENC, 2003a, Section 12.1).

Because the proposed Idaho Spent Fuel Facility would be within the INEEL boundary, annual environmental assessments prepared for DOE would provide information updates related to the INEEL ecological monitoring program (FWENC, 2003a, Section 6.1).

6.3 References

DOE. DOE/EIS–0287–F, “Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement.” Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.

———. DOE/ID–10425(98), “INEEL Storm Water Pollution Prevention Plan for Construction Activities—Generic Plan.” Idaho Falls, Idaho: DOE, Idaho Operations Office. 1998.

———. DOE/EIS–0203–F, “Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement.” Idaho Falls, Idaho: DOE, Idaho Operations Office. 1995.

FWENC. “Environmental Report, Idaho Spent Fuel Facility.” NRC Docket No. 72-25. ISF–FW–RPT–0032. Rev. 3. Morris Plains, New Jersey: FWENC. 2003a.

———. “Safety Analysis Report, Idaho Spent Fuel Facility.” NRC Docket No. 72-25. ISF–FW–RPT–0033. Rev. 3. Morris Plains, New Jersey: FWENC. 2003b.

7 COST-BENEFIT ANALYSIS

The potential environmental impacts of constructing and operating the proposed Idaho Spent Fuel Facility at the Idaho National Engineering and Environmental Laboratory (INEEL) are discussed in Section 4 of this environmental impact statement (EIS). This section summarizes other costs and benefits associated with the proposed action and the no-action alternatives. The economic costs and benefits provided by Foster Wheeler Environmental Corporation (FWENC) in its license application and environmental report (FWENC, 2003a,b) and the U.S. Department of Energy (DOE)[1] are presented and supplemented as necessary with additional assessments by the U.S. Nuclear Regulatory Commission (NRC) and Center for Nuclear Waste Regulatory Analyses staffs. In addition, this section summarizes the results of a generic analysis for a Dry Fuel Storage, Fuel Receiving, Canning/Characterization and Shipping Facility presented in the DOE programmatic spent nuclear fuel (SNF) EIS (DOE, 1995, Volume 2, Part B, Appendix C, Alternative B).

7.1 Costs Associated with the Proposed Idaho Spent Fuel Facility

An estimate of costs for construction and operation of the proposed Idaho Spent Fuel Facility is provided by FWENC as part of its license application (FWENC, 2003a). The estimate is based on the assumption the proposed facility will be constructed on a 3.2-ha [8-acre] site adjacent to the Idaho Nuclear Technology and Engineering Center (INTEC). In the FWENC analysis, construction of the proposed Idaho Spent Fuel Facility was assumed to begin in July 2003, with operations scheduled to commence in June 2005. Using the current schedule, construction would begin later than these assumed dates. The differences in estimated costs, however, likely would be small, and the FWENC estimates are suitable to evaluate cost and benefit of the proposed action.

7.1.1 Costs Associated with Construction Activities

FWENC would design, construct, and initially operate the proposed Idaho Spent Fuel Facility per contract with DOE. In accordance with the terms of the contract, after an initial payment by DOE, FWENC would be responsible for funding the construction and initial operation of the proposed Idaho Spent Fuel Facility. FWENC estimates construction costs for the proposed facility will be $119.6 million (2001 dollars) (FWENC, 2003a).

7.1.2 Costs Associated with Operational Activities

After the proposed Idaho Spent Fuel Facility is operational, DOE would make payments to FWENC during the transfer and storage of the first 800 fuel-handling units of SNF. As defined in the contract, one fuel-handling unit is equal to one fuel element for intact SNF. These amortized capital costs total about $119.6 million (2001 dollars). In addition to the amortizing payments, DOE also would make payments for the transfer and storage of the remaining SNF at specific unit prices for each SNF type. The total payments inclusive of all fuel types could be nearly $32.5 million (2001 dollars).

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[1]DOE. DOE–ID–11003, "Moving INEEL Spent Nuclear Fuel to the Repository." Idaho Falls, Idaho: DOE, Idaho Operations Office. Predecisional Draft. 2002.

In accordance with the contract, poststorage operation and maintenance of the facility by FWENC would be at the option of DOE. Pending the necessary transfer of the NRC license from FWENC, DOE would have the contractual option to assume responsibility for the facility after the initial fuel-handling, packaging, and storage operations. Should DOE desire that FWENC continue as the licensee during the poststorage operations phase of the project, DOE would pay FWENC almost $1.94 million (2001 dollars) per year.

7.1.3 Costs Associated with Decontamination and Decommissioning

As part of the contract with FWENC, DOE retains ownership of the SNF and remains financially responsible for the eventual decontamination and decommissioning of the proposed Idaho Spent Fuel Facility. FWENC provided a proposed decommissioning plan (FWENC, 2003a, Appendix C) that presents the estimated cost of dismantling, decontaminating, and decommissioning the site at $22.6 million (2001 dollars) for radiological decommissioning activities and $13.2 million (2001 dollars) for the nonradiological activities associated with site restoration. The decommissioning cost estimates were derived using approaches from industry and DOE guidance (TLG Engineering, 1986; DOE, 1994). Unit cost factors incorporating site-specific considerations were used whenever practicable, and quantities and volumes of the equipment and material expected to be removed during decommissioning were estimated using proposed facility drawings. The cost estimate also includes peripheral costs such as preparing work plans, writing procedures, and waste costs as described in DOE (1994). These costs are summarized in Table 7-1 and described in more detail next.

7.1.3.1 Radiological Decommissioning Costs

The radiological decommissioning cost estimate provided by FWENC for the proposed Idaho Spent Fuel Facility considers radiological decommissioning costs to be only those costs associated with normal decommissioning activities necessary for the release of the site for unrestricted use in accordance with the NRC radiological criteria for license termination in 10 CFR Part 20, Subpart E. The radiological decommissioning cost estimate does not include those costs associated with SNF management or the disposal of nonradioactive structures and materials.

Burial costs were derived from FWENC modeling and analysis of low-level radioactive waste disposal costs. Contingencies were applied to each area of the cost estimate (i.e., decontamination and dismantlement, waste disposal, final survey). No credit was taken for equipment salvage value.

7.1.3.2 Nonradiological Decommissioning Costs

Although not required by the NRC regulations, FWENC included cost estimates for nonradiological decommissioning activities conducted as part of site restoration. The cost estimates considered nonradiological decommissioning costs to be those costs associated with site remediation and demolition and removal of uncontaminated structures.

Table 7-1. Estimated Decommissioning Costs[a]	
Activity	**Estimated Cost (2001 Dollars)**
Dismantlement, decontamination, and remediation	$12,500,000
Waste disposal[b]	$6,300,000
Final survey	$3,800,000
Subtotal (radiological decommissioning costs)	$22,600,000
Site-restoration total (nonradiological decommissioning)	$13,200,000
Total Decommissioning Costs	**$35,800,000**

FWENC = Foster Wheeler Environmental Corporation

[a] FWENC. "License Application, Idaho Spent Fuel Facility." NRC Docket No. 72-25. ISF–FW–RPT–0127. Rev. 3. Morris Plains, New Jersey: FWENC. 2003.
[b] Waste disposal estimate based on construction debris landfill at $18–$24 per metric ton [$16–$22 per ton]; low-level waste at $1,500–$60,625 per metric ton [$1,360–$55,000 per ton]; and special materials at $41,335 per metric ton [$37,500 per ton].

7.1.4 Other Costs Associated with the Proposed Action

Materials required for construction and operation of the proposed Idaho Spent Fuel Facility will be similar to those for an industrial construction project. In the DOE programmatic SNF EIS (DOE, 1995, Volume 2, Part B, Appendix C, Alternative B), DOE provides generic estimates for the costs of a facility similar to the FWENC design. These estimates are summarized for the construction and operation phases in Table 7-2.

Construction of the proposed Idaho Spent Fuel Facility would result in physical changes to the 3.2-ha [8-acre] tract for the proposed facility and the contiguous 4.1-ha [10-acre] construction laydown tract. Because these areas are small compared with the 2,305-km^2 [890-mi^2] INEEL, the physical changes would be minor. These changes would restrict land use and access, but this restriction would not affect the value of the land, because access to the property is currently restricted.

The proposed Idaho Spent Fuel Facility would be constructed on Federal reserve land under the jurisdiction of the DOE Idaho Operations Office. Therefore, there would be no costs associated with purchase of the land. Construction materials will include gravel, sand, concrete, steel, aluminum, copper, plastics, and lumber, at costs comparable to those for a similar size industrial facility. Other than special purpose items such as construction steel, SNF storage containers, and other dedicated special equipment, materials are available regionally.

The proposed Idaho Spent Fuel Facility operation would likely have little effect on regional economy. Transfer of SNF into new storage containers and placement in the vault would require consumable materials such as filters, welding supplies, and other housekeeping materials. Storage operations will require materials such as high efficiency particulate air filter media and other housekeeping materials.

Table 7-2. Costs Associated with a Generic Dry Fuel Storage Facility/Fuel Receiving, Canning/Characterization, and Shipping Project[a]

	Construction	Operation
Dry Fuel Storage		
Electrical	20 Megawatt hr/yr	200 Megawatt hr/yr
Fuel	Diesel: 6,400 L [1,690 gal]	0[b]
Solid Waste Generation	Total: 37.5 m^3 [49.0 yd^3]	Industrial: 10 m^3/yr [13.1 yd^3/yr] Low-Level Waste: 5 m^3/yr [6.5 yd^3/yr]
Canning/Characterization Facility		
Electrical	30 Megawatt hr/yr	1,800 Megawatt hr/yr
Fuel	Diesel: 10,000 L [2,640 gal]	Fuel Oil: 300,000 L [79,260 gal]
Solid Waste Generation	Total: 37.5 m^3 [49.0 yd^3]	Industrial: 490 m^3/yr [640 yd^3/yr] Low-Level Waste: 220 m^3/yr [290 yd^3/yr]

DOE = U.S. Department of Energy
EIS = environmental impact statement

[a] DOE. DOE/EIS–0203–F, “Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement.” Vol. 2, Part B, Appendix C, Alternative B. Idaho Falls, Idaho: DOE. 1995.
[b] Normal operations. Backup diesel generators may require diesel fuel.

After SNF is transferred from the proposed Idaho Spent Fuel Facility to a national high-level waste (HLW) repository, the proposed Idaho Spent Fuel Facility would be decommissioned. A small portion of the materials used in construction would not be available for release and would require disposal at a radioactive waste site. The rest of the materials would be recycled. Therefore, most proposed Idaho Spent Fuel Facility construction materials would be available for reuse or recycling.

Because the proposed Idaho Spent Fuel Facility would be located more than 17 km [10.5 mi] from the nearest community (Atomic City), there would be minimal impact on regional communities. The distances of communities from the construction site would also limit impacts from noise and other construction disturbances. Construction and operation would use regional labor resources, and an influx of workers is not anticipated. Impacts to housing availability and cost, transportation, or community infrastructures are expected to be small.

Because the proposed Idaho Spent Fuel Facility site is within INEEL, public access is controlled by DOE and limited to the highways (US 20/26). The proposed Idaho Spent Fuel Facility would not restrict public access to these rights of way or to archeological, cultural, or recreational sites.

7.1.5 Impact of the Proposed Idaho Spent Fuel Facility on the Programmatic Costs of SNF Management at INEEL

DOE estimated the programmatic costs of SNF management both with and without the construction and operation of the proposed Idaho Spent Fuel Facility (FWENC, 2003). Taking into account the strategy of employing the DOE standard storage container and the core capability of the proposed Idaho Spent Fuel Facility (FWENC, 2003c), the current life-cycle cost estimate for sending all SNF managed by DOE at INEEL to a national HLW repository is $2.815 billion (2001 dollars). This life-cycle cost considers the costs of the current contract between DOE and FWENC for construction and operation of the proposed Idaho Spent Fuel Facility plus the predicted cost of implementing any future modifications or enhancements to the facility necessary to prepare the SNF for shipment to a national HLW repository. The estimates of costs associated with modification, enhancement, or both include obtaining appropriate amendments to any NRC license for the facility.

If the strategy of repackaging SNF in a DOE standard storage container is not implemented and the proposed Idaho Spent Fuel Facility is not constructed, the life-cycle cost estimate for sending all DOE-managed SNF from INEEL to a national HLW repository is estimated to be $3.069 billion (2001 dollars). This estimate assumes alternative facility approaches (essentially making major modification to and extending the life of existing facilities) will be used in lieu of the proposed Idaho Spent Fuel Facility.

The assumptions used to develop this programmatic life-cycle cost/benefit estimate include

- A national HLW geological repository will open and shipments of SNF will begin in fiscal year 2010.
- Shipments to a repository will be complete by January 1, 2035.
- Certain facilities will be open and operational longer than planned if the proposed Idaho Spent Fuel Facility is not built to meet the previous assumptions.
- The INTEC Irradiated Spent Fuel Storage Facility (CPP–603) would be modified to expand the hot cell and add a load-out facility in lieu of the availability of the proposed Idaho Spent Fuel Facility.
- Standard rail casks and cost of transportation to a repository are provided by the Office of Civilian Radioactive Waste Management at no charge to INEEL.
- The full cost of fuel characterization programs deemed necessary for shipment of bare fuel to a geologic repository, though potentially significant, is not factored into this programmatic cost-benefit analysis.

Thus, the current estimate of programmatic cost-benefit to the government of employing the use of the DOE standard storage container and the proposed Idaho Spent Fuel Facility is, at a minimum, $251 million (2001 dollars) (FWENC, 2003d).

7.2 Benefits Associated with the Proposed Idaho Spent Fuel Facility

Construction and operation of the proposed Idaho Spent Fuel Facility would have a minor positive effect on the regional economy. Socioeconomic benefits include using regional workers for construction of the proposed facility and increasing sales of materials for regional suppliers throughout construction. Because the work force would be small relative to the number of employees at INEEL, the proposed action would not result in a regional growth spurt, and there would be no significant adverse impacts to the infrastructure of public services and transportation systems (see Section 4.10).

The proposed action is designed to support the INEEL mission and comply with agreements and commitments negotiated by DOE. Currently, most SNF to be received by the proposed Idaho Spent Fuel Facility is stored at INTEC. The 1995 Settlement Agreement among the DOE, the State of Idaho, and the U.S. Navy established specific activities required to remove SNF from Idaho by 2035. Although the current storage configuration has worked well, it does not prepare the SNF for shipment from INEEL to a national HLW repository. The proposed Idaho Spent Fuel Facility would provide the ability to remove the SNF from existing storage locations, place it in specially designed storage containers, then seal and place the loaded containers in interim storage. The new containers would be designed for compatibility with transportation systems and with the eventual permanent disposal systems. After the SNF is placed in the containers, it would not need to be repackaged for shipment to a national HLW repository when one becomes available.

7.3 References

DOE. DOE/EIS–0203–F, “Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement.” Idaho Falls, Idaho: DOE, Idaho Operations Office. 1995.

———. DOE/EM–0142P, *Decommissioning Handbook*. Washington, DC: DOE. 1994.

FWENC. “License Application, Idaho Spent Fuel Facility.” NRC Docket No. 72-25. ISF–FW–RPT–0127. Rev. 3. Morris Plains, New Jersey: FWENC. 2003a.

———. “Environmental Report, Idaho Spent Fuel Facility.” NRC Docket No. 72-25. ISF–FW–RPT–0032. Rev. 3. Morris Plains, New Jersey: FWENC. 2003b.

———. “Safety Analysis Report, Idaho Spent Fuel Facility.” NRC Docket No. 72-25. ISF–FW–RPT–0033. Rev. 3. Morris Plains, New Jersey: FWENC. 2003c.

———. “Foster Wheeler Environmental Corporation Idaho Spent Fuel Facility Response to NRC Request for Additional Information Related to Environmental Review.” Letter (March 7) from R.D. Izatt to NRC. FW–NRC–ISF–03–0048. NRC Docket No. 72-25. TAC No. L20768. Richland, Washington: FWENC. 2003d. [The preceding document is available for public review through the NRC electronic reading room at http://www.nrc.gov/reading-rm/adams.html.]

TLG Engineering. “Guidelines for Producing Commercial Nuclear Power Plan Decommissioning Cost Estimates.” AIF/NESP–036. Bridgewater, Connecticut: TLG Services, Inc. 1986.

8 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

8.1 Unavoidable Adverse Impacts

Information on the adverse impacts to the affected environment at the Idaho National Engineering and Environmental Laboratory (INEEL) that cannot be avoided for this proposed action is given in Section 4 of this environmental impact statement (EIS). The environmental impacts from the proposed action are small and will be mitigated by methods described in Section 5. Monitoring methods are described in Section 6. Comparison with the potential impacts from the proposed action to those of the no-action alternative is provided in Table 2-1. Detailed analysis of the potential impacts on public health and safety is provided in the safety evaluation report to be prepared by the U.S. Nuclear Regulatory Commission (NRC). Following is a brief summary of the impacts presented in Section 4 with topical areas classified as resources, ecosystems, or human communities.

- Land Use (Section 4.1)—Ecosystem: Construction activities to occur on an 3.2-ha [8-acre] facility site and an adjoining 4.1-ha [10-acre] laydown area. The 7.3 ha [18 acres] are adjacent to Idaho Nuclear Technology and Engineering Center (INTEC) and have been previously disturbed by other construction activities and land uses. Potential operation impacts include restricted access to the 3.2-ha [8-acre] facility site; and the use of the site for spent nuclear fuel (SNF) receiving, packaging, and storage.

- Transportation (Section 4.2)—Human Community: Operation impacts are related to transfer of the currently stored SNF at INTEC, a distance of 800 m [2,600 ft] or less, to the proposed Idaho Spent Fuel Facility. Shipments would be made in U.S. Department of Energy (DOE)-supplied casks loaded on trailers. Movement of the SNF within the proposed Idaho Spent Fuel Facility would be conducted in accordance with the DOE procedures and orders for SNF transfers within the INEEL complex.

- Geology and Soils (Section 4.3)—Resource: Construction-related impacts to soil would occur on the 3.2-ha [8-acre] site and, to some extent, on the 4.1-ha [10-acre] laydown area. Excavation, earthmoving, and grading would occur on the 3.2-ha [8-acre] site. There is no contamination at the site above regulatory limits. No significant construction or operation impacts would occur on mineral deposits or unique geological resources.

- Water Resources–Water Quality (Section 4.4.1)—Resource: Construction phase impacts would be minimal to both surface water quality and groundwater quality. A storm water pollution prevention plan will be implemented. The proposed site is 140–146 m [460 to 480 ft] above the Snake River Plain Aquifer. Water used for construction phase dust control would evaporate or seep into surface soils. No new groundwater wells or percolation ponds would be required.

- Water Resources–Water Use (Section 4.4.2)—Resource: During the first year of construction, about 1.5 million L [396,000 gal] of water would be used for dust suppression, with an estimated additional 1.91 million L [505,000 gal] for concrete production at the site. During the second year of construction, it is estimated that water needs would be reduced by half. Drinking water use during operation would be nearly 141,950 L/mo [37,500 gal/mo]. These two amounts are a small fraction of the

7.4 billion L [2.0 billion gal] used annually at INEEL and the annual withdrawal of 43 billion L [11.4 billion gal] permitted by the DOE/State of Idaho Water Rights Agreement. Wastewater treatment requirements would be met via existing INTEC facilities.

- Ecological (Section 4.5)—Ecosystem: Small impacts from the construction and operation of the facility would be anticipated. There are no wetlands or habitats for threatened or endangered plant or animal species at the 3.2-ha [8-acre] site or 4.1-ha [10-acre] laydown area. Secondary impacts on wildlife from noise and various human activities would also be small.

- Air Quality (Section 4.6)—Resource: Construction-related fugitive dusts and exhaust emissions would be temporary and highly localized. With construction phase watering, the fugitive dusts and particulates would be about 8.2 metric tons [9 tons]; this is a small amount in relation to the INEEL emission inventory for particulates. No impacts to radiological air quality are anticipated from construction activities. During operation, there would be no chemical air discharges, and the vehicular exhausts would be small and within limitations. Therefore, no significant impacts to nonradiological air quality are anticipated. Facility operations would not be expected to result in the atmospheric discharge of significant amounts of gaseous radioactive effluents. The facility would be fully enclosed and includes a special ventilation system along with high efficiency particulate air (HEPA) filters. Monitoring of stack emissions for particulate radionuclides, iodine-129, and tritium would be used to identify any releases.

- Noise (Section 4.7)—Resource: Construction phase noise levels would be typical of industrial areas; further, the noise would be temporary and highly localized. Noise from construction and operation traffic would be small in relation to existing traffic noise levels in the INTEC area. Potential noise levels from operations would be less than those from construction. Hearing protection will be required for workers per 29 CFR 1910.95. No unique noise receptors are in the vicinity of the proposed Idaho Spent Fuel Facility. Therefore, noise impacts are not expected to be significant.

- Historical, Cultural, and Paleontological (Section 4.8)—Human Community: There are no known historical and cultural resources, or paleontological resources, within the 3.2-ha [8-acre] site and the 4.1-ha [10-acre] laydown area. Thirty-eight buildings and structures within INTEC are potentially eligible for the National Register of Historic Places, but only one of these (CPP–603) is near the area that would be affected by the construction of the proposed facility and the transfer of SNF. The proposed facility would not introduce a built environment in a pristine natural setting. There are potential cumulative effects from withdrawal of access to the proposed 7.3-ha [18-acre] site by the Shoshone–Bannock Tribes, however, these lands are already contained within the limited access buffer area around INTEC.

- Visual/Scenic (Section 4.9)—Human Community: Because of its smaller scale in relation to the adjacent INTEC facilities, construction and operation of the proposed Idaho Spent Fuel Facility would not cause significant visual impacts to the Bureau of Land Management (BLM) Class IV rating for the INTEC area. Fugitive dusts and exhaust emissions from construction would not impair the BLM Class III rating of lands adjacent to INEEL nor would the minimal-to-nil releases of radioactive particulates and gases during operations. No significant visual or scenic impacts are anticipated.

- Socioeconomic (Section 4.10)— Human Community: Construction of the proposed Idaho Spent Fuel Facility is scheduled to last about 2 years. This phase would employ a maximum of 250 workers, about 3 percent of the current INEEL workforce of 8,100. Because most of the workers would likely come from the existing INEEL workforce, the construction phase would not have significant socioeconomic effects on population growth, employment levels, housing, and infrastructure. For the first 3 years of facility operations, when fuel receipt and packaging occurs, about 60 employees would be required. Storage operations beyond the first 3 years will likely require fewer staff. Most operations personnel would be from the local INEEL workforce. Again, no significant impacts are expected on the various features of the socioeconomic environment.

- Environmental Justice (Section 4.11)—Human Community: The minority population near INEEL is predominately Hispanic, American Indian, and Asian, with these groups composing about 12 percent of the population within a 80-km [50-mi] radius. The low-income population in this same area comprises about 13 percent of the population. Special concerns related to the Shoshone–Bannock Tribes have been identified by numerous consultations between tribal officials and INEEL officials. Two recent programmatic impact studies for INEEL concluded that environmental justice impacts are not significant (DOE, 1995, 2002), as did the recent EIS on the independent SNF storage installation for the Three-Mile Island Unit 2 Spent Fuel (NRC, 1998). Accordingly, because of the small socioeconomic impacts of the proposed Idaho Spent Fuel Facility, in general, and the lack of identified disproportionate impacts in the three recent impact studies, it is likely that no disproportionately high and adverse human health or environmental effects will occur on minority and low-income populations.

- Public and Occupational Health and Safety (Section 4.12)—Human Community: Potential impacts were examined for normal, off-normal, and accident conditions. For normal operating conditions, no chemical discharges are planned from the proposed facility, and a health and safety program would be in place for the workers. The primary pathway for offsite radiation exposure to the public would be from atmospheric emissions of radioactive particulates, iodine-129, tritium, and a few other radionuclides. Iodine-129 and tritium contribute about 80 percent of the total dose. The estimated annual dose for the maximally exposed individual at the southern boundary of INEEL is 3×10^{-7} mSv [3×10^{-5} mrem] from the proposed Idaho Spent Fuel Facility; from all nearby facility operations, the dose is less than 0.0032 mSv [0.32 mrem]. The regulatory annual dose limit is 0.1 mSv [10 mrem], and the natural background annual radiation is 3.6 mSv [360 mrem] in this general area. Therefore, public radiation impacts during normal operation of the proposed Idaho Spent Fuel Facility would be small. Occupational radiological doses from the construction of the proposed Idaho Spent Fuel Facility would be less than 0.0032 mSv [0.32 mrem] annually to construction workers. The NRC annual occupational limit is 50 mSv [5,000 mrem], and the annual natural background radiation dose is 3.6 mSv [360 mrem]. The occupational dose to SNF-handling workers would be 9.1 mSv [910 mrem] annually, with the NRC annual occupational limit being 50 mSv [5,000 mrem]. The annual radiation dose to all workers within an 8-km [4.8-mi] radius is 6.68×10^{-5} mSv [6.68×10^{-3} mrem]. Detailed analyses of the radiation doses from off-normal events and accidents at the proposed Idaho Spent Fuel Facility are in Foster Wheeler Environmental Corporation (FWENC) (2003a). Further, analyses were also made of the public and occupational health and safety impacts of external events such as flooding, aircraft impact, volcanic hazards, seismic hazards, and extreme wind and wind-generated missiles. The impacts are small and design features and operational practices are expected to minimize the public and occupational health and safety impacts of these events and accidents.

- Waste Management (Section 4.13)—Resource: Small quantities of gaseous, liquid, and solid low-level radioactive waste would be generated during the SNF receipt and repackaging operations planned for the first 3 years at the proposed Idaho Spent Fuel Facility. After repackaging and storing, no gaseous releases, or liquid or solid radioactive wastes are anticipated to be generated on a regular basis from routine activities at the proposed facility. Less than 19,700 L [5,200 gal] of low-level liquid wastes are anticipated to be generated annually from nonroutine decontamination activities. The INEEL Radioactive Waste Management Complex has the capacity to handle the small quantities of the generated wastes during the storage period for the repackaged SNF.

8.2 Relationship Between Short-Term Uses and Long-Term Productivity

As discussed in Section 4.1 of this EIS, the proposed Idaho Spent Fuel Facility includes the short-term use of up to 7.3 ha [18 acres] of previously disturbed, undeveloped land. This includes the 3.2-ha [8-acre] tract where the proposed facility will be constructed and a contiguous 4.1-ha [10-acre] construction laydown tract. The proposed action would result in physical changes to the site, including construction of a new facility and grading and leveling to prepare the site. Because these two areas are small compared with the 2,305-km^2 [890-mi^2] INEEL and the 101-ha [250-acre] INTEC facility adjacent to the proposed facility, the physical changes are expected to be small. These changes would restrict access to the land during construction and operation of the proposed Idaho Spent Fuel Facility. The restriction would not affect the value of the land, because the property is classified as least productive, and access is already limited. The site would be decontaminated and decommissioned to meet applicable NRC standards at the end of facility use (see Sections 4.16 and 7.1.3). Therefore, it is anticipated that impacts from the proposed action would not lead to any significant impacts on the long-term productivity of the land.

8.3 Irreversible and Irretrievable Commitments

The construction and operation of the proposed Idaho Spent Fuel Facility would consume irretrievable amounts of electrical energy, fuel (see Table 7-2), and miscellaneous chemicals. Also, there would be an indefinite commitment of concrete, metals, plastic, lumber, sand, gravel, and a fraction of the water used in construction. Transfer of SNF into new storage containers and placement in the vault will require consumable materials such as filters, welding supplies, and other housekeeping materials. Storage operations would require materials such as HEPA filter media and other housekeeping materials. Scarce or strategic material would not be used for the construction of the facility. When the proposed Idaho Spent Fuel Facility ceases operation, DOE would be required to submit an updated decontamination and decommissioning plan for NRC review and approval. NRC will require the site be cleaned to applicable standards at that time. The current conceptual decontamination and decommissioning plan for the facility is described in the FWENC license application for the proposed action (FWENC, 2003b) and discussed in Sections 4.16 and 7.1.3 of this EIS.

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9 INDEX

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APPENDIX A

Docket No. 72-25

ENVIRONMENTAL IMPACT STATEMENT SCOPING PROCESS

SCOPING SUMMARY REPORT

Proposed Idaho Spent Nuclear Fuel Facility Independent Storage Installation

November 2002

U.S. Nuclear Regulatory Commission
Rockville, Maryland

CONTENTS

ABBREVIATIONS

CNWRA	Center for Nuclear Waste Regulatory Analyses
DOE	U.S. Department of Energy
EIS	Environmental Impact Statement
FWENC	Foster Wheeler Environment Corporation
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
NEPA	National Environmental Policy Act
NRC	U.S. Nuclear Regulatory Commission
TRIGA	Training, Research, and Isotope reactors built by General Atomics

Appendix A

1. INTRODUCTION

On November 19, 2001, Foster Wheeler Environmental Corporation (FWENC) filed an application with the U.S. Nuclear Regulatory Commission (NRC) for a license to construct and operate an independent spent fuel storage installation (U.S. Nuclear Regulatory Commission, 2002a) at the Idaho National Engineering and Environmental Laboratory (INEEL) in Butte County, Idaho. If licensed, this new installation would be situated on an eight-acre (3.24 ha) site located adjacent to the Idaho Nuclear Technology and Engineering Center (INTEC), about three miles (4.8 km) north of the INEEL Central Facilities Area.

The proposed Idaho Spent Fuel Facility will be designed, constructed, and operated by FWENC under contract to the U.S. Department of Energy (DOE). The DOE has leased the site to FWENC for the operating life of the installation. The facility would store spent fuel and associated radioactive material from the Peach Bottom Unit 1 High-Temperature Gas-Cooled Reactor, the Shippingport Atomic Power Station, and various Training, Research, and Isotope reactors built by General Atomics (TRIGA reactors). This spent fuel is currently being stored within the INTEC. DOE plans to transfer it to the Idaho Spent Fuel Facility when that facility becomes operational. These transfers would occur completely within the boundaries of the INEEL site and will comply with INEEL procedures and the requirements of DOE. Upon arrival at the Idaho Spent Fuel Facility, the spent fuel would be (1) remotely removed from the containers in which it is currently stored, (2) visually inspected, (3) inventoried, (4) placed into new multipurpose canisters, and (5) placed into interim storage. When a geologic repository becomes available, the multipurpose canisters are intended to be removed from storage at the Idaho Spent Fuel Facility and transported to the repository.

The proposed Idaho Spent Fuel Facility would implement, in part, the portion of the DOE Spent Fuel Management and INEEL record of decision concerning construction of a dry spent fuel storage facility (U.S. Department of Energy, 1995a). It also would allow DOE to satisfy, in part, it's commitments in the October 16, 1995, Settlement Agreement among the DOE, the U.S. Department of the Navy, and the State of Idaho to construct dry storage facilities and employ multipurpose canisters to prepare spent fuel for disposal outside of Idaho. These objectives would be accomplished at the Idaho Spent Fuel Facility by:

- Receiving spent nuclear fuel generated at the Peach Bottom Unit 1 High-Temperature Gas-Cooled Reactor, the Shippingport Atomic Power Station, and various TRIGA research reactors;
- Transferring the spent nuclear fuel from the DOE storage containers in which it is currently stored into new multipurpose canisters certified by the NRC; and
- Placing the NRC-certified canisters into an NRC-licensed, interim spent fuel storage facility.

The license application will be considered under the provisions of NRC regulations at 10 CFR Part 72. If granted, the license will authorize the applicant to store spent nuclear fuel in a dry storage system at the applicant's Idaho Spent Fuel Facility site. Additionally, in accordance with NRC regulations at 10 CFR Part 51 and the National Environmental Policy Act (NEPA), an environmental impact statement (EIS) is being prepared by the NRC to examine the potential environmental impacts of the proposed licensing action (i.e., to construct and operate an independent spent fuel storage installation). As part of the NEPA process, the NRC solicited scoping comments from the public. Scoping is an early and open process designed to determine the range of actions, alternatives, and potential impacts to be considered in the EIS, and to identify the significant issues related to the proposed action. Input from the public and other agencies is solicited so the analysis can be more clearly focused on issues of genuine concern. The NRC and its contractor, the Center for Nuclear Waste Regulatory Analyses (CNWRA), are reviewing relevant documents to ensure efficiency and to make decisions regarding their use (i.e., supplementing, tiering, or adoption) in preparing the Idaho Spent Fuel Facility EIS.

Under the present schedule, the EIS will be used to support a decision in 2004 by the NRC whether to authorize construction of the proposed Idaho Spent Fuel Facility. The schedule includes publishing the draft EIS for public comment in June 2003. The availability of the draft EIS, the dates of the public comment period, and scheduled public meetings will be announced in the Federal Register, on the NRC Idaho Spent Fuel Facility Web page, and in local news media. Following the public comment period, the draft EIS would be revised as necessary, and a final EIS would be published in January 2004. No cooperating agencies have been identified during the scoping process. The NRC will prepare the EIS with the assistance of the CNWRA. As discussed in Section 3, the EIS will analyze both construction and operation impacts.

In addition to the EIS for the Idaho Spent Fuel Facility, the NRC will prepare a safety evaluation report on health and safety issues raised by the proposed action. The safety evaluation report will document the NRC evaluation of the safety of the activities proposed by FWENC in its license application and the compliance with applicable NRC regulations.

In the notice of intent, the NRC announced the public scoping period (U.S. Nuclear Regulatory Commission, 2002b). Announcements of the scoping process were provided on the NRC Idaho Spent Fuel Facility Web page (http://www.nrc.gov/waste/spent-fuel-storage/idaho-spent-fuel.html) and in the following local newspapers:

- The Idaho News, Idaho Falls (Sunday, August 4 and Wednesday, August 7, 2002); and

- The Idaho Statesman, Boise (Sunday, August 4 and Wednesday, August 7, 2002).

The public scoping period extended from publication of the notice of intent on July 26, 2002, until September 16, 2002. During this period, 15 written comments were received from two organizations. These public comments are discussed in Section 2 of this report and have been categorized under the following issue headings:

- NEPA Issues
- Policy Issues
- Ecology, Air, and Water
- Cumulative Impacts
- Human Health Impacts
- Waste Management
- Security and Terrorism
- INEEL Infrastructure and Existing Conditions

The scope of the EIS and the summary of issues that will be addressed in the EIS are discussed in Section 3. Although issues raised during the scoping period will be considered in preparing the EIS for the proposed Idaho Spent Fuel Facility, some of these issues will either be analyzed in less detail or will not be analyzed at all, depending on their relevance to the proposed action and the anticipated impacts. Issues that will be considered, but not analyzed in detail, are summarized in Section 4. The preliminary outline for the EIS is included as Attachment A.

2. SCOPING COMMENT SUMMARY

The following summary groups the comments received during the scoping period by technical area and issue.

2.1 NATIONAL ENVIRONMENTAL POLICY ACT ISSUES

Use of Existing NEPA Documents: Both commenters noted that many of the impacts of the proposed action have been addressed by previous NEPA documents prepared by the DOE and the NRC (U.S. Department of Energy, 1995b, 2002; U.S. Nuclear Regulatory Commission, 1998). One commenter expressed concern, however, that the programmatic EIS prepared by the U.S. Department of Energy (1995b) to address the impacts of spent nuclear fuel management at the INEEL facility did not adequately address the potential impacts to the environment from flooding, earthquakes, and construction disturbances.

Public Involvement: One commenter noted that the NRC schedule for the scoping process did not allow for full development of scoping comments. They requested that the NRC make sure that the Citizens Advisory Board for the INEEL is on the distribution list for the draft EIS when it becomes available for public review.

2.2 POLICY ISSUES

Application of NRC Regulations: One commenter noted the understanding that the FWENC license application will be considered under NRC regulations and that if the application is approved, FWENC would be authorized to receive, possess, store, and transfer spent nuclear fuel and other radioactive materials at the proposed Idaho Spent Fuel Facility.

2.3 ECOLOGY, AIR, AND WATER

Surface Water Impacts: One commenter expressed concern that the INTEC area, where the spent nuclear fuel is currently stored and where the proposed Idaho Spent Fuel Facility would be located, are within the 100-year floodplain. The commenter also noted that there are multiple areas of existing contamination at INTEC, also within the floodplain. The commenter wanted the impact analysis to consider the effects of flooding and the existing areas of contamination.

HEPA Filters: One commenter pointed out that the potential environmental consequences of using sintered metal HEPA filters at the proposed facility have either not been documented, or have been documented in a cursory fashion.

Air Emissions: One commenter was concerned that the potential impacts of air emissions during the fuel rod drying process have not been documented in a satisfactory manner.

Construction Impacts: One commenter indicated that the previous DOE NEPA (U.S. Department of Energy, 1995b; 2002) analyses have not provided an adequate analysis of the potential environmental impacts of the construction disturbances associated with the proposed Idaho Spent Fuel Facility.

Accident Issues: One commenter expressed concern about the potential impacts to the environment due to earthquake. The commenter noted that previous NEPA analyses by the U.S. Department of Energy (1995b, 2002) have not adequately addressed this disruptive scenario. The same commenter also noted concerns with the potential environmental consequences of accidental nuclear criticality.

2.4 CUMULATIVE IMPACTS

Past Releases and Continued Waste Generation: One commenter noted that previous DOE NEPA (U.S. Department of Energy, 1995b; 2002) analyses have not properly addressed the cumulative impact of previous releases of radioactive and hazardous materials within the context of continued generation of waste at the INTEC facility.

2.5 WASTE MANAGEMENT

Waste Generation: One commenter raised concern over the cumulative impacts of continued generation of waste at the INEEL, particularly in the context of previous radioactive and hazardous waste releases.

2.6 SECURITY AND TERRORISM

One commenter expressed concern that the INTEC represented a concentrated area of high-risk targets for internal and external terrorism. The commenter noted that external auditors have identified problems with the DOE facility security system and stated that the design basis threats considered in the DOE security procedures have not been updated to reflect concerns resulting from the September 11, 2001, terrorist attacks. The commenter wanted the NRC EIS to address the potential impacts of internal and external terrorism under realistic and current scenarios.

2.7 IDAHO NATIONAL ENGINEERING AND ENVIRONMENTAL LABORATORY INFRASTRUCTURE AND EXISTING CONDITIONS

Spent Fuel Storage Expansion: One commenter noted that the proposed action would be an expansion of spent nuclear fuel storage at the INEEL, and wanted the EIS to consider this in terms of cumulative impact with existing storage capacity at the site.

3. SCOPE OF THE ENVIRONMENTAL IMPACT STATEMENT AND SUMMARY OF ISSUES TO BE ADDRESSED

NEPA (Public Law 91-90, as amended), and the NRC's implementing regulations for NEPA (10 CFR Part 51), specify in general terms what should be included in an EIS prepared by the NRC. Regulations established by the Council on Environmental Quality (40 CFR Parts 1500-1508), while not binding on the NRC, provide useful guidance. The NRC has also prepared environmental review guidance to its staff for meeting NEPA requirements associated with licensing actions (U.S. Nuclear Regulatory Commission, 2001).

Pursuant to 10 CFR 51.71(a), in addition to public comments received during the scoping process, the contents of the draft EIS will depend in part on the environmental report submitted by FWENC. In accordance with 10 CFR 51.71(b), the draft EIS will consider major points of view and objections concerning the environmental impacts of the proposed action raised by other Federal, State, and local agencies, by any affected groups of Native Americans, and by other interested persons. Pursuant to 10 CFR 51.71(c), the draft EIS will list all Federal permits, licenses, approvals, and other entitlements which must be obtained in implementing the proposed action, and will describe the status of compliance with these requirements. Any uncertainty as to the applicability of these requirements will be addressed in the draft EIS.

Pursuant to 10 CFR 51.71(d), the draft EIS will include a consideration of the economic, technical, and other benefits and costs of the proposed action and alternatives to the proposed action. In the draft analysis, due consideration will be given to compliance with environmental quality standards and regulations that have been imposed by Federal, State, regional, and local agencies having responsibilities for environmental protection, including any applicable zoning and land-use regulations and water pollution limitations or requirements established or imposed pursuant to the Federal Water Pollution Control Act. The environmental impact of the proposed action will be evaluated in the draft EIS with respect to matters covered by such standards and requirements, regardless of whether a certification or license from the appropriate authority has been obtained. Compliance with the environmental quality standards and requirements of the Federal Water Pollution Control Act (imposed by the U.S. Environmental Protection Agency or designated permitting states) does not negate the requirement for NRC to weigh all environmental effects of the proposed action, including the degradation, if any, of water quality, and to consider alternatives to the proposed action that are available for reducing adverse effects. While satisfaction of NRC standards and criteria pertaining to radiological effects will be necessary to meet the licensing requirements of the Atomic Energy Act, the draft EIS will also, for the purposes of NEPA, consider the radiological and non-radiological effects of the proposed action and alternatives.

Pursuant to 10 CFR 51.71(e), the draft EIS will normally include a preliminary recommendation by the NRC staff with respect to the proposed action. Any such recommendation would be reached after considering the environmental effects of the proposed action and reasonable alternatives, and after weighing the costs and benefits of the proposed action.

The scoping process summarized in this report will help determine the scope of the draft EIS for the proposed Idaho Spent Fuel Facility. For example, the adequacy of the existing NEPA analyses prepared by the DOE and the NRC for actions at the INEEL facility (U.S. Department of Energy, 1995b, 2002; U.S. Nuclear Regulatory Commission, 1998) will be examined within the context of the proposed action, and supplemented and updated as necessary. The draft EIS will also include analyses of the impacts of flooding, facility emissions, construction, as well as the potential effects of an earthquake on the facility. The draft EIS will contain a discussion of the cumulative impacts of the proposed action in the context of the INEEL site. The development of the draft EIS will be closely coordinated with the safety evaluation report prepared by the NRC to evaluate the health and safety impacts of the proposed action.

The No-action alternative will be considered in the draft EIS. This alternative will address not licensing the proposed Idaho Spent Fuel Facility and continuing the current interim storage of the Peach Bottom, Shippingport, and TRIGA reactor fuel. Neither commenting organization identified other alternatives to the proposed action. Other alternatives may be identified and analyzed during the preparation of the draft EIS.

Issues to be analyzed in depth pertain to the construction and operation of the proposed Idaho Spent Fuel Facility. In addition to the information provided in the documents prepared by FWENC as part of its license application to NRC, the draft EIS will also recognize previous NEPA analyses prepared by both the DOE and the NRC for activities at the INEEL (U.S. Department of Energy, 1995b, 2002; U.S. Nuclear Regulatory Commission, 1998).

The goal in writing the EIS is to present the impact analyses in a manner that makes it easy for the public to understand. This EIS will provide the basis for the NRC decision with regard to potential environmental impacts. Significant impacts will be discussed in greater detail in the EIS, and explanations will be provided for determining the level of detail for different impacts. This should allow readers of the EIS to focus on issues that were determined to be important in reaching the conclusions supported by the EIS. The following topical areas and issues will be analyzed in the EIS.

Geology, Soils, Earthquakes, and Volcanoes. The EIS will describe the characteristics of the INEEL, with specific attention to the area adjacent to the INTEC that will be disturbed by the proposed action. Evaluation of the potential for disruption of the facility by earthquakes or volcanic activity will be considered to the extent that they may have an impact on facility construction or operation. Existing contamination at the site will be identified to the extent that it may affect or be affected by the proposed action. The detailed analysis of the health and safety impacts, however, will be addressed in the safety evaluation report to be prepared by the NRC in support of its licensing decision.

Hydrology. The EIS will assess the potential impacts of the proposed project on the surface water, storm-water runoff, and groundwater resources including the Snake River Plain Aquifer. The assessment will consider water resources, water quality, water use, flood plains, and the probable maximum flood (the largest flood that is likely to occur). The EIS will not, however, evaluate the health and safety aspects associated with these site characteristics which will be addressed in the safety evaluation report.

Air Quality. Potential air quality impacts associated with the proposed action will be evaluated in the EIS. The evaluation will include potential impacts resulting from construction activities and operation (e.g., fuel rod drying activities) and will compare the anticipated air quality impacts, if any, with relevant standards.

Ecology. The area adjacent to the INTEC intended for the proposed facility is already in use as a construction laydown area, and has been substantially disturbed from its natural state. The EIS will include an update of threatened and endangered species and other ecological resources at the INEEL, focusing on the area immediately around the INTEC.

Land Use. The general land use activities at the INEEL will be summarized. The total area involved in the proposed action is confined to an existing industrial facility at the INTEC, therefore the level of detail in the impact analysis for land use is likely to be low. Existing NEPA analyses will be summarized and incorporated where appropriate.

Cultural Resources. The EIS will assess potential impacts of the proposed action on the historic, archaeological, and paleontological resources of the INEEL, with particular attention to the area adjacent to the INTEC that will be disturbed by the proposed action. The EIS will also describe the programmatic framework for evaluating these resources at INEEL.

Transportation. Transportation distances are short in the proposed action, and are not covered in the environmental report prepared by FWENC. The DOE, not FWENC, is responsible for the transportation of the spent nuclear fuel from its current storage location at the INTEC to the proposed facility. As a connected action, the EIS will rely on the DOE orders and procedures for transportation of spent nuclear fuel within the INEEL boundaries.

Waste Management. The EIS will document the quantities, types, and disposal of the potential waste streams resulting from the proposed action. The EIS will consider the impacts of these waste streams on the existing waste management capacities at the INEEL, either specifically or through incorporation of reference material from existing NEPA analyses.

Socioeconomics. All activities related to the proposed action are restricted to within the INEEL boundaries, so the EIS will consider the socioeconomic impact of the proposed action to the extent that it affects employment at the INEEL and imposes additional burden on the existing services provided by the communities immediately around the INEEL. These may include impacts on housing, social services, and emergency services or other impacts identified during the preparation of the EIS.

Environmental Justice. The potential for disproportionately high or adverse human health or environmental impacts on minority and low-income populations will be evaluated and discussed at the census block level. Because all activities related to the proposed action are restricted to within the INEEL boundaries, the EIS will consider the impact on these communities immediately around the INEEL either specifically or through incorporation of reference material from existing NEPA analyses.

Aesthetics. The aesthetics of the INEEL, specifically the INTEC, will be summarized. The proposed facility is confined to an existing industrial facility at the INTEC, therefore, the level of detail in the impact analysis for aesthetics is likely to be low. Existing NEPA analyses will be summarized and incorporated where appropriate.

Noise. The current noise aspects at the INTEC will be summarized. The proposed facility is confined to an existing industrial facility at the INTEC, therefore, the level of detail in the impact analysis for noise is likely to be low. Existing NEPA analyses will be summarized and incorporated where appropriate.

Human Health Impacts. In preparing its safety evaluation report, NRC will evaluate the potential human health impacts of the proposed facility on the workers and the general public for normal operations (including construction, handling, transfer, and inspection activities) and under off-normal or accident conditions. The detailed analyses will be reported in the safety evaluation report and summarized in the EIS. Potential exposures to radioactive materials and to hazardous chemicals will be considered. Both cancer and non-cancer health effects will be evaluated, as appropriate. Calculations for the general public account for sensitive populations as well as normal healthy adults. Models, assumptions, and supporting data used to develop the impacts from these potential exposures will be clearly described. The safety evaluation report will assess the impacts associated with all credible accidents at the proposed Idaho Spent Fuel Facility, both from natural and human activities. Based on the analyses in the safety evaluation report, the EIS will summarize the potential environmental impacts resulting from credible bounding accidents at the proposed facility.

In the context of the EIS, DOE and FWENC programmatic plans for security, emergency response, and environmental monitoring activities will be considered as mitigation measures for potential impacts. These issues may be summarized and discussed in the EIS to the extent that they are required as mitigation measures.

Decontamination and Decommissioning. The November 2001 license application submitted by FWENC includes a proposed decommissioning plan that includes decontaminating and/or removing systems and components of the proposed facility. The EIS will include an evaluation of the effects of decontaminating and decommissioning the Idaho Spent Fuel Facility.

Cumulative Impacts. The EIS will analyze the potential cumulative impacts of the proposed facility in the context of past, present, and reasonably foreseeable future actions. This will include impacts from connected actions such as the transportation of the fuel from its current storage location at the INTEC to the proposed facility.

Unavoidable Adverse Environmental Impacts. The EIS will include a discussion of potential environmental impacts, if any, that could not be avoided if the proposed action were to be implemented.

Irreversible and Irretrievable Commitment of Resources. The irreversible and irretrievable commitment of resources, including land use, materials, and energy will be discussed. Potential waste minimization and pollution prevention activities and mitigation measures will be evaluated.

Cost-Benefit Analysis. The EIS will include a cost-benefit analysis that summarizes the environmental and other costs and benefits of the proposed action.

Compliance with Applicable Regulations. The EIS will present a listing of the relevant permits and regulations that apply to the proposed action. Consultations with involved Federal, State, and local agencies will be documented as appropriate.

Although not anticipated, any pertinent proprietary information that is not available to the public will be reviewed by the NRC in preparing both the safety evaluation report and the EIS. By law, however, the NRC must protect any proprietary information from public disclosure. Therefore, any proprietary information will not be released to the public. As indicated above, all available non-proprietary documentation generated by the DOE and FWENC will be used and incorporated by reference, as appropriate.

4. ISSUES CONSIDERED PERIPHERAL, OUTSIDE THE SCOPE OF THE PROPOSED ACTION, OR COVERED BY PRIOR ENVIRONMENTAL REVIEW

Issues raised during the scoping period for the proposed Idaho Spent Fuel Facility at the INEEL are summarized in Section 2 of this report. Section 3 outlines the subjects and issues that will be addressed in detail in the EIS. Certain issues will not be addressed in depth in the EIS. Major categories of these issues and the reasons for not analyzing them in detail in the EIS are explained in this section. In general, these issues are not directly related to the assessment of potential impacts from the proposed major Federal action now under consideration. The lack of in depth discussion in the EIS, however, does not mean that an issue or concern lacks value. Issues beyond the scope of the EIS may not yet be ripe for resolution, or are more appropriately discussed and decided in other venues. For example, health and safety issues will be considered in detail in the safety evaluation report prepared by NRC for the proposed action and will be summarized in the EIS.

4.1 PREVIOUS U.S. DEPARTMENT OF ENERGY DECISIONS

Both commenters noted that previous NEPA analyses have been prepared by the DOE for the INEEL (U.S. Department of Energy, 1995b; 2002). Sections of these EISs may be relevant to the proposed Idaho Spent Fuel Facility, and will be reviewed in preparing the draft EIS. Because the scope of the proposed Idaho Spent Fuel Facility EIS is limited to the licensing action now under review by NRC, issues pertaining to decisions already made by DOE will be addressed by referencing the appropriate DOE NEPA analysis, and by summarizing the information, as appropriate.

4.2 IMPACTS FROM TERRORISM

One commenter identified the INTEC area as a potential target for internal and external terrorism. However, the EIS will not address the impacts of terrorism as the staff does not consider these impacts to be reasonably foreseeable as a result of the proposed action. However, it must be noted that the consideration of terrorism issues in NEPA documents is currently an issue before the Commission in a number of adjudicatory proceedings. The staff will incorporate these decisions as they become available.

5. REFERENCES

U.S. Department of Energy. "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." DOE/EIS–0287-F. Idaho Falls, Idaho: DOE. 2002.

U.S. Department of Energy. "Environmental Statements Availability, etc; Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs" *Federal Register*, Volume 60 pp: 28680–28696. June 1, 1995a.

U.S. Department of Energy. "Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement." DOE/EIS–0203-F. Idaho Falls, Idaho: DOE. 1995b.

U.S. Nuclear Regulatory Commission. "Foster Wheeler Environmental Corporation, Idaho Spent Fuel Facility; Notice of Docketing, Notice of Consideration of Issuance, and Notice of Opportunity for a Hearing for a Materials License for the Idaho Spent Fuel Facility. *Federal Register*, Volume 67, pp: 43358–43359. June 27, 2002a.

U.S. Nuclear Regulatory Commission. "Foster Wheeler Environmental Corporation's proposed Idaho Spent Fuel Facility's Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process. *Federal Register*, Volume 67, pp: 48953–48956. July 26, 2002b.

U.S. Nuclear Regulator Commission. "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs. Draft Report for Interim Use and Comment." NUREG–1748. Washington, DC: NRC. 2001.

U.S. Nuclear Regulatory Commission. , "Final Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation to Store the Three Mile Island Unit 2 Spent Fuel at the Idaho National Engineering and Environmental Laboratory." NUREG–1626. Washington, DC: NRC. 1998.

Appendix A

ATTACHMENT A

Appendix A

ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED IDAHO SPENT NUCLEAR FUEL FACILITY INDEPENDENT STORAGE INSTALLATION—PRELIMINARY OUTLINE

Summary

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APPENDIX B

CONSULTATION LETTERS

December 4, 2002

Ms. Suzi Pengilly Neitzel
Deputy State Historic Preservation Officer
Idaho State Historical Society
210 Main Street
Boise, ID 83702-5642

SUBJECT: INITIATION OF THE NATIONAL HISTORIC PRESERVATION ACT SECTION 106 PROCESS FOR THE PROPOSED IDAHO SPENT FUEL FACILITY

Dear Ms. Pengilly Neitzel:

Foster Wheeler Environmental Corporation (FWENC) has submitted a license application to the Nuclear Regulatory Commission (NRC) to receive, transfer, package, and possess spent nuclear fuel (SNF) at the proposed Idaho Spent Fuel Facility. The NRC is in the initial stages of developing an Environmental Impact Statement (EIS) for the proposed facility to be located at the U.S. Department of Energy's (DOE) Idaho National Engineering and Environmental Laboratory (INEEL), located near Idaho Falls. The proposed facility will receive SNF from DOE, repackage the SNF into NRC licensed canisters, and place these canisters into interim dry storage pending it's final removal from the State of Idaho. This proposed facility, as well as all associated construction activities and impacts, will be within the boundaries of INEEL. The forthcoming EIS will document the impacts associated with the construction and operation of the facility.

A "Cultural Resource Investigations for the Idaho Spent Fuel Facility at the INEEL" was prepared for DOE in March, 2001, by the INEEL Cultural Resource Management Office (attachment). This report describes the areas that will be affected by the construction of the proposed facility and the cultural resources that are in or near these areas. The proposed location of the Idaho Spent Fuel Facility would be on previously disturbed land adjacent to the Idaho Nuclear Technology and Engineering Center (INTEC) in the south-central portion of the INEEL. The area includes a small complex of existing office buildings, warehouses, and trailers immediately to the east of the INTEC perimeter fence and north of a coal-fired power plant. There are two areas of potential effect for the proposed project. The first is the facility construction site, which is an 8-acre parcel located near a large ash pit associated with INTEC's coal-fired power plant. The second area is a 4-acre construction laydown area, which would be used to facilitate construction activities. This area is located a short distance to the northeast of the proposed facility location. Ground disturbance associated with construction of the facility and other temporary support facilities will be localized, but extensive in both areas. There will not be any modifications or removal of existing structures or buildings within the INTEC facility. Both areas of potential effect have been investigated for cultural resources. Intensive archeological surveys from the 1980s, subsequent archeological reconnaissance by the INEEL Cultural Resource Management Office, historic building inventories and lists of other structures, and previous and ongoing consultation with the Shoshone-Bannock Tribes have been combined to identify any significant cultural resources with visible surface remains in the affected areas. Based on this research, few cultural resources have been identified in the vicinity of INTEC. On the eastern side of the INTEC, where the proposed facility will be constructed, three archeological resources have been identified. However, these resources are located outside of the areas of potential effect for the proposed project and would not be impacted. Nonetheless, these areas would be monitored to avoid any impacts to these or any other resources that are discovered during construction activities.

As required by 36 CFR 800.4(a), the NRC is requesting the views of the State Historical Preservation Officer on further actions to identify historic properties that may be affected by the NRC's under taking (i.e. licensing the proposed Idaho Spent Fuel Facility). As part of the EIS preparation, the NRC conducted a public scoping process to solicit information on environmental issues. This scoping information, along with the "Cultural Resource Investigations for the Idaho Spent Fuel Facility at the INEEL" (attachment), and any information you provide will be used to document affects in accordance with 36 CFR 800.4(d).

My staff will be in contact with your office throughout the EIS process. We will contact your office after we have completed the draft EIS in the Spring of 2003. In the meantime, if you have any questions or comments, or need any additional information, please contact Matt Blevins of the Nuclear Regulatory Commission at 301-7684.

Sincerely,

/RA/

Lawrence E. Kokajko, Chief
Environmental and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Attachment: Cultural Resource Investigations for the Idaho Spent Fuel Facility at the Idaho National Engineering and Environmental Laboratory

cc: See attached list

April 17, 2003

Ms. Suzi Pengilly Neitzel
Deputy State Historic Preservation Officer
Idaho State Historical Society
210 Main Street
Boise, Idaho 83702-5642

SUBJECT: REQUEST FOR CONCURRENCE ON THE DETERMINATION OF EFFECT ON HISTORIC PROPERTIES FOR THE PROPOSED IDAHO SPENT FUEL STORAGE FACILITY

Dear Ms. Pengilly Neitzel:

By a letter dated December 5, 2002, the Nuclear Regulatory Commission (NRC) staff notified you of a pending license application submitted to the NRC by the Foster Wheeler Environmental Corporation (FWENC) to allow the receipt, transfer, packaging, and possession of spent nuclear fuel (SNF) at the proposed Idaho Spent Fuel Facility located on the U.S. Department of Energy's (DOE) Idaho National Engineering and Environmental Laboratory (INEEL). The NRC is in the process of completing the draft Environmental Impact Statement which is scheduled for completion in June 2003.

A "Cultural Resource Investigations for the Idaho Spent Fuel Facility at the INEEL" was prepared for the DOE in March 2001 by the INEEL Cultural Resource Management Office (attachment). This report describes the areas that will be affected by the construction of the proposed facility and the cultural resources that are in or near these areas. The proposed location of the Idaho Spent Fuel Facility would be on previously disturbed land adjacent to the Idaho Nuclear Technology and Engineering Center (INTEC) in the south-central portion of the INEEL. The area includes a small complex of existing office buildings, warehouses, and trailers immediately to the east of the INTEC perimeter fence and north of a coal-fired power plant. There are two areas of potential effect for the proposed project. The first is the facility construction site, which is an 8-acre parcel located near a large ash pit associated with INTEC's coal-fired power plant. The second area is a 4-acre construction laydown area, which would be used to facilitate construction activities. This area is located a short distance to the northeast of the proposed facility location. Ground disturbance associated with construction of the facility and other temporary support facilities will be localized, but extensive in both areas. There will not be any modifications or removal of existing structures or buildings within the INTEC facility. Both areas of potential effect have been investigated for cultural resources. Intensive archeological surveys from the 1980s, subsequent archeological reconnaissance by the INEEL Cultural Resource Management Office, historic building inventories and lists of other structures, and previous and ongoing consultation with the Shoshone-Bannock Tribes have been combined to identify any significant cultural resources with visible surface remains in the affected areas. Based on this research, few cultural resources have been identified in the vicinity of INTEC. On the eastern side of the INTEC, where the proposed facility will be

Ms. S. P. Neitzel 2

constructed, three archeological resources have been identified. However, these resources are located outside of the areas of potential effect for the proposed project and would not be impacted. Nonetheless, these areas would be monitored to avoid any impacts to these or any other resources that are discovered during construction activities.

Based on this information the NRC has determined that no historic properties are affected by the proposed undertaking (i.e., licensing the proposed Idaho Spent Fuel Facility). Please provide your concurrence regarding NRC's determination that the undertaking will not effect historic properties. If you have any questions or comments, or need any additional information, please contact Matthew Blevins at 301-415-7684. Thank you for your assistance.

Sincerely,

/RA/

Lawrence E. Kokajko, Acting Chief
Environmental and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Attachment: As stated

IDAHO STATE HISTORICAL SOCIETY
PRESERVING OUR HERITAGE
FOUNDED IN 1881

Our mission: to educate through the identification, preservation, and interpretation of Idaho's cultural heritage.

Dirk Kempthorne
Governor of Idaho

Steve Guerber
Director

Administration
1109 Main Street, Suite 250
Boise, Idaho 83702-5642
Office: (208) 334-2682
Fax: (208) 334-2774

Archaeological Survey
210 Main Street
Boise, Idaho 83702-7264
Office: (208) 334-3847
Fax: (208) 334-2775

Capitol Education Center
Statehouse, P.O. Box 83720
Boise, ID 83720-0001
Office: (208) 334-5174

Historical Museum and Education Programs
610 North Julia Davis Drive
Boise, Idaho 83702-7695
Office: (208) 334-2120
Fax: (208) 334-4059

Historic Preservation Office
210 Main Street
Boise, Idaho 83702-7264
Office: (208) 334-3861
Fax: (208) 334-2775

Historic Sites Office
2445 Old Penitentiary Road
Boise, Idaho 83712-8254
Office: (208) 334-2844
Fax: (208) 334-3225

Historical Collections and Genealogical Collections
450 North Fourth Street
Boise, Idaho 83702-6027
Office: (208) 334-3356/7
Fax: (208) 334-3198

Oral History
450 North Fourth Street
Boise, Idaho 83702-6027
Office: (208) 334-3863
Fax: (208) 334-3198

Memberships and Outreach and Development
1109 Main Street, Suite 250
Boise, Idaho 83702-5642
Office: (208) 334-3986
Fax: (208) 334-2774

Publications
450 North Fourth Street
Boise, Idaho 83702-6027
Office: (208) 334-3428
Fax: (208) 334-3198

State Archives/Manuscripts
2205 Old Penitentiary Road
Boise, Idaho 83712-8250
Office: (208) 334-2620
Fax: (208) 334-2626

June 4, 2003

Mr. Lawrance E. Kokajko
Acting Chief
Environmental and Performance Assessment
Division of Waste Management
Office of Nuclear Material Safety
Nuclear Regulatory Commission
Washington D.C. 20555-0001

RE: Section 106 Review of the Proposed Idaho Spent Fuel Storage Facility
No Historic Properties–Monitoring Recommended

Dear Mr. Kokajko:

Thank you for requesting our views on the new construction of the Idaho Spent Fuel Storage Facility at the Idaho National Engineering and Environmental Laboratory. The facility will be constructed on a eight-acre parcel at the Idaho Nuclear Technology and Engineering Center (INTEC) and will require the use of an adjacent four acres for construction laydown.

The 12-acre project area has been surveyed for archaeological properties during several past archaeological surveys. No historic properties were identified within the project's area of potential effects. In May 2001, we reviewed the report summarizing this work (by Brenda Ringe Pace dated March 2001) and supported the conclusions that work could proceed with no effect on historic properties. No new sites have been identified since our last comments. Therefore, we still agree that the project, as planned, will have *no effect* on historic properties. We also agree that archaeological monitoring should be conducted during the initial phases of construction.

If archaeological remains are discovered during construction activities, work should halt, and Brenda Ringe Pace, archaeologist for the INEEL, should be notified immediately.

We appreciate your cooperation. If you have any questions, feel free to contact me at 208-334-3847.

Sincerely,

Susan Pengilly Neitzel

Susan Pengilly Neitzel
Deputy SHPO and
Compliance Coordinator

cc: Brenda Ringe Pace, Bechtel BWXT Idaho

April 21, 2003

Ms. Kendra Womack
Fish and Wildlife Service
U.S. Department of the Interior
1387 South Vinnell Way, Room 368
Boise, Idaho 83709

SUBJECT: REQUEST FOR CONCURRENCE ON THE DETERMINATION OF EFFECT ON FEDERALLY LISTED SPECIES AND THEIR CRITICAL HABITATS FOR THE PROPOSED IDAHO SPENT FUEL STORAGE FACILITY

Dear Ms. Womack:

The Nuclear Regulatory Commission (NRC) is in the process of developing an Environmental Impact Statement (EIS) for the proposed Idaho Spent Fuel Facility to be located at the U.S. Department of Energy's (DOE's) Idaho National Engineering and Environmental Laboratory (INEEL), located near Idaho Falls. The proposed facility will receive spent nuclear fuel (SNF) from locations on the INEEL, repackage the SNF into NRC licensed canisters, and place these canisters into interim dry storage pending its final removal from the state of Idaho. This proposed facility, as well as all associated construction activities and impacts, will be within the boundaries of INEEL. The forthcoming EIS will evaluate the actions and impacts associated with the construction and operation of the facility.

An ecological resources report for the proposed Idaho Spent Fuel Facility at the INEEL was prepared for the DOE (May 2001) and is enclosed. This report describes the areas that will be affected by the construction of the proposed facility and the ecological resources that are in or near these areas. The proposed location of the Idaho Spent Fuel Facility would be on previously disturbed land adjacent to the Idaho Nuclear Technology and Engineering Center (INTEC) in the south-central portion of the INEEL. The area includes a small complex of existing office buildings, warehouses, and trailers immediately to the east of the INTEC perimeter fence and north of a coal-fired power plant. There are two areas of potential effect for the proposed project. The first is the facility construction site which is an 8-acre parcel located near a large ash pit associated with INTEC's coal-fired power plant. The second area is a 9-acre construction laydown area, which would be used to facilitate construction activities. This area is located a short distance to the northeast of the proposed facility location. Ground disturbance associated with construction of the facility and other temporary support facilities will be localized, but extensive in both areas. Both areas of potential effect have been investigated for ecological resources. Intensive ecological surveys from the 1980s, subsequent plant and wetland surveys by various research personnel, and previous consultation with your office have all been combined to identify ecological resources. Based on this report and the NRC's preliminary analysis in support of the draft EIS, the NRC has determined that the proposed action is not likely to adversely affect any listed species or critical habitat. The most recent species list, 1-4-02-SP-921, provided by your office in September 2002 was used in making this determination.

Ms. K. Womack -2-

Please provide your concurrence regarding NRC's determination that the proposed action is not likely to adversely affect any listed species or critical habitat. If you have any questions or comments or need any additional information, please contact Matthew Blevins at 301-415-7684. Thank you for your assistance.

Sincerely,

Lawrence E. Kokajko, Acting Chief ***/RA/***
Environmental and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure: As stated

cc: Attached List

June 3, 2003

Ms. Sandi Arena
Fish and Wildlife Service
U.S. Department of the Interior
4425 Burley Drive
Chubbuck, ID 83202

SUBJECT: CLARIFICATION TO APRIL 21, 2003, LETTER REQUESTING CONCURRENCE ON THE DETERMINATION OF EFFECT ON FEDERALLY LISTED SPECIES AND THEIR CRITICAL HABITATS FOR THE PROPOSED IDAHO SPENT FUEL STORAGE FACILITY

Dear Ms. Arena:

In a letter dated April 21, 2003, the U.S. Nuclear Regulatory Commission (NRC) requested concurrence on its finding for the proposed Idaho Spent Fuel Facility. Based on conversations between yourself and Matthew Blevins of my staff, it is my understanding that clarification to the previous letter is necessary. Previously, we asked for concurrence on the NRCís finding of "not likely to adversely affect any listed species or critical habitat" for the proposed facility. The earlier request should have clearly stated the NRCís finding that the proposed facility "will not affect any listed species or critical habitat." I believe the information provided in the earlier request will support this finding.

Please provide your concurrence regarding the NRCís determination that the proposed action will not affect any listed species or critical habitat. If you have any questions or comments or need any additional information, please contact Matthew Blevins at 301-415-7684. Thank you for your assistance.

Sincerely,

/RA/

Lawrence E. Kokajko, Acting Chief
Environmental and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

cc: Attached List

United States Department of the Interior

FISH AND WILDLIFE SERVICE

EASTERN IDAHO FIELD OFFICE - ES
4425 BURLEY DR., SUITE A
CHUBBUCK, IDAHO 83202
Telephone (208) 237-6975 Fax Number (208) 237-8213

June 10, 2003

Lawrence E. Kokajko, Acting Chief
U.S. Nuclear Regulatory Commission
Environmental and Performance Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety and Safeguards
Washington, D.C. 20555-0001

Subject: Request for Concurrence on the Determination of Effect on Federally Listed Species and their Critical Habitats for the Proposed Idaho Spent Fuel Storage Facility File # 506.0000 FWS # 1-4-03-I-0220

Dear Mr. Kokajko:

The U.S. Fish and Wildlife Service (Service) received the United States Nuclear Regulatory Commission's (Commission) April 21, 2003 letter, regarding the request for concurrence on the determination of effect on federally listed species and their critical habitats for the proposed Idaho Spent Fuel Storage Facility. Species that may potentially occur in the proposed project area include: gray wolf (*Canis lupus*) and wintering bald eagle (*Haliaeetus leucocephalus*). The effects determination provided in the April 21, 2003 letter of *is not likely to adversely affect* was clarified via a telephone conversation with Matthew Blevins on May 29, 2003. Following our conversation, the Service received a letter dated June 3, 2003, clarifying that the Commission's effects determination for the proposed Idaho Spent Fuel Storage Facility is that the proposed project will have *no effect* on threatened or endangered species.

The proposed location of the Idaho Spent Fuel Facility would be on previously disturbed land adjacent to the Idaho Nuclear Technology and Engineering Center (INTEC) in the south-central portion of the Idaho National Engineering and Environmental Laboratory (INEEL). The area includes a small complex of existing office buildings, warehouses, and trailers immediately to the east of the INTEC perimeter fence and north of a coal-fired power plant.

There have been several sightings of the gray wolf on the INEEL during the past decade; however, none have been confirmed. Additionally, wolves are expected to avoid areas of high human activity, such as the proposed project area. Bald eagles occur rarely on the INEEL and only during the winter. Primary areas where wintering bald eagles may occur include the north end of the INEEL near the towns of Howe and Mud Lake. As such, the Service has no objection to your determination of *no effect* on gray wolf and wintering bald eagle

We appreciate your conscientious efforts to comply with Federal requirements. If you have any questions regarding this letter, please contact Sandi Arena of this office at 208-237-6975 ext. 34.

Sincerely,

Deb Mignogno, Supervisor
Eastern Idaho Field Office

APPENDIX C

DETAILED CUMULATIVE IMPACTS ASSESSMENT

Methodology

The 11-step cumulative effects assessment methodology published by the Council on Environmental Quality is used as the framework for addressing cumulative effects (Council on Environmental Quality, 1997). The steps, in an expanded format, are as follows:

- Step 1: Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals. This step is focused on the incremental impacts of the construction and operation of the proposed Idaho Spent Fuel Facility. Accordingly, these impacts have been summarized based on the information in Sections 4.1–4.13. Further, where the incremental impacts were deemed to be small and insignificant, no analyses of cumulative effects were conducted. Therefore, the assessment goal is to assess the direct, indirect, and contributed impacts of the proposed Idaho Spent Fuel Facility on nearby resources, ecosystems, and human communities that may have been, or would be, subject to cumulative effects. Step 1 results are described in Section 4. [Resources considered herein include geology and soils (Section 4.3), water (4.4), air quality (4.6), noise (4.7), and waste management (4.13); ecosystems include land use (4.1) and ecology (4.5); and human communities include transportation (4.2), historical and cultural (4.8), visual/scenic (4.9), socioeconomical (4.10), environmental justice (4.11), and public and occupational health and safety (4.12).]

- Step 2: Establish the geographic scope for the analysis (Council on Environmental Quality, 1997). The geographic scope is dependent on the affected resources, ecosystems, and human communities. Because of more site-specific and localized concerns, the Idaho National Engineering and Environmental Laboratory (INEEL) boundaries were used to define the impact area for geology and soils, water, air quality, noise, waste management, land use, ecology, and historical and cultural resources. INEEL and its surrounding region were used to establish impacts to transportation, visual/scenic, socioeconomical, environmental justice, and public and occupational health and safety resources.

- Step 3: Establish the timeframe for the analysis (Council on Environmental Quality, 1997). The timeframe for the analysis includes the past, present, and future. The historical (past) boundary was assumed to be prior to the establishment of the U.S. Department of Energy (DOE) and precursor activities at INEEL (established in 1949). Accordingly, the boundary selected was the 1940s. Past activities also include the facilities and programs at INEEL to year 2003. The future time boundary would extend to 2039 to encompass the construction period for the proposed Idaho Spent Fuel Facility (2–4 years), meet the terms of the 1995 Settlement Agreement, and a 2- to 4-year decommissioning period. The recent Idaho High-Level Waste (HLW) and facilities disposition environmental impact statement (EIS) incorporated a timeframe for analysis from 2000 to 2095 (DOE, 2002, Section 5.4). The 2000–2095 period was the timeframe established for completion of activities evaluated in that EIS and the assumed period of institutional control, although DOE has no plans to relinquish institutional control of INEEL facilities or lands.

- Step 4: Identify other actions affecting the resources, ecosystems, and human communities of concern (Council on Environmental Quality, 1997). This step was accomplished by reviewing the identified actions in the DOE Spent Nuclear Fuel Programmatic EIS, the DOE Idaho HLW and Facilities Disposition EIS (DOE, 2002), and the EIS on the independent spent fuel storage installation for Three-Mile Island Unit 2 Spent Fuel (U.S. Nuclear Regulatory Commission, 1998). Actions within INEEL, as well as offsite, were identified. Information on these past, present, and reasonably foreseeable future actions is summarized in Section 4.14.2. Contributions to cumulative effects are summarized in Section 4.14.3.

- Steps 5 and 6: Characterize the resources, ecosystems, and human communities identified in Steps 1–4 for response to change and capacity to withstand stresses. Further, characterize the stresses affecting these resources, ecosystems, and human communities and their relations to regulatory thresholds (Council on Environmental Quality, 1997). Considerable information on the conditions of these environmental categories, their current stresses, and their relations to regulatory thresholds and requirements is in Section 3 of the EIS. A summary table and discussion is included in Section 4.14.

- Step 7: Define a baseline condition for the resources, ecosystems, and human communities (Council on Environmental Quality, 1997). The words baseline condition can be used in three ways in an impact study: (i) to define the conditions of pertinent resources, ecosystems, and human communities at an historical reference date and as reflected by trends to the current date; (ii) to define the current conditions (such as in Section 3 of the EIS, with the current conditions reflective of historical cumulative effects); and (iii) to define the future without the proposed action conditions based on forecasting changes for the future time period within the analysis. Descriptive information will be included on conditions reflective of an historical reference date and trends. Steps 5 and 6 previously discussed relate to current conditions, with summary information included. The future without the proposed action conditions is summarized in conjunction with Step 9.

- Step 8: Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities (Council on Environmental Quality, 1997). These relationships will be addressed by identifying and describing common pathways or connections between the construction and operation of the proposed Idaho Spent Fuel Facility; related past, present, and reasonably foreseeable future actions; and the affected resources, ecosystems, and human communities. This step is related to Steps 1 and 4 previously discussed and will be addressed in Section 4.14 of the EIS.

- Step 9: Determine the magnitude and significance of cumulative effects (Council on Environmental Quality, 1997). The magnitude of the cumulative effects will be determined based on information from selected tables in DOE (2002), as well as impact information from Sections 4.1–4.13 of this report. The significance of the cumulative effects was determined considering historical, current, and forecasted conditions for the affected resources, ecosystems, and human communities, along with professional judgment. Information related to this step is in Section 4.14 of the EIS.

- Step 10: Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects (Council on Environmental Quality, 1997). Because there are no significant incremental impacts from the proposed Idaho Spent Fuel Facility and no significant cumulative effects associated therewith, it would not be necessary to develop alternatives to avoid, minimize, or mitigate significant cumulative effects. The proposed facility already includes a number of design, construction, and operational measures that are focused on avoiding, minimizing, or mitigating direct, indirect, and cumulative effects. These measures are mentioned in various locations in Sections 2 and 4. In addition, they are addressed in a summary fashion in Section 5 of the EIS.

- Step 11: Monitor the cumulative effects of the selected alternative and adapt management (Council on Environmental Quality, 1997). Extensive monitoring of the physical-chemical and biological environment is already conducted at INEEL, including specific components that are related to Idaho Nuclear Technology and Engineering Center (INTEC) and its environs (including the site for the proposed Idaho Spent Fuel Facility). Because there are no significant incremental impacts from the proposed Idaho Spent Fuel Facility and no significant cumulative effects associated therewith, it would not be necessary to develop and implement a special cumulative effects monitoring program with related adaptive management strategies. Specific monitoring of selected parameters is planned for the proposed Idaho Spent Fuel Facility. For example, process and effluent radiation monitoring would include criticality monitoring, area radiation monitoring, radiation signature monitoring, continuous air monitoring, and exhaust gas stack sampling. This monitoring program is presented in Section 6 of the EIS.

Cumulative Impacts of Past Actions

This summary is of the affected environment in accordance with 13 topical areas classified as resources, ecosystems, or human communities. The information is abstracted from Sections 3.1–3.14. Detailed information and data can be found in these sections, along with information on pertinent regulatory thresholds and environmental management policies and requirements. The approach used is to describe current conditions, which are reflective of the cumulative effects from past actions at INEEL, along with actions from the 1940s, or earlier, which predate the DOE operations.

- Land Use (Sections 3.1 and 3.2)—Ecosystem: INEEL covers 230,850 ha [570,000 acres] in southeast Idaho, with about 2 percent {4,600 ha [11,400 acres]} developed to support DOE. One of nine developed areas is INTEC, located in the south-central part of INEEL. INTEC includes 150 buildings located on 101 ha [250 acres]. The proposed Idaho Spent Fuel Facility would be constructed on 3.2 ha [8 acres] adjacent to the southeast boundary of INTEC; construction laydown activities would also occur on an adjoining 4.1-ha [10-acre] area. Additional land uses at INEEL include 340,000 acres leased for cattle and sheep grazing. Future industrial development at INEEL is expected to occur in the central portion within existing major facility areas. A designated Sagebrush Steppe Ecosystem Reserve {29,672 ha [73,263 acres]} is located at INEEL; its southern boundary is 17.6 km [11 mi] north of INTEC. Approximately 75 percent of the land adjacent to INEEL is administered by the Bureau of Land Management for wildlife habitat, mineral and energy production, grazing, and recreation. Approximately 1 percent of the adjacent land is owned by the State of Idaho and is used for purposes similar to that of the Federal government. The remaining

24 percent of the land adjacent to INEEL is privately owned and primarily used for grazing and crop production (DOE, 2002). Historical use of a portion of the INEEL land in the 1940s was as a bombing range; agricultural and grazing operations existed on a periodic basis prior to and during the 1940s.

- Transportation and Infrastructure (Section 3.3)—Human Community: Two interstate highways (86 and 15), three U.S. highways (91, 20, and 26), and one state highway (33) serve the regional area and provide access to INEEL. Approximately 140 km [87 mi] of paved roads are located within INEEL. One DOE-owned spur line provides railway access to INEEL. Historical trails and roads existed in the INEEL area and region prior to and during the 1940s.

- Geology and Soils (Section 3.4)—Resources: INEEL is located on the Eastern Snake River Plain, which is a broad northeast-trending basin that began filling with volcanic deposits about 6 million years ago. Overlying and interlacing the volcanic lavas are thin, discontinuous deposits of wind-blown sand and loess, floodplain, riverbed and lake sediments, and landslope debris. Surficial sediments at the proposed Idaho Spent Fuel Facility site consist mostly of gravel, gravelly sands, and sands. The proposed site has been previously disturbed, and its vegetation covers about 5 percent of the 3.2 ha [8 acres]. Site soils are below thresholds for radiological and nonradiological contaminants. No mineral resources are associated with the 3.2-ha [8-acre] site. Finally, there is a low rate of seismicity in the Eastern Snake River Plain, and the annual probability of nearby volcanic eruptions is also low. Historical agricultural and grazing activities on current INEEL lands may have caused some losses of soil caused by erosion. Radiological contamination of soils in the vicinity of INTEC would have occurred in more recent decades.

- Water Resources–Surface Water (Section 3.5.1)—Resources: Three main streams are associated with INEEL—the Big and Little Lost Rivers and Birch Creek. INTEC is located 61 m [200 ft] from the Big Lost River channel; however, INTEC is surrounded by a storm water drainage ditch system for controlling storm water runoff. Several studies of a probable maximum flood near INTEC have been conducted. Based on conservative assumptions, small areas of the northern portion of INTEC could flood at the estimated 100- and 500-year flows, but the southeast corner of INTEC, where the proposed Idaho Spent Fuel Facility would be located, is not within the estimated 100- and 500-year flood plains. Additional work is ongoing at INEEL by the U.S. Geological Survey and the Bureau of Reclamation to further refine flow frequency estimates for the Big Lost River in the vicinity of INTEC. Finally, it should be noted that no surface water is used as a water supply at INEEL.

  Water quality in the Big Lost River has remained fairly constant for the period of record. Applicable drinking water quality standards for measured physical, chemical, and radioactive parameters have not been exceeded (DOE, 1995). INEEL activities do not directly affect the quality of surface water because discharges are to artificial seepage and evaporation basins or storm water injection wells. Effluents are not discharged to natural surface waters. Water from the Big Lost River, however, as well as seepage from evaporation basins and storm water injection wells, does infiltrate the Snake River Plain Aquifer.

- Water Resources–Groundwater (Section 3.5.2)—Resources: The Snake River Plain Aquifer is the largest groundwater system in Idaho. As the major source of drinking water for southeast Idaho, it has been designated a sole-source aquifer by the U.S. Environmental Protection Agency. Aquifer recharge is primarily from the infiltration of irrigation water and by valley underflow from the mountains to the north and northeast of the plain. The vadose zone extends down from the ground surface to the top of the Snake River Plain Aquifer; at INTEC, the zone extends from the ground surface to 140–146 m [460–480 ft] below the ground surface. Three zones of perched groundwater occur at INTEC ranging about 9–98 m [30–322 ft] below the ground surface.

  Monitoring of groundwater quality at INEEL has been conducted within four categories—drinking water monitoring, compliance monitoring (source oriented), surveillance monitoring (of the groundwater), and special studies. INTEC drinking water wells are hydrologically upgradient of the INTEC facility; they would be used to supply water to the proposed Idaho Spent Fuel Facility. In 2000, the most recent year with published data, all drinking water samples collected at INTEC had concentrations below the maximum contaminant levels specified in Federal and state drinking water regulations. Surveillance monitoring of perched and aquifer water underneath and downgradient from INTEC established that concentrations of several inorganics and radionuclides exceed the Safe Drinking Water Act maximum contaminant levels and secondary maximum contaminant levels. An indepth study of soil and groundwater contaminations at INTEC was conducted in 1995. The study indicated that both soil and groundwater contaminations existed relative to several inorganics and radionuclides (details are in Section 3.5.2.4).

  The two primary uses of water withdrawn from the Eastern Snake River Plain Aquifer are for agricultural irrigation and for INEEL operations. Nearly 1.77 trillion L [0.47 trillion gal] of water is withdrawn for agricultural purposes within the region. Annual water withdrawals by INEEL are about 7.4 billion L [2.0 billion gal]; the water is used for drinking purposes, as process water, and for noncontact cooling. Finally, DOE holds a Federal Reserved Water Right for INEEL, which permits a maximum water consumption of 43.2 billion L [11.4 billion gal] per year.

- Ecological Resources (Section 3.6)—Ecosystem: Ecological resources at INEEL include flora; fauna (terrestrial and aquatic); threatened, endangered, and sensitive species; and wetlands. Vegetation at INEEL is primarily of the shrub-steppe type; the 15 vegetation associations range from primarily shadescale-steppe vegetation at lower altitudes through sagebrush- and grass-dominated communities to juniper woodlands along the foothills of the nearby mountains and buttes. Facility and human-disturbed (grazing not included) areas include about 2 percent of INEEL, with introduced annuals, including Russian thistle and cheatgrass, frequently dominating disturbed areas. These species usually are less desirable to wildlife as food and cover and compete with more desirable perennial native species. Disturbances to vegetative cover from large wildfires have been a concern at INEEL in recent years. Previous studies at INEEL indicated that more than 270 vertebrate species occur, including 46 mammal, 204 bird, 10 reptile, 2 amphibian, and 9 fish. The monitoring of radionuclide levels outside the boundaries of the various INEEL facilities, and off INEEL, has detected radionuclide concentrations above background levels in individual plants and animals; however, these limited data do not suggest that populations of exposed animals (e.g., mice and rabbits) or animals that feed on these exposed animals (e.g., eagles and hawks) are at risk.

Seven bird species, six mammals, one reptile, and six plant species are listed as threatened or endangered, species of concern, or other unique species. Details are contained in Section 3.6. None of these species has been identified at the site for the proposed Idaho Spent Fuel Facility; moreover, no critical habitat has been designated at the proposed site. Finally, the U.S. Fish and Wildlife Service National Wetlands Inventory identified more than 130 areas inside the boundaries of INEEL that might possess some wetlands characteristics. Surveys conducted in the fall of 1992 indicated that these possible wetlands cover about 1.3 percent {3,323 ha [8,206 acres]} of INEEL. There are, however, no wetland-like areas within the INTEC boundary, including the site for the proposed Idaho Spent Fuel Facility.

- Air Quality (Section 3.7)—Resources: Monitoring and assessment of radiological air quality at INEEL and in the surrounding region have demonstrated that exposures resulting from airborne radionuclide emissions are well within applicable standards and are a small fraction of the dose from background sources. The National Emission Standards for Hazardous Air Pollutants includes an annual radiation dose limit of 0.1 mSv [10 mrem] to the hypothetical maximally exposed individual (MEI). The calculated offsite dose to the MEI from INEEL radiation sources is about 0.00031 mSv [0.031 mrem]; this dose is well below the National Emissions Standard for Hazardous Air Pollutants of 0.1 mSv [10 mrem] and the annual background dose of 3.6 mSv [360 mrem]. In summary, radioactivity and radiation levels resulting from INEEL site emissions are low, well within applicable standards, and negligible when compared with doses received from natural background sources. These summary remarks apply to onsite conditions to which INEEL workers or visitors may be exposed and to offsite locations where the general public population resides.

  Nonradiological air quality includes criteria pollutants regulated by the National and State of Idaho Ambient Air Quality Standards and other types of pollutants with potentially toxic properties called toxic or hazardous air pollutants. Criteria pollutants are nitrogen dioxide, sulfur dioxide, carbon monoxide, lead, ozone, and respirable particulate matter less than or equal to 2.5 μm [9.8×10^{-9} in] in diameter. Twenty-six toxic air pollutants are emitted from INEEL facilities. Monitoring and assessment of the nonradiological air quality on and around INEEL indicate the air quality is good and within applicable standards and guidelines. The area around INEEL is either in attainment or unclassified for all National Ambient Air Quality Standards. Portions of Bannock and Power Counties in Idaho, near the region of influence, are in a nonattainment area for particulate matter. For toxic emissions, all INEEL boundary and public road levels have been found to be well below reference levels appropriate for comparison. Similarly, all toxic pollutant levels at onsite locations at INEEL are below occupational limits established for the protection of workers. Detailed information on comparisons to standards is found in Section 3.7.

- Noise (Section 3.8)—Resources: The environmental noise levels at INEEL and the associated facilities are typical of industrial operations. No cumulative effects concerns have been identified for noise levels on and around INEEL.

- Historical, Cultural, and Paleontological (Section 3.9), Human Communities—Prehistoric settlement and use of the area now known as INEEL date back 12,000 years. Numerous archeological surveys have been conducted in recent years, and no known sites have been identified on the 3.2-ha [8-acre] proposed project site nor on the adjoining 4.1-ha [10-acre] construction laydown area. Within INTEC, there are 38 buildings and structures that are of historical significance and potentially eligible for listing on the National Register of Historic Places. Special concerns exist relative to early cultures and lifestyles of the Shoshone–Bannock Tribes, and their inability to maintain and revitalize their traditional cultures because of continuing restricted access to aboriginal lands, including some areas on INEEL. Finally, several types of paleontological resources have been identified within INEEL boundaries.

- Visual/Scenic (Section 3.10)—Human Community: Lands within and adjacent to INEEL are subject to the Bureau of Land Management Visual Resource Management Guidelines. Adjacent lands are designated as a visual resource Class II area, which allows for moderate industrial growth while preserving and retaining the existing character of the landscape. Lands within the boundaries of INEEL are designated as either Class III or Class IV areas, allowing for partial retention of existing character and major modifications, respectively. The INTEC area is a Class IV area. No major issues exist relative to these classifications and incompatibilities with current land uses within INEEL.

- Socioeconomical (Section 3.11)—Human Community: The total population in 2000 in the seven-county region of influence was 250,365. Population growth in the region of influence paralleled statewide growth from 1960 to 1990, with approximate average annual rates of 1.3 and 1.4 percent. From 1990 to 2000, however, state population growth accelerated to 2.9 percent a year, compared with the region of influence growth of 1.4 percent. Nevertheless, with these trends, the region of influence population would reach almost 269,000 by 2005 and 339,700 by 2025. In the 1990s, employment in the region of influence grew at an average annual rate of nearly 2.6 percent. In 2000, the region of influence experienced the lowest unemployment rate in a decade—4.0 percent. This rate was lower than the 4.9 percent for the state, though rates varied widely in the region of influence from 2.5 percent in Madison County to 5.0 percent in Bannock County. The INEEL influence on the regional economy is apparent from the fact that in fiscal year 2001, INEEL accounted for 8,100 jobs, or 6 percent of the total workforce in the region of influence. Finally, housing and key community services such as education, law enforcement, fire protection, and medical services do not appear to be overstressed in the region of influence.

- Environmental Justice (Section 3.12)—Human Community: The environmental justice study area was chosen to encompass an 80-km [50-mi] radius around INTEC. This area includes portions of the seven counties that compose the region of influence for socioeconomics. Census data from 2002 were used to identify minority populations. The 2000 population within the 80-km [50-mi] radius was 203,165, including a minority population of 21,898 (11 percent). The low-income population was based on 1990 data because the 2000 data were not available. The 1990 population was 170,989, including 20,110 within the definition of low income (12 percent).

- Public and Occupational Health and Safety (Section 3.13)—Human Community: The annual exposure to airborne releases of radioactivity vary from 0.0027 mSv [0.27 mrem] for an onsite worker, to a range of 0.00008–0.00031 mSv [0.008–0.031 mrem] for the hypothetical MEI. These doses are well below the 0.1 mSv/yr [10 mrem/yr] National Emissions Standard for Hazardous Air Pollutants limit in 40 CFR Part 61. Further, the annual doses to individuals are well below the natural background level of 3.6 mSv/yr [360 mrem/yr]. The number of latent cancer fatalities estimated in the surrounding population for the next 70 years is less than 1. Lifetime health effects from groundwater pathway exposures were estimated to be 1 in 170 million. Health risks to the public from nonradiological airborne emissions and groundwater consumption are less than 1 in 1 million, and in some cases, the risks are 0. Radiation workers at INEEL can be exposed to radiation internally from inhalation and ingestion and externally from direct exposure. The largest fraction of occupational dose received by INEEL workers is external radiation from direct exposure. The average annual occupational dose at INEEL between 1997 and 2000 was 0.84 mSv [84 mrem]. This value is well below the annual occupational dose limit of 50 mSv [5,000 mrem] in 10 CFR Part 20.

- Waste Management (Section 3.14)—Resource: A variety of radioactive wastes are stored, generated, or both at INEEL. The current stored inventory includes 2,100 m^3 [2,750 yd^3] of mixed low-level waste; 980 m^3 [1,280 yd^3] of low-level waste; 65,000 m^3 [85,000 yd^3] of transuranic waste; 4,400 m^3 [5,750 yd^3] of HLW; and 3,785,000 L [1 million gal] of mixed transuranic waste/sodium-bearing waste. The annual generation of wastes includes 43,000 m^3 [56,250 yd^3] of industrial solid waste; 120 m^3 [150 yd^3] of hazardous waste; 160 m^3 [210 yd^3] of mixed low-level waste; and 2,900 m^3 [3,800 yd^3] of low-level waste. Industrial and commercial solid waste is disposed of at the INEEL Landfill Complex in the Central Facilities Area. Hazardous waste is minimized and managed via private sector treatment and disposal. The annual generation of mixed low-level and low-level radioactive waste is stored at the Radioactive Waste Management Complex.

Table 4-13 provides a synopsis of the effects and concerns and the basis for their classification.

References

Council on Environmental Quality. "Considering Cumulative Effects Under the National Environmental Policy Act." Washington, DC: Council on Environmental Quality. 1997.

DOE. DOE/EIS–0287–F, "Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement." Idaho Falls, Idaho: DOE, Idaho Operations Office. 2002.

———. DOE/EIS–0203–F, "Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement." Idaho Falls, Idaho: DOE, Idaho Operations Office. 1995.

NRC. NUREG–1626, "Final Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation to Store the Three Mile Island Unit 2 Spent Fuel at the Idaho National Engineering and Environmental Laboratory." Washington, DC: U.S. Nuclear Regulatory Commission. March 1998.

APPENDIX D

RESPONSES TO PUBLIC COMMENTS

CONTENTS

D.1 INTRODUCTION TO THE RESPONSES TO PUBLIC COMMENTS

The National Environmental Policy Act (NEPA) of 1969 (42 USC 4321 et seq.) requires Federal agencies to consider the environmental impacts of actions under their jurisdictions. Both the Council on Environmental Quality and the U.S. Nuclear Regulatory Commission (NRC) have promulgated regulations to implement the requirements of NEPA. Council on Environmental Quality NEPA regulations are contained in the Code of Federal Regulations (CFR) at 40 CFR Parts 1500 to 1508, and NRC requirements are provided in 10 CFR Part 51.

In fulfilling its requirements under NEPA, NRC made the draft environmental impact statement (EIS) for the proposed Idaho Spent Fuel Facility available for public review and comment in June 2003 in accordance with 10 CFR 51.74 and 40 CFR 1503.1. A 45-day public comment period was specified in accordance with 10 CFR 51.73. The public comment period ended on August 18, 2003; NRC received more than 90 written comments.

In modifying the draft EIS to prepare the final EIS for the Proposed Idaho Spent Fuel Facility at the Idaho National Engineering and Environmental Laboratory in Butte County, Idaho, NUREG–1773, the staff of NRC and its contractor, the Center for Nuclear Waste Regulatory Analyses (CNWRA), have carefully reviewed and considered each comment and grouped and summarized comments relating to similar issues and topics. This grouping is permitted by NRC implementing regulations at 10 CFR 51.91 and Council on Environmental Quality NEPA regulations at 40 CFR 1503.4(b). The grouping, including editorial comments, follows the general outline of the draft EIS and includes

- Editorial comments;
- Introduction;
- Alternatives;
- Description of the affected environment;
- Air quality;
- Environmental impacts; and
- Mitigation.

After grouping the more than 90 written comments, the NRC and CNWRA staffs prepared responses to these comments.

The comments and the responses are contained in this appendix to the final EIS. Where comments resulted in modifying or supplementing the information in the draft EIS, those changes are noted. The NRC and CNWRA staffs responded to all comments received during the 45-day public comment period.

D.2 COMMENTS AND RESPONSES

D.2.1 Editorial Comments

Comment 1: Commenters suggested corrections for typographical errors, misspellings, and grammatical mistakes in the draft EIS. Several commenters also proposed text to clarify discussions in the draft EIS.

Response 1: Proposed changes were made when appropriate and when they did not alter the impact assessment. Where proposed changes were intended to correct inaccuracies or inconsistencies, they were checked for accuracy prior to incorporation in the final EIS.

Comment 2: Several commenters provided suggestions to clarify or correct background information on the proposed action. For example, one commenter noted the correct shutdown date for the Shippingport Light Water Breeder Reactor was 1982, which is in agreement with the NRC records for the facility. One commenter suggested the final EIS clarify the NRC definitions for SNF and high-level waste (HLW). Several commenters requested clarification of the responsibilities of the different parties to the licensing action.

Response 2: Where commenters identified errors, such as the shutdown date for the Shippingport Light Water Breeder Reactor, corrections were made throughout the text. A text box has been added to Section 1 of the final EIS to clarify NRC definitions for SNF and HLW. The text in Section 1.6.4 of the final EIS was expanded to clarify the roles of the NRC, the U.S. Department of Energy (DOE), and the license applicant, Foster Wheeler Environmental Corporation (FWENC).

D.2.2 Introduction

D.2.2.1 Site Description

Comment 1: FWENC noted the location of the construction laydown area for the proposed Idaho Spent Fuel Facility was inconsistent in the draft EIS with the current plans. FWENC also noted some descriptions of the proposed action do not properly locate the facility relative to the existing perimeter fence or the storm ditch for the Idaho Nuclear Technology and Engineering Center (INTEC).

Response 1: In addition to the area adjacent to the northeast corner of the proposed Idaho Spent Fuel Facility defined in the draft EIS, the construction laydown will include an area immediately east of the proposed facility, as described in a FWENC letter dated June 4 (FWENC, 2003a). The current planned construction laydown area is shown in the final EIS in revised Figure 1-1. The additional area is already disturbed, and, according to the FWENC environmental report (2003b), the area has previously been surveyed for cultural and biological resources. The potential impacts for these resources remain minimal and are unchanged from the analyses presented in the draft EIS. The text has been modified throughout the final EIS to reflect the correct location of the construction laydown area. The changes affect only the construction laydown area; the proposed location and size of the area for the Idaho Spent Fuel Facility remain unchanged from the draft EIS.

The commenters are also correct that the proposed Idaho Spent Fuel Facility will be located outside the current perimeter fenceline for the INTEC facility. As described in FWENC (2003c, Section 3.3.5.1; 2003d, Section 1.2.2), the proposed facility will be bounded by a site security fence to restrict access and protect individuals from exposure to radioactive materials and radiation. The text in the final EIS has been revised to clarify the location of the proposed facility relative to the existing perimeter fence. The text in Section 3.5.1.2 of the final EIS also has been revised to clarify the location of the facility relative to the storm water drainage ditch system.

D.2.2.2 Regulatory Permit Status

Comment 1: Two commenters provided updates to the regulatory permit status. The draft EIS stated FWENC would seek a Categorical Exemption from the Idaho Division of Environmental Quality for construction activities associated with the proposed facility. The commenter noted documentation of the calculated emissions will be provided to the Idaho Division of Environmental Quality and the U.S. Environmental Protection Agency (EPA), as appropriate to demonstrate compliance and to address Idaho National Engineering and Environmental Laboratory (INEEL) Title V operating permit considerations. The commenters also noted that rather than FWENC being conditionally exempt from Resource Conservation and Recovery Act (RCRA) requirements, the proposed Idaho Spent Fuel Facility will be considered part of the larger INEEL facility for the purposes of RCRA waste accountability. One commenter noted there was no specific reference to the National Emission Standards for Hazardous Air Pollutants regulations in the listing of applicable Federal standards and regulations in Section 1.6.1.1 of the draft EIS. Finally, DOE identified several places where the DOE orders identified in the draft EIS have been superseded or discontinued.

Response 1: Throughout the final EIS, the text has been revised to reflect the current plans for providing information on construction activity emissions to the Idaho Division of Environmental Quality and the EPA to demonstrate compliance with the INEEL Title V operating permit. The text in the final EIS also has been revised to reflect the proposed Idaho Spent Fuel Facility is part of INEEL for RCRA waste accountability purposes. As a result of this status, applicable sections of 40 CFR Part 270 for large quantity generators will be implemented in compliance with the existing INEEL RCRA permit and in coordination with the DOE Idaho Operations Office and Bechtel BWXT Idaho, the INEEL management and operations contractor.

EPA uses National Emission Standards for Hazardous Air Pollutants to set emissions standards for potential noncriteria pollutants not covered by the National Ambient Air Quality Standards. The primary National Emission Standards for Hazardous Air Pollutants are designed to protect human health, and the secondary standards are designed to protect public welfare. The National Emission Standards for Hazardous Air Pollutants are presented in Table 3-7 of the draft EIS. The text in Section 1.6.1.1 of the final EIS has been revised to include National Emission Standards for Hazardous Air Pollutants for radiological emissions that are give in 40 CFR Part 61.

The text of the final EIS also has been revised to include the current status of orders for DOE environmental compliance at INEEL. DOE Order 5400.1, which established general environmental protection program requirements and assigns responsibilities for ensuring compliance with applicable laws, regulations, and DOE policies, has been superseded by DOE Order 450.1. DOE Order 5480.1B, which established the environmental, safety, and health programs for DOE operations at INEEL, is no longer in effect. Environmental, safety, and health standards are contained in DOE Order 5480.4.

D.2.2.3 Security and Physical Protection

Comment 1: One commenter expressed concern that when all the SNF is stored in one location, it may become vulnerable to terrorist activity.

Response 1: The NRC staff is sensitive to the potential risk of terrorist activity. As part of fulfilling its mission to protect public health and safety and the environment, NRC has assessed potential vulnerabilities and issued interim compensatory measures to licensees to ensure a safe environment. Also, NRC has increased security awareness for all commercial licensees and applicants. The commenter correctly noted there is a need for a facility to store SNF that is currently being stored in older buildings at INEEL. The Native American Tribes agree that SNF needs to be safely repackaged and prepared for removal from INEEL and the State of Idaho.

In *The Matter of Private Fuel Storage, LLC* (Independent Spent Fuel Storage Installation), 56 NRC 340 (2002), the Commission held that NRC is not required to consider terrorism in EISs. The Commission indicated, "the possibility of a terrorist attack … is speculative and simply too far removed from the natural or expected consequences of agency action to require a study under NEPA." With respect to the proposed Idaho Spent Fuel Facility, FWENC will be required to meet the NRC physical control requirements in 10 CFR Part 72, Subpart H. The physical protection plan developed by FWENC will be evaluated as part of the NRC safety evaluation report rather than as part of the final EIS. If the construction authorization is approved, NRC will conduct inspections to ensure that security and physical protection commitments and requirements are implemented.

D.2.3 Alternatives

Comment 1: In the summary of waste management activities provided in Table 2-1 of the draft EIS, it is indicated that small quantities of radioactive waste will be generated during SNF receipt and repackaging, and subsequently will be transferred to the Radioactive Waste Management Complex located at INEEL. One commenter expressed concern that the waste would not be transferred out of state and that it would remain permanently at INEEL.

Response 1: The proposed action, as summarized in Section 4.13 of the draft EIS, indicates that solid low-level radioactive wastes may either be transferred to the Radioactive Waste Management Complex for disposal or shipped offsite for disposal. Any wastes disposed at the Radioactive Waste Management Complex would remain permanently on the site. Section 4.13 also states that if all the solid low-level radioactive waste generated by the proposed action were sent to the Radioactive Waste Management Complex for disposal, this waste stream would increase the annual waste volume from INEEL to the facility by 3 percent. This increase is, therefore, a small proportion of the annual waste stream going to the Radioactive Waste Management Complex. Hence, no significant environmental impacts are expected. Because this concern is already discussed in the draft EIS, no changes were made in the final EIS in response to the comment.

Comment 2: Commenters stated the impact summary presented in Table 2-1 for the no-action alternative is not correct, particularly where the summary table indicates there would be no impact. The commenters expressed concern that under the no-action alternative, SNF would continue to be stored in existing facilities; although the associated risks to public and occupational health and safety would remain unchanged, the risks would not be zero. The commenters also argued the summary presented in Table 2-1 is not consistent with other sections, including Section 4.15, where short- and long-term impacts of the no-action alternative are considered separately.

Response 2: There are impacts associated with the no-action alternative for some resource areas. As discussed in Section 4.15 of the draft EIS, the no-action alternative would require no construction or major upgrades in the short term, and some resources, such as land use and visual/scenic resources, would not be affected by the no-action alternative. In the long term for the no-action alternative, however, DOE would either need to modify existing facilities or build new facilities to prepare the SNF for removal from INEEL by 2035, in compliance with terms of the 1995 Settlement Agreement. Specific estimates of the long-term impacts from the no-action alternative are highly uncertain, but they are likely to be similar to the proposed Idaho Spent Fuel Facility. The impact summary presented for the no-action alternative in Table 2-1 has been modified to clarify where there are no additional impacts and to distinguish between short- and long-term impacts.

Comment 3: One commenter said that the statement in Section 2.4 of the draft EIS is not correct that "no other alternatives are reasonably likely to exceed these impacts." The commenter suggested the statement should be changed to "other alternatives are reasonably likely to result in equal or greater environmental impacts."

Response 3: The commenter is correct, and the proposed wording emphasizes the selected alternatives represent a conservative and bounding estimate of the likely impacts. The final EIS text has been modified as suggested.

D.2.4 Description of the Affected Environment

D.2.4.1 Water Resources

Comment 1: Several comments related to the flooding potential for the Big Lost River Basin near the proposed Idaho Spent Fuel Facility. One commenter stated the flooding estimates presented in the FWENC safety analysis report (FWENC, 2003c, Section 2.4.4.2) evaluate a probable maximum flood scenario that includes overtopping of the Mackay Dam. Another commenter noted the U.S. Geological Survey recently published a report that revises flood flows downward.

Response 1: A more detailed evaluation of potential flooding at the site from a probable maximum flood is included in Section 4.12.4.1 of the final EIS. The text in Section 3.1.3 of the final EIS will be revised to include a simplified description of the probable maximum flood scenario, including overtopping of the Mackay Dam.

The 100-year peak flow of the Big Lost River was estimated by the U.S. Geological Survey (Hortness and Rousseau, 2003) to resolve differences in previous estimates by the Bureau of

Reclamation and the U.S. Geological Survey. The 2003 report estimated a 100-year peak flow for the Big Lost River immediately upstream of the INEEL diversion dam of 106 m^3/s [3,750 ft^3/s] with upper and lower 95-percent confidence limits of 177 m^3/s [6,250 ft^3/s] and 37 m^3/s [1,300 ft^3/s], respectively. These estimates indicate the conservative nature of earlier estimates by the U.S. Geological Survey {205 m^3/s [7,260 ft^3/s]} (Berenbrock and Kjelstrom, 1996) and the Bureau of Reclamation {82 m^3/s [2,910 ft^3/s]} (Ostenaa, et al., 1999).

D.2.4.2 Ecological Resources

Comment 1: One commenter noted that elk are the most numerous big game species on the INEEL and often cause problems with adjoining private land owners. The elk use the INEEL as a refuge during hunting season and as a base from which to raid the farmers' fields.

Response 1: The commenter correctly points out that elk populations are greater than indicated in the text of the draft EIS ("present in small numbers as transients"). Since 1986, the number of elk wintering and summering at INEEL has increased, with many being year-round residents. The big-game populations are dependent on, among other things, populations during the previous year, severity of winter conditions, and acreage of recently burned land. In the case of elk, the population is also dependent on game-control measures. As mentioned by the commenter, elk continue to receive the greatest attention due to their adverse economic impact on local farmers. Because the proposed site is adjacent to the existing INTEC facility and will be surrounded by a perimeter security fence, however, the impacts on the elk population from the proposed facility remain negligible. Final EIS text has been modified to remove the indication that elk populations are small and transient.

D.2.4.3 Cultural, Historical, Archaeological, Ethnographical, and Paleontological Resources

Comment 1: The Shoshone–Bannock Tribes stated their wish to be involved when, and if, cultural items or human remains are found at the proposed site. The Tribes commented it is their understanding if remains are found, construction will halt until further investigation has been completed. The Tribes also noted the areas for the proposed Idaho Spent Fuel Facility and the associated construction laydown previously have been surface surveyed by INEEL cultural resource staff. If items below the subsurface are uncovered during construction, the Tribes would like to be informed and be a part of the decisionmaking process regarding the disposition of the items. The Tribes noted in the draft EIS, the historical, cultural, and paleontological resources have been identified as small, however, they requested clarification whether cultural items that may be below the surface have been considered.

Response 1: As indicated in the environmental report submitted with the license application (FWENC, 2003e, Appendix B), the cultural resource investigations conducted at INEEL must meet the U.S. Department of the Interior standards in 36 CFR Part 800 and requirements established in the INEEL Cultural Resources Management Plan. Ground-disturbing projects are preceded by archive searches and, if necessary, additional archaeological field surveys. Searches of the INEEL cultural resource management archives indicated the proposed locations of the 7.2-ha [17.8-acre] facility and construction laydown area have been extensively surveyed, with only limited historical, cultural, and paleontological resources identified. In addition, the proposed location is already highly disturbed, and part of the site is used for construction laydown. For these reasons, additional field activities were not conducted. Previous and ongoing consultations between the DOE, its management and operations contractor, and the Shoshone–Bannock Tribes have been used to ensure that significant cultural resources with visible surface remains in the area have been identified.

The INEEL facility perimeters are routinely monitored for archaeological resources. These ongoing investigations should ensure that any impacts to sensitive properties as a result of the new construction will be identified in a timely fashion. If cultural resource materials are unexpectedly encountered during project activities such as excavation, FWENC employees are authorized by the INEEL Stop-Work Authority, to stop work, ensure that resources are protected from inadvertent harm, and contact the INEEL Cultural Resource Management Office for assistance. The identification and protection of any resources discovered will adhere to the requirements stipulated in Federal statutes and regulatory requirements applicable to cultural resources (refer to Section 1.6.1.1). In the unlikely event that human remains or burial-related artifacts are unearthed, procedures on the handling of these resources will comply with the Native American Graves Protection and Repatriation Act of 1990. As part of the Cultural Resource Management Plan, DOE has committed to additional interaction and exchange of information with the Shoshone–Bannock Tribes if additional resources are identified.

D.2.4.4 Air Quality

Comment 1: One commenter noted the highest predicted concentrations of toxic air pollutants presented in Table 3-8 of the draft EIS for the maximum baseline case at INEEL included the effects of operating the New Waste Calciner Facility. The commenter pointed out this facility is currently on standby and will not operate again without significant upgrades to the emissions system.

Response 1: DOE placed the New Waste Calciner Facility on standby in 2000 and submitted a two-phased partial closure plan for the calciner portion of the facility in August 2000 (DOE, 2002, Section 2.2.5). The plan is consistent with an April 19, 1999, modification to the Notice of Noncompliance Consent Order signed by DOE and the Idaho Department of Health and Welfare in 1992. In publishing the record of decision for the alternatives evaluated in the INEEL HLW and facilities disposition final EIS, DOE will decide whether to upgrade and permit the calciner. If DOE decides to upgrade the calciner, it will modify the closure plan, as necessary, through the permitting process. The text in the final EIS has been changed, as appropriate.

D.2.5 Environmental Impacts

D.2.5.1 Air Quality Impacts

Comment 1: One commenter noted that Section 4.6 in the draft EIS should include a discussion or reference of compliance with general conformity regulations of the Clean Air Act. The commenter noted INEEL is in an air quality attainment area and, therefore, in accordance with Section 176(c)(1) of the Clean Air Act, a conformity determination is not required.

Response 1: The commenter is correct that general conformity applies in either Federal nonattainment or Federal air quality maintenance areas. INEEL occupies parts of five counties that are either in attainment or unclassified with respect to the EPA National Ambient Air Quality Standards (DOE, 2002, Section 4.7.2). A conformity determination is not required, and the text of the final EIS has been changed, as appropriate.

D.2.5.2 Socioeconomical Impacts

Comment 1: One commenter noted that there are economic benefits that may have a direct impact on the Shoshone–Bannock Tribes and the current high unemployment on the Fort Hall Indian Reservation. Previously, Tribal members have been employed at INEEL, but because of current budget constraints, a limited number of Tribal members are employed at INEEL. In addition, the commenter noted numerous businesses owned by Tribal members can do work outside the reservation. The commenter also noted educational programs for Tribal youth have been limited because of funding cuts.

Response 1: As the licensee, FWENC would be responsible for identifying, hiring, and training the necessary staff to conduct the activities at the proposed Idaho Spent Fuel Facility. Although NRC regulates training and certification of operations staff, specific issues related to staffing are beyond the scope of the final EIS.

D.2.5.3 Impacts from Operations

Comment 1: One commenter expressed concern the draft EIS provided no mention of an operator qualification training program to ensure that qualified personnel are operating the proposed facility. The commenter observed the training program should identify qualification progressions and certifications and indicate how often requalifications are to occur. The program should also identify for what hours (e.g., 24 hours or day shift only) the facility will be operated and the number of staff required to operate the facility safely.

Response 1: Section 4.12 of the draft EIS addresses the radiological and nonradiological impacts. A description of the radiation protection program can be found in the proposed Idaho Spent Fuel Facility safety analysis report (FWENC, 2003c, Section 7). The operator training and certification plan is presented in the FWENC license application (FWENC, 2003e, Appendix B). The NRC evaluation of the FWENC radiation protection program and operator qualification training and certification programs will be included in the safety evaluation report.

Comment 2: One commenter stated Table 4-4 of the draft EIS should be updated to reflect the most current estimates of chemical uses for the proposed Idaho Spent Fuel Facility. Another commenter stated inconsistencies exist with regard to the impacts of construction activities from potential preexisting contamination at the proposed site. Another commenter stated the statement in the summary of environmental consequences presented in Section 8.1 of the draft EIS is not strictly correct that public radiation impacts from normal facility operation would be minimal. Because the existence of the SNF facility means an increase, however small, over background, the potential radiation impacts cannot be said to be minimal, though they are insignificant.

Response 2: It is important to include the most current estimates of chemical use for the proposed facility, and Table 4-4 of the final EIS was updated using information provided in Revision 2 of the environmental report (FWENC, 2003b, Table 3-1). Based on the results of soil contamination surveys presented in Section 3.4.2 of the final EIS, there is no existing contamination at the proposed site. The text in Section 4.12.1.2.2 has been revised to refer to Section 3.4.2 of the final EIS. The summary in Section 8.1 of the final EIS has been revised to indicate that the potential public radiation impacts from normal facility operation are expected to be insignificant.

Comment 3: One commenter stated the reference in Section 4.12.1.2.2 of the draft EIS using 9.1 mSv [910 mrem] for the potential total annual whole body dose to individual workers is not correct. The commenter noted that Revision 2 of the FWENC safety analysis report (FWENC, 2003c, Table 7.4-2) provides the total calculated dose of 470.35 person-mSv [47,035 person-mrem] for 1 year of operation. With 60 people employed during operations, the estimated average dose per person will be 7.84 mSv [784 mrem], below the 9.1 mSv [910 mrem] quoted in the draft EIS. The 470.35 person-mSv [47,035 person-mrem] estimate is conservative because no credit is taken for any shielding in the waste processing area. Considering shielding, the average annual dose per person will further decrease to 2.97 mSv/yr [9,297 mrem/yr], again, well below the 9.1 mSv/yr [910 mrem/yr] value quoted in the draft EIS.

Response 3: The second column from the right in Table 7.4-2 in Revision 2 of the safety analysis report (FWENC, 2003c) is labeled Total Individual Dose (mrem/yr). A total estimated individual dose of 9.1 mSv/yr [910 mrem/yr] is listed for the machinist on the second page of the table as a result of routine operations for maintenance and repair. When shielding is used, this potential dose represents the maximum of all tabulated total annual individual doses. The maximum annual individual dose is preferred rather than an average worker dose for comparisons with the annual occupational limit of 50 mSv [5,000 mrem]. Hence, no changes were made for the final EIS.

Comment 4: One commenter asked whether the final EIS will include results of a more detailed evaluation of the impacts to public health and safety. Another commenter stated the off-normal and accident analyses presented in Tables 4-8 and 4-9 of the draft EIS include several statements in the Effects and Consequences column that indicate NRC requested additional information from FWENC. The commenter stated FWENC provided responses to the requests for additional information and suggested the tables reflect the current status of the NRC safety evaluation.

Response 4: The NRC safety review of the proposed Idaho Spent Fuel Facility will include preparation of a detailed report published as a safety evaluation report. This publically available report will be based, in part, on the safety analysis report submitted by FWENC (2003c). The safety evaluation report will include the detailed NRC review of technical issues such as adequacy of the facility design to withstand external events (e.g., earthquakes, floods, and tornadoes); radiological safety of facility operation, including doses from normal operations and accidents; emergency response plans; physical security of the facility; fire protection; maintenance and operating procedures; and decommissioning. The safety evaluation report also will include results of a detailed safety review of the storage containers against design criteria contained in 10 CFR Part 72 and compliance of the proposed facility with the radiation protection standards in 10 CFR Part 20.

The safety evaluation report for the proposed Idaho Spent Fuel Facility is being prepared by NRC in parallel with preparation of the final EIS. In preparing the safety evaluation report, NRC submitted requests for additional information to clarify the analyses presented by FWENC. At the time the draft EIS was published in June 2003, NRC had not yet received responses to all of the requests for additional information. NRC has now received responses and will continue to evaluate the FWENC safety analysis and present the results of its review in the safety evaluation report. The purpose of Tables 4-8 and 4-9 in the final EIS is to provide a summary of the off-normal events and accident scenarios considered in the safety analysis. These tables have been revised to reflect current status of the safety evaluation. FWENC provided design and operational features to meet applicable regulatory safety requirements. Results of the detailed safety review to determine compliance with the NRC design criteria and radiation protection standards will be presented in the safety evaluation report and be made available to the public in spring 2004.

Comment 5: One commenter identified several points of clarification in the evaluation of the potential impacts from extreme wind and wind-generated missiles in Section 4.12.4.5 of the draft EIS. For example, the commenter stated the draft EIS inaccurately states the transfer cask provides protection inside the canister receipt area. The canister receipt area is for new canisters and does not involve the transfer cask. Also, the 15-percent SNF handling number from the safety analysis report (FWENC, 2003c, Section 8.2.5.4) is specific to a cask suspended by the crane in the cask receipt area unloading operation, and not the proposed Idaho Spent Fuel Facility in general. The commenter also stated the Canister Handling Machine has not been designed to withstand tornado missiles as indicated in the draft EIS. Finally, another commenter questioned the need to include the discussion and analysis of aircraft impact hazards in the draft EIS.

Response 5: Several points raised by these comments are correct. The annual frequency at which the crane would be handling SNF while a tornado may potentially occur was estimated to be less than 10^{-7} in the safety analysis report (FWENC, 2003c) and, therefore, was not considered credible following NRC Regulatory Guide 1.117 (1978). Hence, this crane is not required to be designed to withstand the design-basis tornado and associated tornado missiles. Based on a similar type of analysis, the annual frequency at which the Canister Handling Machine would be handling SNF while a tornado may potentially occur is estimated to be less than 10^{-7} in the safety analysis report (FWENC, 2003c, Section 8.2.5.4). This frequency of occurrence also is not considered credible following NRC Regulatory Guide 1.117 (1978); and, therefore, the Canister Handling Machine is not required to be designed to withstand the design-basis tornado and associated tornado missiles. The text of the final EIS has been changed, as appropriate.

The NRC staff is sensitive to the issue of aircraft crash hazards. The information presented in Section 4.12.4.2 of the draft EIS is informational in nature and presents flight frequency information for the airspace around INEEL. This section provides no specific information on physical protection methods or measures that may be used to mitigate potential aircraft impact hazards. A more detailed analysis will be performed to support preparation of the safety evaluation report. NRC also evaluated the final EIS to ensure that potentially security-sensitive information is not included.

D.2.5.4 Waste Management Impacts

Comment 1: One commenter stated the liquid radioactive waste generated during repository operations will not go to the INEEL Radioactive Waste Management Complex, but instead will be processed by a mobile waste processing contractor who will transport the waste to a licensed disposal site.

Response 1: The summary of information on waste management on page xxi of the draft EIS implies the liquid wastes will be processed at the INEEL Radioactive Waste Management Complex. To resolve this inaccuracy and the associated comment, the summary of waste management impacts on page xxi of the draft EIS was modified to be consistent with the detailed information presented in Section 4.13 of the draft EIS. In particular, the text was expanded to state the liquid wastes will be collected and shipped by a mobile waste processing contractor to a licensed disposal facility, and the solid wastes will be disposed at the INEEL Radioactive Waste Management Complex or at an offsite low-level waste disposal facility.

Comment 2: The Shoshone–Bannock Tribes expressed concern that once this facility has been built and is deemed suitable for safe storing, repackaging, and preparing SNF, it also might be used in the future to handle SNF from other states, or private or commercial reactors. The Tribes believe this facility will handle only SNF from the INEEL and not any other type of fuel from outside states or facilities. They stated that because the State of Idaho and the DOE Settlement Agreement does not include the Shoshone–Bannock Tribes as signatories, the agreement may be altered in the future to allow access to INEEL of various types of SNF and for that fuel to be transported across the Tribal reservation. Furthermore, the Tribes expressed concern that if a permanent repository is not identified and approved, the SNF will be left in place at INEEL.

Response 2: The proposed action, described in Section 1.2 of the draft EIS, is consistent with the technical specifications provided in the license application, which indicate the types and amounts of SNF to be stored at the proposed Idaho Spent Fuel Facility. If a license were granted by NRC for the proposed action, the license would contain these technical specifications for the types and amounts of SNF allowed to be stored at the facility. The technical specifications for the proposed action do not include storage of SNF from sources other than those documented in the draft EIS. If a license is granted, the conditions of the license are binding on the applicant. Any future proposals to change or amend the specifications of a license require consideration of potential environmental impacts from the proposed change. Therefore, the NRC licensing process addresses the concern that the applicant might significantly change the proposed action after a license is granted.

Regarding the concern that a repository may not be identified for final disposal of the stored SNF, the current assessment of impacts in the EIS assumes the proposed action is of sufficient duration for such a facility to be licensed and constructed. According to the proposed action, the Idaho Spent Fuel Facility would not be licensed as a permanent disposal facility. If a HLW disposal facility does not become available during the period of licensed operation, a resolution to the problem would require a license amendment and subsequent evaluation of environmental impacts. According to the existing NRC licensing process, any potential public health and safety issues related to future events or changes in plans would have to be addressed.

D.2.5.5 Decontamination and Decommissioning

Comment 1: One commenter expressed concern for long-term stewardship of the proposed Idaho Spent Fuel facility, the final end state of the facility, and future land use. The commenter stated previous facilities or buildings at INEEL have been identified as clean-up areas, but because of funding or other issues, have been left in place as concrete monoliths.

The commenter noted statements within the draft EIS that refer to dismantling, decontamination, and decommissioning the proposed facility in 2018, with the understanding the facility also will prepare SNF to be removed from INEEL and the State of Idaho by 2035. The commenter requested clarification whether the SNF removal program, decontaminating, and decommissioning of the site would be completed by 2018, well in advance of the milestone date (2035) established by terms of the 1995 Settlement Agreement.

Response 1: Facility construction and transferring, repackaging, and storing SNF at the proposed facility are anticipated to be complete in about 6 years. FWENC is applying to NRC for a 20-year license (FWENC, 2003e, Section 1.5), and the facility is being designed with a 40-year service life (FWENC, 2003c,e). Decontamination and decommissioning cannot begin until the SNF is removed from the facility for disposal at a HLW repository. Current DOE schedules call for the repository to become operational in 2010, and ultimate disposition of the SNF stored at the proposed facility will depend on DOE schedules and queues for SNF transport to the geologic repository. The 2018 date for decontamination and decommissioning was originally presented in Section 1.5, Revision 0, of the FWENC license application (2003e). This date was intended as a reference point for estimating the costs of decontamination and decommissioning and did not represent a commitment for either FWENC or DOE. DOE is still committed by the terms of the 1995 Settlement Agreement to remove SNF from INEEL by 2035. The license application has been revised to remove the reference to the year 2018 (FWENC, 2003e, Section 1.5), and the reference also has been removed from the final EIS.

Comment 2: One commenter noted the term “Licensee” should be used instead of “FWENC” when referring to the decontamination and decommissioning plan, because at the time of decommissioning, the licensee may not be FWENC.

Response 2: FWENC has a contract with DOE to operate the proposed Idaho Spent Fuel Facility through 2010 (DOE, 2000; FWENC, 2003e, Appendix C). Beyond this time period, DOE has the option to extend its contract with FWENC, transfer the license for the facility to another contractor, or assume the license itself, after obtaining the necessary regulatory approvals from NRC. Regardless of who holds the license, DOE is responsible for providing funding for decontaminating and decommissioning the proposed facility. The availability of funds at the time will depend on Congressional appropriations. The text in the final EIS has been changed as suggested.

D.2.6 Mitigation

Comment 1: One commenter expressed concern that the summary of potential impacts and mitigation measures presented in Table 5-1 of the draft EIS does not acknowledge the appropriate ecological, historical, and cultural surveys have been performed.

Response 1: As indicated in the environmental report submitted with the license application (FWENC, 2003b, Appendix B), searches of the INEEL cultural resource management archives indicated the proposed locations of the 7.2-ha [17.8-acre] facility and construction laydown area have been surveyed extensively, with only limited historical, cultural, and paleontological resources identified. In addition, the INEEL facility perimeters are routinely monitored for archaeological resources. The text in the final EIS has been modified to reference Appendix B (and the references therein) in the environmental report (FWENC, 2003b).

D.3 REFERENCES

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