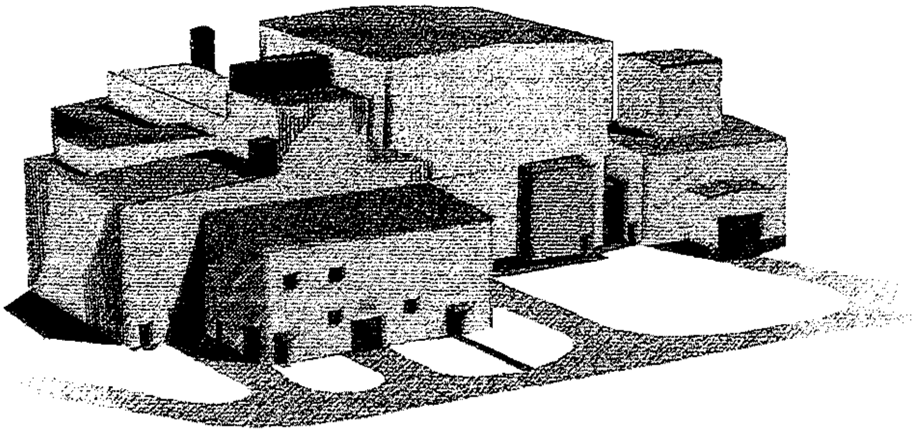
Environmental Report

Idaho Spent Fuel Facility

Docket No. 72-25



ISF-FW-RPT-0032

FOSTER WHEELER ENVIRONMENTAL CORPORATION

Contents

Tables

Figures

Appendices

EXECUTIVE SUMMARY

This Environmental Report is submitted in accordance with the requirements of Title 10 of the Code of Federal Regulations, Section 72.34, *Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste*. This Environmental Report summarizes the potential environmental effects of the construction and operation of the Idaho Spent Fuel Facility, an Independent Spent Fuel Storage Installation within the definition of U.S. Nuclear Regulatory Commission regulations. The Idaho Spent Fuel Facility will be located adjacent to the U.S. Department of Energy (DOE), Idaho Nuclear Technology and Engineering Center facility in the Idaho National Engineering and Environmental Laboratory.

Currently a guidance document does not exist for Environmental Reports for Independent Spent Fuel Storage Installations. As such, Foster Wheeler Environmental Corporation staff reviewed the following:

- Reg. Guide 3.8, Rev. 2, Preparation of Environmental Reports for Uranium Mills
- Reg. Guide 4.2, Rev. 2, Preparation of Environmental Reports for Nuclear Power Stations
- Reg. Guide 4.9, Rev. 1, Preparation of Environmental Reports for Commercial Uranium Enrichment Facilities
- NUREG-1555 (October 1999), Environmental Standard Review Plan

This Environmental Report follows the general format and content of Reg. Guide 4.2. Modifications to format and content were made to address the discussion of an Independent Spent Fuel Storage Installation in lieu of a nuclear power plant.

In sum, site preparation and construction activities for the Idaho Spent Fuel Facility will include land excavation, temporary increase in noise, and minor water usage. There are no significant environmental impacts from site preparation and construction activities.

Operation of the Idaho Spent Fuel Facility involves the receipt of spent nuclear fuel from the U.S. Department of Energy, removal of the fuel from existing storage containers and repackaging into new canisters. These canisters will then be placed in a redundant confinement storage tube contained in a vault structure that provides radiological shielding and passive natural convection air-cooling.

The proposed action evaluated in this Environmental Report for the construction and operation of the Idaho Spent Fuel Facility involves a multipurpose spent nuclear fuel canister system designed for interim storage at the Idaho Spent Fuel Facility and ultimate shipment to a geologic repository. The spent fuel to be received and stored at the Idaho Spent Fuel Facility consists of fuel elements from the Peach Bottom reactor, the Shippingport reactor, and from training, research and isotopic reactors built by General Atomics.

Certain environmental effects will be increased due to Idaho Spent Fuel Facility activities. These include the occupational radiation exposure necessary for facility operations, and the commitment of small amounts of land at the site for the facility. No significant environmental impacts will result from the operation of the ISF Facility.

THIS PAGE INTENTIONALLY LEFT BLANK.

1.0 PURPOSE OF THE FACILITY

This chapter summarizes the purpose and proposed action of the Idaho Spent Fuel (ISF) Facility, including its background, functional purpose, and applicable regulatory requirements.

1.1 PURPOSE AND PROPOSED ACTION

This Environmental Report addresses the proposed construction and operation of an Independent Spent Fuel Storage Installation (ISFSI) within the boundaries of the Idaho National Engineering and Environmental Laboratory (INEEL) near Idaho Falls, Idaho, for the U.S. Department of Energy (DOE) (Figure 1-1). The ISF Facility will provide safe interim dry storage for a portion of the spent nuclear fuel stored at the INEEL, pending final transfer to a geologic repository. Once the spent nuclear fuel is transferred to the geologic repository, the ISF Facility will be decommissioned.

The United States District Court for the District of Idaho required the development of the *DOE Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (FEIS) (Ref. 1-1). The ISF Facility is one of the actions identified by the spent nuclear fuel management program. Because this assessment enveloped the entire INEEL and specifically addressed the establishment of an interim storage facility, the results included the ISF Facility. In addition, an environmental report has been prepared by the DOE in support of the nearby Three Mile Island Unit Two (TMI-2) ISFSI (Ref. 1-2). Therefore, much of the information related to the environmental impact of the ISF Facility is contained in the above referenced FEIS.

1.2 BACKGROUND

During the past 40 years, the DOE and its predecessor agencies have generated, transported, received, stored, and reprocessed spent nuclear fuel at DOE facilities nationwide. The spent nuclear fuel was generated from various sources, including the DOE's production reactors; Naval Nuclear Propulsion Program reactors; government, university, and other research and test reactors; special-case commercial power reactors; and foreign research reactors.

In October 1995, the State of Idaho, the U.S. Department of the Navy, and the DOE signed a Settlement Agreement (Ref. 1-3) establishing: (1) limits on shipments of spent nuclear fuel into Idaho, (2) a schedule by which spent nuclear fuel would be removed from Idaho, and (3) milestones to be accomplished by the DOE Spent Fuel Program. The Settlement Agreement also specified the method of interim spent nuclear fuel storage to be used: "DOE and the Navy shall employ multi-purpose canisters (MPC) or comparable systems to prepare spent fuel located at INEEL for shipment and ultimate disposal of such fuel outside Idaho."

On October 17, 1995, the Settlement Agreement was approved by a Federal court and issued as a Consent Order (Ref. 1-4). This proposed action implements a portion of the Settlement Agreement by placing in dry storage non-defense related spent nuclear fuel from the Peach Bottom and Shippingport reactors, and from specific Training, Research and Isotopic reactors built by General Atomics (TRIGA).

1.3 FACILITY PURPOSE AND OPERATION

The purpose of the ISF facility is to:

- receive spent nuclear fuel from the Peach Bottom reactor, the Shippingport reactor, and TRIGA
- transfer the spent nuclear fuel from current DOE storage containers to containers licensed by the U.S. Nuclear Regulatory Commission (NRC) in accordance with 10 CFR Part 72 (Ref. 1-5)
- place the new NRC licensed containers in interim dry storage in the storage area

The ISF Facility will be designed, constructed, licensed, and operated by Foster Wheeler Environmental Corporation (FWENC) to meet NRC requirements for placing the spent nuclear fuel in dry storage. The major processes involved in the receipt, packaging, and storage of the spent nuclear fuel are summarized below.

The spent nuclear fuel, stored in existing DOE storage canisters, will be transported by the DOE approximately 500 yards to the ISF Facility in a DOE-supplied transfer cask.

The transfer cask will be moved into the Cask Receipt Area, where it will be offloaded and placed on a rail-mounted trolley. The trolley containing the transfer cask will be moved through doors, into a slightly negative pressure Fuel Packaging Area. The transfer cask will be opened to allow access to the existing DOE storage canister. The storage canister lid will be removed, allowing access to the spent nuclear fuel. The spent nuclear fuel will be remotely removed from the storage container, visually inspected, inventoried, and placed in a new NRC licensed storage canister. Once the new canister is filled with spent nuclear fuel, a shield plug will be installed and the canister lid welded into place. With the canister lid welded in place, the interior volume will be evacuated to remove moisture and then backfilled with helium and leak checked.

The canisters will be transferred to the Storage Area and placed in storage tubes in a concrete vault. The storage tubes will have bolted lids and double metallic seals. The storage tube internal atmosphere will be evacuated to remove moisture and backfilled with helium. The spent nuclear fuel will be isolated from the environment by two confinement boundaries: the canister and the storage tubes. The Storage Area will provide radiological shielding, passive natural convection air-cooling, and easily retrievable storage capability for the canisters.

When a geologic repository becomes available, the storage canisters will be removed from the Storage Area, loaded into transportation casks, and transported from the ISF Facility.

1.4 REQUIREMENTS

The ISF Facility will be designed, constructed, licensed, and operated in accordance with NRC regulations associated with dry-cask storage installations and radioactive materials (e.g., 10 CFR Parts 20 and 72) (Refs. 1-6, 1-5). The facility will be constructed and operated in accordance with necessary permits and will abide by applicable laws, regulations, and ordinances of the United States and the State of Idaho. The details of the required permits are identified in Chapter 12, *Environmental Approvals and Consultations*.

1.5 SUMMARY

The ISF Facility will receive and transfer into new canisters, spent nuclear fuel from the Peach Bottom reactor, Shippingport reactor, and TRIGA. The spent nuclear fuel will be stored in a NRC licensed storage facility in a manner that provides redundant confinement (two barriers) (Ref. 1-5). The spent nuclear fuel will remain in storage until a geologic repository becomes available, at which time the fuel will be transferred from the ISF Facility to that repository. The ISF Facility will then be decommissioned.

1.6 REFERENCES

1-1. DOE (1995), *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, April.

1-2. DOE-ID (1997), *Independent Spent Fuel Storage Installation (ISFSI) License for the Three Mile Island Unit Two (TMI-2) Fuel issued by the U.S. Nuclear Regulatory Commission*, U.S. Department of Energy, Idaho Operations Office, Idaho Falls, Idaho.

1-3. Settlement Agreement, Cases Public Service Co. of Colorado v. Batt, No. CV 91-0035-S-EJL (D. Id.) and United States v. Batt, No. CV-91-0065-S-EJL (D. Id.), October 16, 1995.

1-4. U. S. District Court for the District of Idaho, 1995, Public Service Company of Colorado v. Philip E. Batt, Civil No. 91-0035-S-EJL (Lead Case), Consent Order, October 17, 1995.

1-5. Title 10, Code of Federal Regulations, Part 72, *Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste.*

1-6. Title 10, Code of Federal Regulations, Part 20, *Standards for Protection Against Radiation.*

THIS PAGE INTENTIONALLY LEFT BLANK.

2.0 SITE AND ENVIRONMENTAL INTERFACES

This chapter describes the ISF Facility site and its relationship to the environmental features of the INEEL area and surrounding region.

2.1 GEOGRAPHY AND DEMOGRAPHY

2.1.1 Site Location and Description

The INEEL is one of nine multi-program laboratories in the DOE system. The INEEL, in southeast Idaho, measures approximately 37 miles north to south and about 34 miles east to west, and encompasses 890 square miles (Figure 2-1). Most of the INEEL is in Butte County, but portions also extend into Bingham, Bonneville, Jefferson, and Clark counties. The ISF Facility site is totally within Butte County.

As shown in Figure 2-2, the ISF Facility will be constructed within the INEEL adjacent to the Idaho Nuclear Technology and Engineering Center (INTEC), an existing site for the interim storage of spent nuclear fuel. The ISF Facility is at approximately 43°34'05'' north latitude, and 112°55'41'' west longitude. The approximate 8-acre ISF Facility site is owned by the DOE and will be leased to FWENC.

Public transportation routes nearest the ISF Facility site include U.S. Highways 20/26, which pass approximately 4 miles south of the ISF Facility site, connecting the INEEL with the communities of Arco, Atomic City, Blackfoot, and Idaho Falls (Figure 2-3). Other roads near the ISF Facility site are the controlled access roads between INEEL facilities. The roads nearest the ISF Facility site are Spruce Avenue on the north, Balsa Street on the east, and East Perimeter road on the west. A railroad spur line from the Mackay Branch of the Union Pacific Railroad is just south of the ISF Facility site.

2.1.2 Population Distribution

There are no cities, towns, or permanent residents within a 10-mile radius of the ISF Facility site. DOE institutional controls will restrict access to the INEEL lands for the next 100 years (Ref. 2-1). Therefore, population within 10 miles of the ISF Facility site is unlikely to change during the life of the ISF Facility.

The 2000 Census determined the population within 50 miles to be approximately 128,000 persons (Figure 2-4). The nearest populated area to the INEEL is Atomic City, population about 25 (Ref. 2-2), about 1 mile from the southern INEEL boundary and 11 miles from the ISF Facility site. The INEEL, where the ISF Facility will be constructed, was designated as an area to build, test, and operate various nuclear reactors and associated facilities. The isolated location was chosen to ensure maximum public safety. Ingress and egress of site personnel and visiting personnel on official business is strictly controlled. No casual visits are permitted, except for persons driving through the INEEL on the public highways and visitors to the Experimental Breeder Reactor I (EBR-1) National Historic Monument, which is open to the public during the summer. The only recreational activities allowed within the INEEL are limited hunting and limited grazing, subject to special requirements.

2.1.3 Use of Adjacent Lands and Waters

Categories of land use at the INEEL include facility operations, grazing, general open space, and infrastructure such as roads. Facility operations include industrial and support operations associated with energy research and waste management activities. Land is also used for recreation and for environmental research associated with the designation of the INEEL as a national environmental research park. Much of the INEEL is open space not designated for specific uses. Some of this space serves as a buffer zone between INEEL facilities and other land uses. About 2 percent of the total INEEL is used for facilities and operations, thus it is designated as "rural" for dispersion purposes. Public access for most facility areas is restricted. Common land uses at the INEEL are presented in Figure 2-5.

Recreational uses include public tours of general facility areas and the Experimental Breeder Reactor-I (EBR-I). Controlled hunting is allowed but generally restricted to within 0.5 mile of the INEEL boundary.

Between 300,000 and 350,000 acres are used for cattle and sheep grazing. Rights-of-way and grazing permits are granted and administered by the U.S. Department of the Interior, Bureau of Land Management (BLM) for sheep and cattle. Grazing is not allowed within 2 miles of any INEEL nuclear facility, and to avoid the possibility of milk contamination by long-lived radionuclides, dairy cattle are not permitted to graze on the INEEL. The U.S. Sheep Experiment Station uses a 900-acre portion of this land at the junction of Idaho State Highways 28 and 33 as a winter feed lot for approximately 6500 sheep.

Recreation and tourist attractions surrounding the INEEL include Craters of the Moon National Monument, Hell's Half Acre Wilderness Study Area, Black Canyon Wilderness Study Area, Camas National Wildlife Refuge, Market Lake State Wildlife Management Area, North Lake State Wildlife Management Area, Yellowstone National Park, Targhee and Challis National Forests, Sawtooth National Recreation Area, Sawtooth Wilderness Area, Sawtooth National Forest, Grand Teton National Park, Jackson Hole recreation complex, and the Snake River.

The four most prominent tourist/recreation areas in the region are EBR-I, on the INEEL; Craters of the Moon National Monument, approximately 19 miles southeast of the INEEL; the resort areas of Ketchum and Sun Valley, approximately 72 miles from the ISF Facility site; and Yellowstone National Park, approximately 100 miles from the ISF Facility site.

The INEEL is remote from most developed areas. INEEL lands and adjacent areas are not likely to experience residential and commercial development, and no new development is planned near the INEEL (Ref. 2-1). However, regional recreational and agricultural uses are expected to increase in response to greater demand for recreation and the conversion of range to cropland.

There are no commercial industrial facilities any closer to the INEEL boundary than Idaho Falls, about 29 miles away. The U.S. Navy maintains the Naval Reactors Facility (NRF) about 5 miles from the ISF Facility site. NRF's operations support the U.S. Navy's nuclear-powered fleet through receipt of naval spent fuel for examination and storage preparation and through research and development of materials and equipment.

Other INEEL nuclear facilities within 5 miles of the ISF Facility site are the Central Facilities Area (CFA), Test Reactor Area (TRA), Power Burst Facility/Waste Experimental Reduction Facility (PBF/WERF), and the INTEC (Figure 2-6).

2.2 ECOLOGY

2.2.1 Terrestrial Ecology

The INEEL is in a cool desert ecosystem dominated by shrub-steppe vegetation. The area is relatively undisturbed, providing important habitat for species native to the region. Vegetation and habitat on the INEEL can be grouped into five types: shrub-steppe, native grasslands, modified ephemeral playas, lava, and wetland-like areas (Figure 2-7).

The INEEL shrub-steppe vegetation, is dominated by big sagebrush and rabbitbush. Grasses found on the INEEL include cheatgrass, Indian ricegrass, wheatgrass, and squirreltail. Herbaceous plants such as phlox, wild onion, and milk vetch, and weeds such as Russian thistle, halogeton, and various mustards occur on disturbed areas throughout the INEEL.

The results of the ecological assessment completed for the ISF Facility are included as Appendix A, *Ecological Resources of the Idaho National Engineering and Environmental Laboratory and Potential Effects of the Independent Spent Fuel Facility.* The INEEL supports wildlife typical of shrub-steppe communities, including over 270 vertebrate species such as small mammals, American antelope, deer, elk, songbirds, sage grouse, lizards, and snakes. Threatened and endangered species of concern and other unique species known to occur in or near the INEEL were identified using the Idaho Department of Fish and Game's guidelines. No state or Federally listed threatened and endangered species (Table 2-1) are known to occur in the ISF Facility site area.

2.2.2 Aquatic Ecology

In 1999, the U.S. Fish and Wildlife Service (USFWS) conducted a wetland survey of the INEEL for the *Idaho High-Level Waste & Facilities Disposition Draft Environmental Impact Statement* (Ref. 2-3) and identified two areas that meet or potentially meet the criteria for jurisdictional wetlands. These areas are at the Big Lost River Sinks and north of the TRA. There are no wetlands or wetland-like areas in or adjacent to the INTEC, which includes the ISF Facility site.

2.3 METEOROLOGY

The INEEL is on a mile-high area of the Eastern Snake River Plain in southeastern Idaho. Air masses entering the Eastern Snake River Plain first cross a mountain barrier, precipitating much of their moisture. Rainfall at the INEEL is light and the region has semi-arid characteristics. The local northeast-southwest orientation of the Eastern Snake River Plain and bordering mountain ranges channels the prevailing west winds so that a southwest wind predominates over the INEEL; the next most frequent winds come from the northeast. The relatively dry air and infrequent low clouds permit intense surface solar heating during the day and rapid radiational cooling at night, resulting in a large diurnal range of temperature near the ground. Because of the moderating influence of the Pacific Ocean, most air masses flowing over this area are warmer during winter and cooler during summer than air masses flowing at similar latitude in the more continental climate east of the Continental Divide. The Centennial and Bitterroot Mountain Ranges keep most of the shallow but intensely cold winter air masses from entering the Eastern Snake River Plain when they move south from Canada. Occasionally, cold air spills over the mountains. When this happens, the cold air is held in the Eastern Snake River Plain by the surrounding mountains, and the INEEL experiences low temperatures for periods of a week or longer.

Through August 2000, the warmest temperature recorded at the NOAA Idaho Falls 46W station was 101°F and the coldest was -47°F.

About 27.6 inches of snow falls each year. The greatest snow depth observed on the ground at the CFA was 22.3 inches. The maximum yearly total is 59 inches, and the smallest total is 6 inches. The greatest 24-hour snowfall was 9 inches. January and February average about 4 inches for a monthly maximum snow depth. The ground is usually free of snow from mid-April to mid-November (Ref. 2-4).

The highest relative humidity is observed in the winter, when the average mid-day relative humidity is about 55 percent. The lowest relative humidity is observed in the summer when the average mid-day relative humidity is about 18 percent.

The average annual precipitation is 8 inches, and the yearly totals range from 4 to 14 inches. Maximum observed 24-hour precipitation amounts to less than 2 inches.

NOAA records indicate that there have been a total of five funnel clouds and no tornadoes have been sighted within the boundaries of the INEEL. NUREG/CR-4461, *Tornado Climatology of the Contiguous United States*, identifies that the average probability of any tornado occurring in the region that includes the INEEL is 6×10^{-7} yr^{-1} (return period of 1.66×10^{6} years). Probability of a category F-2 (113 mph winds) or greater is 1.69×10^{-7} yr-1 (5.91×10^{6} year return period). The maximum wind speed with a probability of occurrence of 1×10^{-7} is 171 mph (Ref. 2-5).

The INEEL averages two or three thunderstorm days each month, from June through August. The BLM Interagency Fire Center (Boise) operates a lightning detection system by which the location and number of lightning strikes may be documented. Although the INEEL is surveyed by the system, no historical statistics for the area have been compiled.

2.4 HYDROLOGY

2.4.1 Surface Hydrology

The INEEL is in the Pioneer Basin, a closed topographic depression on the Eastern Snake River Plain that receives intermittent runoff from the Big Lost River, Little Lost River, and Birch Creek drainage basins. No known perennial streams cross the Pioneer Basin, because the permeability of alluvium and underlying rock of the basin causes the water to infiltrate into the ground. In addition, much of the water from the tributary drainage basins is diverted for irrigation upstream of the INEEL. The largest stream, the Big Lost River, enters the southern end of the INEEL from the west and, during exceptionally wet years, flows in a large arc north to the foot of the Lemhi Mountain Range, where it ends in a series of playas (sinks). The only other naturally occurring stream on the INEEL is Birch Creek, which enters from the north. This stream is usually dry, except during heavy spring runoff when water may flow onto the INEEL. The Little Lost River approaches the INEEL from the northwest through Howe and ends in a playa on the INEEL (Figure 2-8).

Other than these intermittent streams, playas, and manmade percolation, infiltration, and evaporation ponds, there is little surface water at the INEEL. Surface water that reaches the INEEL is not used for consumption (e.g., irrigation, manufacturing, or drinking). No future uses of surface water that reaches the INEEL have been identified.

The worst flooding condition at the INTEC, adjacent to the ISF Facility, would result from the postulated failure of Mackay Dam due to the probable maximum precipitation storm (Ref. 2-6). The floodwaters within the ISF Facility area would reach up to 1499.83 meters (4920.7 feet) based on the NAVD 88 datum. The final graded ground surface elevation at the ISF site will be 1498.7 meters (4917 feet). The first floor elevation of the ISF facilities will be at elevation 1498.8 meters (4917.5 feet). The Transfer Area floor is at 4917.5 feet, the Storage Area floor is at 4918 feet, and the Cask Receipt Area is at 4913.2 feet.

Studies completed for the DOE (Ref. 2-6) indicate adequate time (more than 12 hours) is available to implement ISF Facility site flood control strategies. In the unlikely event of flooding of the ISF Facility structures (due to coincident failure of flood control strategies and the probable maximum load), such flooding would not cause structural damage or create significant offsite radiological consequences.

2.4.2 Subsurface Hydrology

The INEEL is in the Eastern Snake River Plain, underlain by the Snake River Plain Aquifer. The Snake River Plain Aquifer is characterized as a thick sequence (75 feet) of basalt and sedimentary interbeds filling a large structural basin about 200 miles long and up to 70 miles wide in southeastern Idaho (Ref. 2-7). The Snake River Plain Aquifer is the only source of water used at the INEEL. Table 2-2 lists the INEEL production wells, depth of each well, depth to water at each well, and annual volume of water withdrawn from each well (Ref. 2-4). The water withdrawn from each well is used for potable water, for grounds maintenance, and for necessary INEEL operations. The ISF Facility will not require additional wells. Potable water for the ISF Facility will be provided from the INTEC.

Low levels of radioactive contamination are present in the groundwater near the ISF Facility site. This contamination is due to past wastewater disposal using an injection well at the INTEC, adjacent to the ISF Facility site. Since use of the well was discontinued and the well was sealed, the contaminant levels have been dropping steadily. The major radionuclides in the contamination are ^{3}H, ^{90}Sr, and ^{137}Cs (Ref. 2-8).

2.5 GEOLOGY AND SEISMOLOGY

2.5.1 Geologic Information

The Eastern Snake River Plain is a broad low-relief basin floored with basaltic lava flows and terrigenous sediments extending in a broad arc from the Idaho-Oregon border on the west to the Yellowstone Plateau on the east. It transects and sharply contrasts with the mountainous northern Basin-and-Range Province and the Idaho Batholith (Figure 2-9). Eastern Snake River Plain surface elevations decrease continually and gradually from about 6560 feet near Yellowstone to about 2130 feet near the Idaho-Oregon border.

The northern Basin-and-Range Province, which bounds the Eastern Snake River Plain on the south, consists of north-to northwest-trending mountain ranges separated by intervening basins filled with terrestrial sediments and volcanic rocks. The Yellowstone Plateau, at the northeastern end of the Eastern Snake River Plain, is a high volcanic plateau underlain by Pleistocene rhyolitic volcanic rocks. At an elevation of 6889 feet, it is significantly higher than the Eastern Snake River Plain but not as high as the mountain summits of the northern Basin-and-Range Province, which borders the southern boundary of the Eastern Snake River Plain. A large area of irregular mountainous terrain characterizes the Idaho Batholith, which joins the northern margin of the Snake River Plain, with peaks from 7874 feet to 12,139 feet.

The axial ridge (axial volcanic zone) constrains the Snake River to the southeastern edge of the plain and causes rivers from the mountains north of the plain to drain into the playas. The most prominent example is the Big Lost River, which flows onto the plain near Arco, turns northeast in the southwestern part of the INEEL, and flows north to the Big Lost River Sinks in the northern part of the INEEL. The Little Lost River and Birch Creek also empty into playas in the northern part of the INEEL.

In detail, much of the Eastern Snake River Plain exhibits rough, uneven topography due to the character of the numerous basalt flows that make up the surface. The topography is characterized by lobate forms, numerous steep-walled closed depressions and mounds, and anastomosing fissures. Erosion processes have established classic drainage patterns; streams tend to be intermittent, wandering, and blind as they follow lava flow contacts and lava channels, commonly ending in closed depressions.

In many areas, the lava flow topography is softened by deposition of windblown silt into fissures and depressions. In some areas, silt deposition has been so great that the topography is dominated by dune forms and rolling terrain with little or no basalt at the surface. Development of intermittent lakes and ponds in many depressions in the lava flow surface has resulted in deposition of fine silts and clays, producing small flat-floored playas.

During the past 4 million years, the Eastern Snake River Plain has experienced volcanic activity, mostly as mild outpourings of basaltic lava flows. Vents for the basaltic volcanism are concentrated in northwest-trending volcanic rift zones and along the axial volcanic zone. Sediments deposited by wind action, streams, and lakes have also accumulated in the Eastern Snake River Plain, concurrent with the basaltic lava flows. Lithologic logs of four INEEL deep holes and hundreds of shallower borings show an interlayered sequence of basalt lava flows and poorly consolidated sedimentary interbeds (the Snake River Group) occurring to depths of up to 6560 feet beneath the INEEL. This sequence is underlain by a large, but unknown, thickness of Late Tertiary rhyolitic volcanic rocks.

The ISF Facility site is located approximately 4000 feet southeast of the channel of the Big Lost River in the south central part of the INEEL, on Late Pleistocene alluvial gravels above the Holocene floodplain. Numerous abandoned channels and perhaps braided channels of the Big Lost River characterize the Holocene floodplain. The presently active channel, which is dry most of the time, is incised into the Holocene floodplain deposits by about 5 to 7 feet, and is floored by sands and fine gravels.

Surficial sediments (Big Lost River alluvium) at the ISF Facility site consist mostly of gravel, gravelly sands, and sands. In some locations, a thin layer of clay and silt underlies the gravelly alluvium, forming a discontinuous low-permeability layer just above the basalt bedrock. Sedimentary interbeds in the Snake River Group beneath the ISF Facility site consist mostly of silts, clayey silts, and sandy silts. The interbed occurs at about 197 feet below the surface. Several more interbeds occur at depths of up to 590 feet.

2.5.2 Seismic Information

The distribution of earthquakes at and near the INEEL from 1884 to 1999 clearly show that the Eastern Snake River Plain has a low rate of seismicity, whereas the surrounding Basin-and-Range Province has a fairly high rate of seismicity. The faulting and generation of earthquakes in the Basin-and-Range Province is attributed to northeast-southwest directed crustal extension.

The markedly different late-Tertiary and Quaternary tectonic and seismic histories of the Eastern Snake River Plain and the Basin-and-Range Province reflect the dissimilar deformational processes acting in each region. Both regions are subject to the same extensional stress field (Refs. 2-9, 2-10, and 2-11); however, crustal deformation in the Plain occurs through dike injection and, in the Basin-and-Range Province, through large-scale normal faulting (Refs. 2-12, 2-13, and 2-14).

Major seismic hazards include the effects of ground shaking and surface deformation (surface faulting, tilting). Other potential seismic hazards (e.g., avalanches, landslides, mudslides, soil settlement, and soil liquefaction) are not likely at the INEEL because local geologic conditions are not conducive. Based on the seismic history and geologic conditions, earthquakes greater than magnitude 5.5 (and associated strong ground shaking and surface fault rupture) are not likely to be generated in the Plain. However, moderate to strong ground shaking can affect the INEEL from earthquakes in the Basin-and-Range Province. Patterns of seismicity and locations of mapped faults are used to assess potential sources of future earthquakes and to estimate levels of ground motion at the INEEL.

The sources and maximum magnitudes of earthquakes that could produce the maximum levels of ground motions at INEEL facilities include (Refs. 2-15 and 2-16):

- a moment magnitude 7.15 earthquake at the southern end of the Lemhi fault along the Howe and Fallert Springs segments
- a moment magnitude 7.25 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 volcanic rift zone or Lava Ridge-Hell's Half Acre volcanic rift zone, and the axial volcanic zone
- a background moment magnitude 5.5 earthquake in the Eastern Snake River Plain
- a background earthquake with magnitude up to 6.75 in the northern Basin and Range Province

The Lemhi fault is the Basin-and-Range Province normal fault closest to the ISF Facility (Figure 2-10). Its paleoseismic characteristics and geometry indicate the potential for a moment magnitude 7.1 earthquake with an epicenter 14 miles from the ISF Facility.

No capable faults have been identified in the ISF area, and no significant earthquakes have been recorded or reported in this area.

2.6 REGIONAL HISTORIC, ARCHAEOLOGICAL, ARCHITECTURAL, SCENIC, CULTURAL RESOURCES

2.6.1 Archaeological Sites, Historic Structures, and Cultural Resources

The *Idaho National Engineering Laboratory Management Plan for Cultural Resources, Final Draft* (Ref. 2-17) identifies cultural resources found at the INEEL. This inventory includes fossil localities that provide important paleoecological background for the region and the numerous prehistoric archaeological sites preserved in it. These latter sites, including campsites, lithic workshops, cairns, and hunting blinds, are also an important part of the INEEL inventory. These sites provide information about aboriginal hunting and gathering groups who inhabited the area for approximately 12,000 years. Archaeological sites, pictographs, caves, and other features of the INEEL landscape are important to contemporary Native American groups for historical, religious, and traditional reasons. Historic sites document use of the area during the late 1800s and 1900s. These sites include the abandoned town of Powell/Pioneer; Goodale's Cutoff, a northern spur of the Oregon Trail; and many small homesteads, irrigation canals, sheep/cattle camps, and stage/wagon trails. Finally, important information on the development of nuclear science in America is preserved in the many scientific and technical facilities within the INEEL.

The ISF Facility is a new facility on vacant land that has been disturbed over the past five decades. An inventory of the land conducted in 2001 revealed no historically significant facilities. The results of the archaeological assessment completed for the ISF Facility are included as Appendix B, *Cultural Resources Investigations for the Idaho Spent Fuel Facility at the Idaho National Engineering and Environmental Laboratory*. Because the site is highly disturbed, it is unlikely that archaeological resources are present. However, should materials such as bones, obsidian debris, arrowheads, or charcoal-colored soil horizons be encountered, the INEEL Cultural Resource Management Office will be consulted.

2.6.2 Native American Cultural Resources

Native American people hold the land sacred; to them the entire INEEL reserve is culturally important. To the Shoshone-Bannock Tribes, cultural resources include forms of traditional life ways and usage of natural resources. These resources include both prehistoric archaeological sites, which are religiously or culturally important, natural features, and air, plant, water, or animal resources with special significance. These resources may be affected by changes in the visual environment (construction, ground disturbance, or introduction of a foreign element into the setting), dust, or contamination. The INEEL is within a large territory once inhabited by and still important to the Shoshone-Bannock. Plant resources on or near the INEEL used by the Shoshone-Bannock are in Table 2-3 (Appendix B). Areas significant to the Shoshone-Bannock include buttes, wetlands, sinks, grasslands, Birch Creek, and the Big Lost River.

Five Federal laws require consultation between Federal agencies and Native American tribes: the National Environmental Policy Act, the National Historic Preservation Act (as amended), the American Indian Religious Freedom Act, the Archaeological Resources Protection Act, and the Native American Graves Protection and Repatriation Act. In accordance with these directives and DOE written Native American policy (Ref. 2-18 and Appendix B), DOE at the INEEL has committed to additional interaction and exchange of information with the Shoshone-Bannock Tribes of the nearby Fort Hall Indian Reservation and is developing procedures for consultation and coordination, as outlined in the *Idaho National Engineering Laboratory Management Plan for Cultural Resources, Final Draft* (Ref. 2-17).

2.6.3 Paleontological Resources

The INEEL contains about 31 known fossil localities, and available data suggest relatively abundant, varied paleontological resources. Preliminary analyses suggest that these materials will most likely be found in association with archaeological sites; in areas of basalt flows; in deposits of the Big Lost River, Little Lost River, and Birch Creek; in deposits of Lake Terreton and playas, in some wind and sand deposits; and in sedimentary interbeds or lava tubes in lava flows (Ref. 2-17). There are no known fossil localities on the ISF Facility site (Appendix B).

2.6.4 Visual and Scenic Resources

2.6.4.1 Visual Resources

The Bitterroot, Lemhi, and Lost River ranges border the INEEL on the north and west. Volcanic buttes near the southern boundary of the INEEL can be seen from most locations on the site and the Fort Hall Indian Reservation. Most of the INEEL consists of open, undeveloped land, predominantly covered by big sagebrush and grasslands. Pasture and irrigated farmland border much of the INEEL.

Although the INEEL has a master plan, no specific visual resource standards have been established. Nine facility areas are on the INEEL. These generally low-density facilities are industrial in appearance and are dispersed throughout the INEEL. They range from 10 feet to about 100 feet high, with a few stacks and towers to 250 feet. The ISF Facility also fits this profile.

2.6.4.2 Scenic Areas

Craters of the Moon National Monument is about 15 miles southwest of the INEEL western boundary. The seasonal visual range from Craters of the Moon is up to 97 miles. The Monument is in a designated Wilderness Area, for which Class I (high) air quality standards, or minimal degradation, must be maintained, as defined by the Clean Air Act (CAA) (Ref. 2-19). Under the CAA, air quality is defined to include visibility and scenic view considerations.

Lands under BLM jurisdiction adjacent to the INEEL are designated as Visual Resource Management Class II areas (Refs. 2-20 and 2-21). This designation urges preservation and retention of the existing character of the landscape. Lands within INEEL boundaries are designated as Class III and IV, the most lenient classes in terms of modification.

Features of the natural landscape have special significance to the Shoshone-Bannock tribes. The visual environment of the INEEL is within visual range of the Fort Hall Indian Reservation.

The ISF Facility site is well within the INEEL boundaries, adjacent to the INTEC. Therefore, it will blend with existing INTEC structures with respect to visual considerations from the public access areas.

2.7 NOISE

Noise levels at the INEEL range from 10 decibels adjusted (dBA) for the rustling of grass to 115 dBA, the upper limit for unprotected hearing established by the Occupational Safety and Health Administration (OSHA), from industrial operations, construction activities, and vehicular traffic combined. In accordance with INEEL procedures, workers on site use hearing protection. Workplace noise limits are established in accordance with OSHA standards (Ref. 2-22). OSHA requires site workers to wear hearing protection devices when exposed to noise levels above 85 dBA on an 8-hour time-weighted average.

Noise generated at the INEEL is not detectable off site, because public areas are at least 5 miles away. Previous studies of noise effects on wildlife indicate that even high intermittent noise levels at the INEEL (over 100 dBA) would have no deleterious effect on wildlife productivity (Ref. 2-23). Construction and operation of the ISF Facility will likely not exceed noise levels previously experienced at the INEEL.

2.8 REFERENCES

2-1. DOE-ID (1996). *Comprehensive Facility and Land Use Plan*, DOE-ID 10514, U.S. Department of Energy, Idaho Operations Office, Idaho Falls, ID.

2-2. DP-1. Profile of General Demographic Characteristics: 2000. Geographic Area: Atomic City, Idaho. (n.d.). Retrieved August 2, 2001 from: http://factfinder.census.gov/servlet/QTTable?ds_name=D&geo_id=16000US1603970&qr_name=DEC_2000_SF1_U_DP1&_lang=en.

2-3. DOE-ID (1999) *Idaho High-Level Waste & Facilities Disposition Draft Environmental Impact Statement*, DOE/EIS-0287D, December.

2-4. Clawson, K.L., G.E. Start, and N.R. Ricks, (1989), *Climatography of the Idaho National Engineering Laboratory 2nd Edition,* DOE/ID-12118, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Environmental Research Laboratories, Air Resources Laboratory, Field Research Division, Idaho Falls, ID, p. 155.

2-5. U.S. Nuclear Regulatory Commission (1986), NUREG/CR-4461, *Tornado Climatology of the Contiguous United States*, Pacific Northwest Laboratories, May.

2-6. Koslow, K.N. and D.H. Van Haaften (1986). *Flood Routing Analysis for a Failure of Mackay Dam*, EGG-EP-7184, EG&G Idaho, Inc., Idaho Falls, Idaho, 78 p.

2-7. Bishop, C.W. (1993). *Water Resources*, in Irving, J.S. (1993) *Environmental Resource Document for the Idaho National Engineering Laboratory, Volume 1*, EGG-WMO-10279, EG&G Idaho, Inc., Idaho Falls, Idaho.

2-8. Golder Associates, (1994). *Assessment Trends in Groundwater Quality at the Idaho National Engineering Laboratory*, Report No. 933-1151, Idaho Falls, Idaho.

2-9. Zoback, M.L. and M.D. Zoback (1989). "Tectonic stress field of the continental United States," in *Geophysical Framework of the Continental United States*, Geological Society of America Memoir 172, 523-539.

2-10. Pierce, K.L. and Morgan, L.A. (1992) The track of the Yellowstone hot spot: Volcanism, faulting, and uplift, in *Regional Geology of Eastern Idaho and Western Wyoming*: Geological Society of American Memoir 179, 1-54.

2-11. Jackson, S.M., Wong, I.G., Carpenter, G.S., Anderson, D.M., and Martin, S.M. (1993) "Contemporary seismicity in the Eastern Snake River Plain, Idaho Based on Microearthquake Monitoring;" *Bulletin of the Seismological Society of America*, v.83, p. 680-695.

2-12. Rodgers, D.W., Hackett, W.R., and Ore, H.T. (1990) "Extension of the Yellowstone plateau, Eastern Snake River Plain, and Owyhee Plateau," *Geology, v.18*, p. 1138-1141.

2-13. Parsons, T. and G. Thompson (1991). "The Role of Magma Overpressure in Suppressing Earthquakes and Topography: Worldwide Examples," *Science, v.253*, p. 1399-1402.

2-14. Hackett, W.R. and R.P. Smith (1992). Quaternary Volcanism, Tectonics, and Sedimentation in the Idaho National Engineering Laboratory Area, in *Field Guide to Geologic Excursions in Utah and Adjacent Areas of Nevada, Idaho, and Wyoming*, Utah Geological Survey, Miscellaneous Publication 92-3, p. 1-17.

2-15. Woodward-Clyde Consultants (1990). *Earthquake strong ground motion estimates for the Idaho National Engineering Laboratory: Final Report, Volume I: Summary, Volume II: Methodology and Analyses, and Volume III: Appendices*, EG&G Idaho, Inc. Informal Report EGG-BG-9350.

2-16. Woodward-Clyde Consultants (1992). *Earthquake strong ground motion evaluations for the proposed New Production Reactor at the Idaho National Engineering Laboratory, Volume I: Deterministic Evaluation and Volume II: Probabilistic Evaluation,* EG&G Idaho, Inc. Informal Report EGG-GEO-10304.

2-17. Miller, S.J. (1995). *Idaho National Engineering Laboratory Management Plan for Cultural Resources, Final Draft*, DOE/ID-10361, Idaho Falls, Idaho.

2-18. DOE-ID (1992), *Working Agreement, Policy on Native American Consultation*, U.S. Department of Energy, Idaho Operations Office, Idaho Falls, Idaho.

2-19. Title 42, United States Code, Chapter 85, *Air Pollution Prevention and Control*, Part 7401 et seq.

2-20. Bureau of Land Management (1984). *Medicine Lodge Resource Management Plan Environmental Impact Statement*, U.S. Department of Interior, Bureau of Land Management, Idaho Falls District, Idaho Falls, Idaho.

2-21. Bureau of Land Management (1986). *Final Environmental Impact Statement Eastern Idaho Wilderness Study*, U.S. Department of Interior, Bureau of Land Management, Idaho Falls District, Idaho Falls, Idaho.

2-22. Title 29, Code of Federal Regulations, Part 1910.95, *Occupational Noise Exposure*, Office of the Federal Register, Washington, D.C.

2-23. Leonard, P.R. (1993), *Air Resources, Environmental Resource Document for the Idaho National Engineering Laboratory*, WMO-10279, EG&G Idaho, Idaho Falls, Idaho.

THIS PAGE INTENTIONALLY LEFT BLANK.

3.0 FACILITY

This chapter describes the ISF Facility and how the facility interacts with the environment.

3.1 EXTERNAL APPEARANCE

The ISF Facility is a utilitarian structure (Figure 3-1) similar to the existing INTEC buildings.

The ISF Facility does not discharge liquids to the environment, so there are no intake or outfall structures. Process ventilation is filtered and discharged through the monitored exhaust stack.

3.2 FUEL PACKAGING AND STORAGE AREAS

The ISF Facility is a fully enclosed building complex to allow for year-round operations for receipt, packaging, and storage of spent nuclear fuel (Figure 3-2). The ISF Facility consists of three principal areas: the Cask Receipt Area, the Fuel Packaging Area, and the Storage Area. A common Transfer Tunnel allows movement of spent nuclear fuel throughout the facility via shielded, rail-mounted trolleys.

3.2.1 Cask Receipt Area

The Cask Receipt Area (Figure 3-2) provides for transfer of incoming DOE transport casks from truck-mounted transporters to the rail-mounted trolley for movement into other ISF Facility areas. The Cask Receipt Area incorporates 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 ISF Facility. The rail-mounted trolley moves in an enclosed Transfer Tunnel that connects the Cask Receipt Area with the Fuel Packaging Area and Storage Areas.

3.2.2 Fuel Packaging Area

The Fuel Packaging Area (Figure 3-2) provides the facilities for remotely unloading the DOE transport cask and packaging the spent nuclear fuel into new canisters (herein called ISF canisters), which are specifically designed to be compatible with future transportation and disposal requirements. The ISF canisters are welded closed, vacuum dried, and backfilled with helium to provide an inert storage environment for the spent nuclear fuel.

The spent nuclear fuel handling is performed entirely by remote manipulation using the fuel handling machine and master/slave manipulators. The Fuel Packaging Area is provided with shielded windows and a closed-circuit television system to aid in remote operations.

3.2.3 Storage Area

The Storage Area (Figure 3-2) provides for the interim dry storage of the spent nuclear fuel. The Storage Area includes a passively cooled concrete vault housing the storage tubes (Figure 3-3). The area above the concrete vault is an enclosed, metal-sided building to facilitate year-round spent nuclear fuel loading operations. Each storage tube provides interim storage for a single ISF canister. A canister handling machine moves the individual ISF canisters from the Transfer Tunnel to the storage tube location. After the ISF canister is lowered into a storage tube location, the storage tube is sealed with a cover plate with dual metallic seals and the air evacuated. The storage tubes are then filled with an inert gas to further reduce the potential of corrosion during storage.

3.3 FACILITY WATER USE

The ISF Facility will consume about 37,520 gallons per month (450,250 gallons per year) of potable water for drinking water, staff hygiene, and sewage disposal. Because water consumption is limited to personnel use, usage will be relatively consistent throughout the year, with minimal fluctuations.

The ISF Facility potable water will be supplied from the approximately 1.6 billion gallons per year currently used on the INEEL. The source of the INEEL water, and the impact of its use, is described in the *Idaho High-Level Waste & Facilities Disposition Draft Environmental Impact Statement* (Ref. 2-3).

3.4 HEAT DISSIPATION SYSTEM

The ISF Facility Storage Area vaults use a passive cooling system. Heat from the spent nuclear fuel stored in the sealed ISF canisters transfers to the surrounding air by natural convection cooling. Outside air enters through fixed openings in the outside walls of the storage vault and exits through fixed openings in the charge face floor. The heated air rises from the charge face floor and exits the upper level of the Storage Area through fixed louvers on the exterior walls. This process does not require or depend on mechanical motive force for decay heat removal.

3.5 RADIOACTIVE WASTE SYSTEMS AND SOURCE TERM

This section describes the liquid, gaseous, and solid radioactive waste treatment systems and the instruments used to monitor effluent release points. It includes the origin, treatment, and disposal of liquid, gaseous, and solid radioactive waste generated during transfer and storage operations.

3.5.1 Source Term

The radiological source term for the ISF Facility used in the ORIGEN2 projections originates from three different fuel types. These include fuel assemblies from Peach Bottom High Temperature Gas-Cooled Reactor (HTGR) Unit 1 (Peach Bottom, Pennsylvania) cores 1 and 2, Light Water Breeder Reactor (LWBR) fuel assemblies from the Shippingport Atomic Power Station (Shippingport Borough, Pennsylvania), and standard stainless steel and standard aluminum clad TRIGA reactor fuel elements.

The calculation model used to determine the source term is ORIGEN2 (Ref. 3-1), a flexible reactor physics code that provides various nuclear material characteristics in easily comprehensible form. It is a versatile point-depletion and radioactive-decay computer code highly regarded for use in simulating nuclear fuel cycles and calculating the nuclide compositions and characteristics of materials.

The original radionuclide source term data was provided in the DOE ISF Project Contract (Ref. 3-2). This data served as the baseline reference data inserted into the ORIGEN2 program and then decayed to obtain the output results.

The description of the source term is summarized in the ISF Safety Analysis Report (SAR), Chapter 7, Radiation Protection in four output data sets: (1) radioisotopic composition, (2) photon production rate, (3) neutron production rate, and (4) decay heat (Ref. 3-3).

3.5.2 Liquid Radioactive Waste Systems

The ISF Facility liquid waste processing system will safely handle and store liquid radioactive waste generated from various sources. These include liquid waste resulting from non-routine decontamination activities, personal decontamination, and eye wash stations. The ISF Facility does not generate liquid radioactive waste during normal operations.

Local sumps in the Canister Closure Area, Liquid Waste Storage Tank Area, and Solid Waste Processing Area will collect liquid radioactive waste during non-routine decontamination activities. A mobile liquid waste pumping unit will remove liquid waste from the sumps and discharge to drain piping connected to the liquid radioactive waste storage tank.

In the workshop, a radioactive decontamination sink and an eye wash will gravity-drain liquid waste to the liquid waste storage tank. The personnel safety shower in the Operations Area will collect liquid waste from the shower and the eye wash in a self-contained reservoir. If necessary, a mobile pumping unit will remove liquid waste from the reservoir and discharge to drain piping connected to the liquid waste storage tank.

Liquid waste in the Transfer Tunnel will be collected in segmented trenches. A mobile pumping unit will remove it from the trenches and discharge to drain piping connected to the liquid radioactive waste storage tank.

Liquid radioactive waste from the 5000-gallon storage tank will be processed on site, if necessary, and be transported to an approved disposal facility in accordance with local, state, and Federal transport regulations. The ISF Facility will not discharge liquid radioactive waste to the environment.

3.5.3 Gaseous Radioactive Waste Systems

The ISF Facility has no processes that generate gaseous radioactive waste. However, during fuel repackaging operations, interstitial fission gases inside the fuel matrix could potentially be liberated.

The potential for airborne particulate contamination exists at the ISF Facility. To minimize release of airborne particulates, the ISF Facility is divided into four ventilation confinement zones:

- an inner (primary) confinement zone where highly radioactive materials are processed
- an intermediate (secondary) confinement zone where some potential for radioactive release may exist
- an outer (tertiary) confinement zone where there is little potential for radioactive release
- radioactively clean ancillary areas

Decreasing pressures between confinement zones will maintain inward airflow from the clean ancillary areas towards the primary confinement zone. High-efficiency particulate air (HEPA) filters in supply and exhaust ductwork will prevent particulate backflow through supply ducts.

HEPA filters will be installed on the exhaust ducts leaving the inner (primary) zone. These filters will be located inside the Fuel Packaging Area and act as pre-filters to protect the downstream ductwork from contamination. System description, instrumentation, flow diagrams, flow rates, and component capacities for the heating, ventilation, and air conditioning (HVAC) system are presented in the SAR, Chapter 4, *Installation Design*.

3.5.4 Solid Radioactive Waste System

The solid radioactive wastes at the ISF Facility fall into three categories: (1) large canisters, (2) small canisters, and (3) process-generated waste. The ISF Facility will use a solid waste processing system to safely handle and package the waste for disposal by the DOE on the INEEL. The process flow diagrams and system descriptions for the solid waste processing system are presented in the SAR, Chapter 6, *Site Generated Waste Confinement and Management*.

3.5.4.1 Large and Small Canister Processing

Large canister radioactive waste consists of metal canisters 18 to 25 inches in diameter and up to 158 inches long, weighing up to 2700 pounds. Small canister radioactive waste consists of metal canisters 4 to 5 inches in diameter and up to 158 inches long. After the canisters are emptied, the interior walls of the canisters will be surveyed in the Fuel Packaging Area. The canisters, which cannot be contact handled, will be set aside for cleaning and/or sectioning in the Fuel Packaging Area. The canisters will be moved with the fuel handling machine from the Fuel Packaging Area to the Solid Waste Processing Area through the canister waste port. The canisters will be tipped and moved to a cutting table to be sectioned with an automatic band saw and placed in a disposal bin. The waste disposal bin will be surveyed, manifested, and removed from the Solid Waste Processing Area. The waste will be disposed of by DOE in the INEEL Radioactive Waste Management Complex.

3.5.4.2 Process-Generated Waste Processing

Process-generated waste consists of paper, rubber, plastic, rags, machinery parts, tools, vacuum cleaner debris, welding materials, and HEPA filters. Process-generated waste will be taken to the Solid Waste Processing Area, where it will be consolidated, segregated, and, as applicable, compacted into 55-gallon drums. As with the waste disposal bins, the drums will be prepared and transported to the INEEL Radioactive Waste Management Complex.

3.5.5 Process and Effluent Monitoring

Process and effluent radiation monitoring for the ISF Facility includes criticality monitoring, area radiation monitoring, radiation signature monitoring, continuous air monitoring, and record sample air monitoring. Because there will be no liquid releases (see Section 3.5.2), the only effluent radioactive release point will be the exhaust stack.

Continuous air monitors will be used to monitor the general level of airborne material in work areas, and to detect breakthrough of the HEPA filters downstream of the Fuel Packaging Area. Each continuous air monitor will be configured with a setpoint appropriate to its primary function. For continuous air monitors that monitor normally occupied work areas, the setpoint will be 1/10 of the derived air concentration. In addition to the exposure rate setpoint, each continuous air monitor will also monitor the change in exposure rates, and an unduly rapid rise time in exposure will trigger an alarm. A continuous air monitor alarm or radiation area alarm in a work area will prompt an evacuation of the immediate area per administrative procedures.

ISF Facility effluent monitoring consists of exhaust stack sampling for particulate radionuclides and exhaust stack sampling for ^{129}I and ^{3}H.

A particulate sample will be collected weekly depending on the work in process, ^{129}I samples will be collected biweekly and ^{3}H samples collected monthly. Iodine samples will be collected on a silver zeolite impregnated charcoal canister and ^{3}H will be collected using a three-stage bubbler collection system. Both of these sampling methods are proven methods for gas sampling.

3.6 CHEMICAL AND BIOCIDE WASTES

The ISF Facility will not have a water intake that would require using a biocide. Table 3-1 identifies the chemicals, where used, and the nominal annual quantities used.

3.7 SANITARY AND OTHER WASTE SYSTEMS

3.7.1 Sanitary Waste

The ISF Facility sewer system, is described in the SAR, Chapter 4, *Installation Design*. The ISF Facility sewer system will be tied to the INTEC system outside the ISF Facility boundary, on the west side of the facility. Disposal of sanitary waste from INTEC is addressed in the *Idaho High-Level Waste & Facilities Disposition Draft Environmental Impact Statement* (Ref. 2-3).

3.7.2 Other Non-Radioactive Wastes

The ISF Facility will generate non-radioactive waste associated with administrative office functions and housekeeping, and inspection and storage facility materials such as small amounts of lubricants and non-destructive testing fluids.

3.8 REPORTING OF RADIOACTIVE MATERIAL MOVEMENT

Transportation of the spent nuclear fuel from the INTEC to the ISF Facility site is a DOE responsibility. The environmental impacts of transportation-related accidents are discussed in the SAR (Ref. 3-3). Radioactive waste from the ISF Facility site will be moved to the Radioactive Waste Management Complex under DOE Orders, which provide controls for radioactive material movement within the INEEL boundaries.

3.9 TRANSMISSION FACILITIES

The ISF Facility does not have transmission lines. Electrical power for the ISF Facility is supplied through a unit substation with a step-down transformer. The unit substation will be located within a fenced area, with cables from the substation routed underground to the ISF Facility. The aesthetic impact of the substation will be minimal.

3.10 REFERENCES

3-1. ORIGEN2, *Isotope Generation and Depletion Code–Matrix Exponential Method*, Oak Ridge National Laboratory, RSIC Computer Code Collection.

3-2. DOE-ID (2000), *Contract Award and Notice to Proceed*, Contract No. DE-AC07-001D13729, Spent Nuclear Fuel Dry Storage Project, May. (http://www.id.doe.gov/doeid/psd/SNFDSPContract.htm)

3-3. Foster Wheeler Environmental Corporation (2001), *ISF Facility Safety Analysis Report*, ISF-FW-RPT-0033.

4.0 ENVIRONMENTAL EFFECTS OF SITE PREPARATION AND FACILITY CONSTRUCTION

This chapter addresses the effects of construction of the ISF Facility on the physical environment, inhabitants, and socioeconomic conditions of the region.

4.1 LAND USE IMPACTS

ISF Facility construction will cause some physical changes to the land. These physical changes, their effects on the site and affected offsite areas, and on the historic properties of the land are examined below.

4.1.1 Site and Vicinity

The ISF Facility will be constructed on a previously disturbed site adjacent to the INTEC. Mobile construction equipment will excavate the foundation and establish the facility grade. Explosives will not be used to establish below grade areas. During construction, equipment delivering cement and other construction materials will access the site.

Once construction begins, access to the completed ISF Facility will be restricted in accordance with Federal regulations (Ref. 4-1) until the facility is decommissioned. Site use will be restricted to activities in support of facility operations. Therefore, the property will be unavailable for other uses such as exploration of mineral resources. The environmental effect of restricting site availability is minor, because it is within the 890-square-mile INEEL, and not accessible to the public.

The ISF Facility will be constructed on the edge of the Big Lost River flood plain just southeast of the main channel of the Big Lost River. The construction of the ISF Facility will not affect the flood plain.

In the unlikely event of a flood-induced overtopping failure of the Mackay Dam, the ISF Facility construction site would likely be flooded (Figure 4-1). This probable maximum flood would result in flooding of below grade foundations and the displacement of loose construction materials and soils. Because it would take greater than 12 hours for the flood wave to reach the ISF Facility construction site, there will be sufficient time to take flood control measures (e.g., sand bagging the perimeter, moving equipment to higher ground, staging sump pumps in below-ground areas).

Short-term impacts of construction activities will include environmental effects typical of a construction effort. These impacts and plans for mitigating the impacts are described below.

Excavation and construction vehicles will generate fugitive dust – a total of about 15 tons of dust and particulates over the construction period. These dusty conditions may continue until the bare areas are covered with native grasses, gravel, or asphalt. Fugitive dust is of concern for several reasons:

- Safety – dust storms can severely restrict visibility for vehicular traffic at the ISF Facility site.
- Aesthetic and "good neighbor" concerns.
- Regulatory concerns – the Clean Air Act establishes a visual air pollutant requirement.

Water will be used to mitigate construction dust. This is expected to reduce the estimated 15 tons of fugitive dust and particulates to about 9 tons. This method is routinely and effectively used on construction projects.

Construction vehicles and procedures will also generate noise, which can affect the construction workers, workers at adjacent facilities, the public, and local wildlife. Workers at the site and at adjacent facilities will use hearing protection devices as required by OSHA, to mitigate noise. Highway 20, the publicly accessible point of the INEEL, is nearly 4 miles from the ISF Facility construction site, and the nearest residences are about 11 miles from the ISF Facility site boundary. These distances are sufficient to mitigate the effects of construction noise on the public. Studies of the effects of noise on wildlife indicate that intermittent noise levels over 100 dBA do not affect wildlife productivity (Ref. 2-21). Therefore, the effects of noise on both humans and wildlife will be minor.

Lubricants and fuels for construction equipment will be present on the ISF Facility site. These fluids will be stored in approved containers. Because quantity is limited by the size of containers, the impact of a spill or occasional dripping is minor and can be addressed by the construction crew.

Vegetative cover on the ISF Facility site is less than five percent. Therefore, the potential of the vegetation fueling a range fire is limited.

A construction fence will be erected to maintain control of construction materials and to restrict access to only those who need to be in the area and who have personnel protection equipment (e.g., hard hats, safety glasses, work shoes). A security fence will be built later in construction, and after construction is completed, the construction fence will serve as an outer "nuisance" fence.

Roadways will be added within the ISF Facility site boundary. Only vehicle traffic for the ISF Facility will use these roadways.

In sum, construction of the ISF Facility will physically change the 8-acre tract. Because the ISF Facility site (1) is only a small portion of the 890-square-mile INEEL, and (2) has been previously disturbed, the physical changes are minor. As outlined above, these changes will restrict land use and will have a small impact during construction. However, the restriction of land use does not affect the value of the land, as this property is classified as least productive. The minor physical impacts from construction, such as dust, risk of fire, and control of construction wastes, can be mitigated.

4.1.2 Transmission Corridors and Offsite Areas

The ISF Facility, essentially an industrial facility, does not have an electrical transmission corridor for power distribution. Electrical power for operations will be supplied from the INTEC distribution system. ISF Facility power and the INTEC distribution system will be connected at the ISF Facility site boundary through a small substation. The final leg of the connection will route underground supply cables approximately 200 feet to the ISF Facility. Because the connection to the distribution system and routing path to the ISF Facility are on the ISF Facility site, the impact of the transmission corridor is negligible.

A 10-acre plot northeast of the ISF Facility site will be used as a construction laydown area. Because it is not part of the ISF Facility construction, the only construction activities here would be some grading and leveling, as for a parking lot. The construction laydown area has similar restrictions and effects on land use as the ISF Facility site itself.

4.1.3 Historic Properties

An archeological and cultural assessment was accomplished for the ISF Facility site by the INEEL Cultural Resource Management Office. Results are included as Appendix B, *Cultural Resources Investigation for the Idaho Spent Fuel Facility at the Idaho National Engineering and Environmental Laboratory.*

The INEEL Cultural Resources Management Office archives indicate that repeated, intensive archaeological surveys of the ISF Facility site and the construction laydown area yielded only negative results. The archive search identified no historic architectural properties in or near the area of construction. Additionally, because of considerable modern disturbance and low archaeological sensitivity, it is unlikely that resources of interest to the Shoshone-Bannock Tribes will be encountered. Outside the construction area are three archaeological localities. Two are isolated artifacts unlikely to yield additional information and evaluated as ineligible for nomination to the National Register; the third is a historic homestead evaluated as ineligible for nomination (Appendix B).

If cultural resource materials are encountered during construction, FWENC will contact the INEEL Cultural Resources Management Office for assistance (Ref. 4-2). Additional investigations will be initiated and newly exposed resources protected as deemed appropriate.

4.2 WATER-RELATED IMPACTS

The ISF Facility is being constructed on the edge of the Big Lost River flood plain southeast of the main channel of the Big Lost River. Bodies of water near the ISF Facility site include the Big Lost River (about 4000 feet from the ISF Facility site boundary), sewage treatment lagoons in the INTEC area, and two percolation ponds south of the INTEC. Because the treatment lagoons and percolation ponds are manmade and not intended to support aquatic life, they are not examined for purposes of this section. The effect of construction activities on the Big Lost River surface hydrology is examined. The ISF Facility site is 450 feet above the Snake River Plain Aquifer. Subsurface hydrology is examined, but construction of the ISF Facility is unlikely to produce runoff or contamination sufficient to reach the aquifer.

4.2.1 Hydrologic Alterations

Construction of the ISF Facility will involve preparing the land, erecting buildings, and finish grading. These phases of construction will have minimal impact on the surface and subsurface hydrology.

Site preparations include scraping and excavation 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 ISF 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 will 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 a concern, as the loose soil will 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. However, it is unlikely, because the river is approximately 4000 feet from the ISF boundary, and the soil would settle on the surface before reaching it.

During construction, water will be distributed to control fugitive dust. This water, like other small amounts of water on the site, will evaporate or seep into the ground, thereby never reaching the Big Lost River, and will have minimal affect on the aquifer.

During construction, there will be occasions in which the physical changes of the land could affect the nearby water bodies and the subsurface aquifer. However, these effects will be mitigated through the implementation of a Storm Water Pollution Prevention Plan for Construction Activities, written in accordance with *EPA Administered Permit Programs: The National Pollutant Discharge Elimination System* (40 CFR 122 [Ref. 4-3]), and site-specific requirements. The Storm Water Pollution Prevention Plan for Construction Activities includes an assessment of drainage and runoff, an evaluation of the Endangered Species Act and National Historic Preservation Act impacts, identification of erosion and sediment controls during construction, permanent stormwater management controls, and identification and control of other potential sources of pollution. Once construction is complete, unpaved areas of the property will be covered in 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. Due to the type of facility, a Storm Water Pollution Prevention Plan for Industrial Activities is not required. See Section 12.1.2 for additional information.

4.2.2 Water Use Impacts

Construction activities at the ISF Facility site will require a supply of water for making concrete and controlling fugitive dust, and potable water for human consumption and sanitary facilities. The water is available from existing resources with minimal impact on water resources and no effect on the Big Lost River or the Snake River Plain Aquifer.

4.3 ECOLOGICAL IMPACTS

The following sections examine the terrestrial and aquatic ecosystems and identify the effects of construction activities on these systems.

4.3.1 Terrestrial Ecosystems

Much of the INEEL is undeveloped and is important habitat for native flora and fauna. However, the ISF Facility site has been previously disturbed; it does not presently support native vegetation and provides little habitat value to wildlife. The nearest native vegetation is sagebrush steppe, which likely supports a diverse complement of small mammals, reptiles, and bird species common to sagebrush steppe. Pronghorn antelope and mule deer likely use these nearby areas throughout the year (Appendix A).

ISF Facility construction may fragment habitat. Habitat fragmentation alters the movement of species such as pronghorn and elk. Habitat fragmentation at the ISF Facility site would not eliminate or severely restrict movement of animals. Historical data indicate that species such as pronghorn continue to use and move through areas immediately adjacent to new developed areas. However, species may avoid habitat next to structures because of the presence of humans, night lighting, or noise. Reviews of previously disturbed land and habitat fragmentation indicate that impact to wildlife will be minor (Ref. 2-3).

Good housekeeping practices will be used during construction at the ISF Facility site and the construction laydown area. These practices will include restricting activities and access to those areas, using techniques to mitigate erosion, storing fluids harmful to animals (e.g., diesel fuel, gasoline, and anti-freeze solutions) in proper containers, and promptly cleaning up spills.

The buildings to be constructed for the ISF Facility, and the construction buildings (trailers and sheds), are similar to existing structures at the INTEC, with low profiles. Therefore, the new buildings will not disturb bird flight patterns.

The U.S. Fish and Wildlife Service and the Idaho Department of Fish and Game Conservation Data Center were contacted to identify animal and plant species of special status (e.g., threatened, experimental, species of concern, or watch) that use the INEEL. These are described below.

In most of Idaho, the gray wolf is listed as an experimental, non-essential population. There have been several unconfirmed gray wolf sightings on the INEEL during the past decade; none near facility complexes or the Big Lost River. The U.S. Fish and Wildlife Service does not designate critical habitat for experimental, non-essential populations; therefore, the INEEL has no habitat critical for the gray wolf (Appendix A).

The U.S. Fish and Wildlife Service conducts an annual mid-winter bald eagle count on the INEEL. Bald eagles occur on the INEEL only during the winter, primarily near the north end of the site and the towns of Howe (20 miles away) and Mud Lake (30 miles away). Occasionally, bald eagles may congregate at the spreading areas near the Radioactive Waste Management Complex (8 miles away) (Appendix A).

The construction of the ISF Facility will not measurably affect local species, including those of Federal or state concern. There are no federally listed or proposed threatened or endangered species, species of special concern, or designated critical habitat near the ISF construction area (Appendix A).

4.3.2 Aquatic Ecosystems

The ISF Facility is to be constructed on the edge of the Big Lost River flood plain, southeast of the main channel of the Big Lost River. Bodies of water near the ISF Facility site include the Big Lost River (about 4000 feet from the ISF Facility site boundary), sewage treatment lagoons in the INTEC, and two percolation ponds south of the INTEC. The sewage treatment lagoons and percolation ponds are manmade, and not intended to support aquatic life.

Aquatic communities in the Big Lost River depend on the river's flow. Drought and upstream irrigation diversions limit the flow of water onto the INEEL and near the ISF Facility site. In years when water does flow, six species of fish have been observed: rainbow trout, mountain whitefish, shorthead sculpin, kokanee salmon, brook trout, and speckled dance (Appendix A). Because the river is approximately 4000 feet from the ISF Facility site boundary, construction activity will not affect aquatic communities.

4.4 SOCIOECONOMIC IMPACTS

The ISF Facility is being constructed within the INEEL and will use existing resources. Therefore, its construction will have minimal effect on regional communities and the systems that support them.

4.4.1 Physical Impacts

The ISF Facility will be constructed southeast of the INTEC within the INEEL boundaries. The INEEL boundary nearest to the ISF Facility site is 8.5 miles south. The nearest populated area is Atomic City, population 25, about 1 mile from the southern INEEL boundary and 11 miles from the ISF Facility site. Therefore, no permanent residents live within a 10-mile radius of the ISF Facility site.

Construction activities will produce some fugitive dust that could temporarily affect visibility in localized areas; however, dust would not be visible from lands adjacent to the INEEL or beyond. Construction activities are limited in duration, and FWENC will follow good housekeeping practices (e.g., spraying or misting water) to minimize both erosion and dust. As with fugitive dust, noise will not be discernable in the populated areas surrounding the INEEL.

4.4.2 Social and Economic Impacts

Changes to INEEL-related expenditures and workforce levels could have economic impacts on local employment, population, and community services. These potential impacts could be beneficial, in that they would contribute to stabilization of the INEEL workforce, and thus the regional economy.

Although construction of the ISF Facility will require a few technical positions that could necessitate bringing in some workers and their dependents, most of the workforce would come from the INEEL or the regional labor pool. Sufficient workers appear to be available at INEEL and in the region to staff ISF Facility construction and operation (Ref. 1-1).

The INEEL workforce has stabilized over the past decade, and workers tend to move between projects there (Ref. 1-1). Therefore, most of the workers will be from the region. With minimal influx of workers, ISF Facility construction will have minimal impact on housing, transportation, and community services.

Construction of the ISF Facility will require purchasing building materials. However, because the project is similar in scale to an industrial building, the increase is expected to be relatively small.

4.4.3 Environmental Justice Impacts

The environmental justice assessment identifies and addresses disproportionately high and adverse human health and environmental effects on minority and low-income populations. As previously discussed, the ISF Facility construction will have minimal effect on the regional socioeconomic conditions.

The ISF Facility is to be constructed on a previously disturbed tract of land adjacent to an existing industrial complex. Construction has been shown to cause no new impact on human health and the environment. Construction has been shown to not significantly impact the surrounding population, with most of the ISF Facility construction workforce coming from INEEL or the regional labor pool. No means were identified for minority or low-income populations to be disproportionately affected.

4.5 RADIATION EXPOSURE TO CONSTRUCTION WORKERS

Sources of radiation exposure during construction are background radiation and potential accidents or abnormal operations exposure from other facilities at the INEEL. The CFA, INTEC, TRA, and PBF/WERF are within 5 miles of the ISF Facility site. The background radiation levels at the INEEL are less than 0.32 mrem (Ref. 2-3).

4.6 MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING CONSTRUCTION

Construction of the ISF Facility will not adversely affect the land, surface or subsurface hydrology, cultural and historic properties, socioeconomic conditions, or worker health and safety. A few minor impacts have been identified, and will be mitigated. Mitigation measures include good housekeeping practices, using water to control fugitive dust, and soil retention methods to control erosion. Habitat fragmentation and consumption of building materials are impacts that cannot be mitigated. However, as previously discussed, these items will not present adverse environmental consequences.

4.7 REFERENCES

4-1. Title 10, Code of Federal Regulations, Part 73, *Physical Protection of Plants and Materials*.

4-2. DOE (2000), *Spent Nuclear Fuel Dry Storage Project*, Contract DE-AC07-00ID13729, May, 2001.

4-3. Title 40, Code of Federal Regulations, Part 122, *EPA Administered Permit Programs: The National Pollutant Discharge Elimination System*.

THIS PAGE INTENTIONALLY LEFT BLANK.

5.0 ENVIRONMENTAL EFFECTS OF FACILITY OPERATION

This chapter describes impact of ISF Facility operation on the environment, including the effects of heat dissipation, direct radiation, radiological discharges, and chemical discharges; and the effect of eventual facility decommissioning on the ultimate fate of resources. Impacts of ISF Facility operation are minimal.

5.1 EFFECTS OF OPERATION OF HEAT DISSIPATION SYSTEM

The ISF Facility employs a passive heat removal system that dissipates heat from the stored spent nuclear fuel to the ambient air through the building exhaust vents. The heat discharges to the surrounding air. It does not interface with surface or subsurface hydrology.

No liquid effluents are discharged, and no heat is released to water from the ISF Facility. Therefore, no state or Federal effluent guidelines related to liquid discharges apply, and there are no physical or biological effects related to liquid discharges.

5.2 RADIOLOGICAL IMPACT FROM ROUTINE OPERATIONS

Releases of radioactive material and radiation from the ISF Facility are minimized to ensure that no Federal limits are exceeded and are kept As Low As Reasonably Achievable (ALARA). Therefore, no adverse impacts exist on the INEEL workforce, members of the public, local flora, or local and migratory fauna.

5.2.1 Exposure Pathways

The ISF Facility is designed so that the release of radioactive material is through the filtered ventilation system to the HVAC discharge stack.

Potential pathways of radiation exposure from the ISF Facility are direct radiation from the Receipt, Transfer, and Storage Areas; immersion in or inhalation of stack effluent; radionuclides on ground surfaces and on flora; and internal exposure from ingestion of drinking water, fish, game, and plants.

The ISF Facility design includes shielding to minimize direct radiation levels. The shielding ensures that radiation levels are below the federal limits to members of the public, and contributes to maintaining radiation levels ALARA, even though members of the public cannot access the ISF Facility site area.

5.2.2 Airborne Model

The principal potential pathway of radiation to the controlled area boundary is from air emissions during ISF Facility operations. The EPA CAP-88 model predicted the highest dose to be at Frenchman's Cabin, at the southern boundary of the INEEL, where a hypothetical dose of approximately 3.0×10^{-5} mrem/year was calculated. This dose is 0.0003 percent of the EPA radiation protection standard of 10 mrem.

Within the ISF Facility itself, the areas where loose surface radioactive contamination can exist are maintained at a negative pressure, so that air flows into these areas. The exhaust airflow from these and other areas of the ISF buildings is routed through HEPA filters and exhausted through the stack. Therefore, although a person immersed in the stack exhaust could potentially be exposed, the design of the facility ventilation system ensures that radioactive particulate is not exhausted.

There are three possible sources for an ingestion pathway: (1) game animals, (2) aquatic life, and (3) plants. For this pathway to exist, ISF Facility radioactive materials must be transported to areas where plants and animal live or migrate. As previously noted, the air emissions are the principal potential pathway for radioactive materials to exit the ISF Facility and be deposited in areas accessible by animals and on plants; however, the values of the radionuclides and the hypothetical dose are low (Table 5-1).

5.3 EFFECTS OF CHEMICAL AND BIOCIDE DISCHARGES

The ISF Facility will have no chemical or biocide discharges and there are no environmental effects from this type of discharge.

Herbicides (weed killers) or ground sterilants are used around INEEL facilities to control vegetation around fence perimeters, primarily to mitigate the risk of range fires. It is likely that the ISF Facility will also use this technique, but because concentration are small and the products are applied in accordance with manufacturer guidelines, their use will not adversely impact the environment.

5.4 EFFECTS OF SANITARY WASTE DISCHARGES

The ISF Facility sanitary waste system will be routed to the INTEC sanitary waste system. There will be no adverse environmental effects with the discharge of sanitary wastes to the INTEC. The DOE EIS (Ref. 2-3) addresses disposal of the sanitary waste from INTEC.

5.5 EFFECTS OF OPERATION AND MAINTENANCE OF THE TRANSMISSION SYSTEMS

The ISF Facility does not have transmission lines and there are no environmental effects associated with transmission line system operation and maintenance.

5.6 OTHER EFFECTS

Other issues that may affect the environment include the effect of groundwater withdrawal on groundwater resources, disposal of solid and liquid wastes, and noise levels.

The ISF Facility does not add any new wells. The ISF Facility uses water from existing INEEL wells and will have minimal impact on groundwater resources (Section 3.3).

During transfer operations, radioactive and non-radioactive waste will be generated. The DOE will dispose of both radioactive and non-radioactive solid waste within the boundaries of the INEEL.

During transport operations, vehicular traffic will increase noise levels between the INTEC and the ISF Facility. This noise is well within the levels and type currently experienced at the INEEL. Vehicles will also add to the cumulative amount of exhaust at the INEEL. The vehicular exhaust is within limitations and will not adversely affect the environment.

5.7 RESOURCES COMMITTED

ISF Facility operation involves two functions: (1) transfer of spent nuclear fuel into new storage canisters, and (2) storage of those canisters in storage tubes. This section discusses the irreversible use of resources (e.g., materials, environmental losses, and water use) during these activities.

Transfer operations place the spent nuclear fuel in storage canisters, seal the canisters by welding, vacuum dry the contents, and transfer the canisters to the Storage Area. These activities use consumable materials (e.g., welding wire, inert gases for welding and vacuum drying, and gasoline for vehicles) that become part of the canister or are used up. Transfer processes will also consume electrical resources.

The ISF Facility does not directly withdraw water from the groundwater supply, but consumes water from the INEEL water supply system. Estimated potable water consumption is approximately 450,250 gallons per year, to be supplied from the 1.6 billion gallons per year currently used on the INEEL.

A number of researchers have studied the effects of the INEEL industrial complexes on local and migratory fauna. One observed impact is reduced growth rate and life expectancies of individual animals as a result of radiation exposure. The studies did not identify population or community-level impacts to the same exposure (Ref. 1-1). As noted previously, the effects of radiological exposure to local and migratory fauna will be so small as to not be measurable. Therefore, even individual animals will not be affected by ISF Facility operation.

5.8 DECOMMISSIONING

When the spent nuclear fuel is removed from the ISF Facility, decommissioning activities to decontaminate and dismantle the facility will commence as identified in the *Proposed Decommissioning Plan* (Ref. 5-2). The ISF Facility design incorporates features to improve the decommissioning process, mainly in four areas: (1) reducing residual radioactive inventory; (2) reducing time to perform decommissioning tasks; (3) reducing time that personnel must spend in high contamination areas; and (4) reducing the generation of secondary radioactive waste.

ISF Facility features that improve decommissioning include:

- capability to maintain and manipulate the Fuel Packaging Area crane without entering the Fuel Packaging Area
- compartmentalization of facility processes
- protective coatings on concrete surfaces
- ready access to storage tanks
- minimal piping inside tanks

Decommissioning the ISF Facility involves decontaminating and/or removing systems and components for packaging to enable shipment to an offsite processing facility or a low-level radioactive waste disposal area or facility, or to be handled by other alternatives in accordance with applicable regulations.

Materials that are released for use after radiological survey will be available for use as recycled material or for disposal in non-radioactive landfills. Which option to pursue will be decided at decommissioning, based on economic benefit. Historically, most free released material is recycled as scrap.

5.9 REFERENCES

5-1. EPA Office of Radiation Programs CAP-88 Model, *Clean Air Act Assessment Package*, radiological assessment methodology, Windows version 2.0, 1997. Radiation Safety Information Computational Center, http://www.er.doe.gov/production/er-80/cap88.

5-2. FWENC (2001), *Proposed Decommissioning Plan, ISF-FW-PLN-0027.*

6.0 EFFLUENT AND ENVIRONMENTAL MEASUREMENTS AND MONITORING PROGRAMS

This chapter describes the means by which FWENC will collect the baseline data presented in other chapters and describes FWENC's plans and programs for monitoring the environmental impacts of site preparation, facility construction, and facility operation.

6.1 PREOPERATIONAL ENVIRONMENTAL PROGRAM

6.1.1 Hydrology

No surface or groundwater bodies are affected by the ISF Facility; therefore, the environmental monitoring programs do not need to envelope these areas.

6.1.2 Air

The following section discusses existing air quality and meteorology of the ISF Facility area and introduces the models used to estimate the effects of the ISF Facility emissions.

6.1.2.1 Air Quality

The EPA and the State of Idaho are jointly responsible for establishing and implementing programs that meet the requirements of the Clean Air Act, which provides the framework to protect air resources and public health and welfare. The EPA and State of Idaho have monitored ambient air quality to define areas as either attainment (that is, standards are not exceeded) or nonattainment of ambient air quality standards. The INEEL region has been classified as attainment or unclassified for the National Ambient Air Quality Standards (per Ref. 6-1), meaning that air quality levels are considered healthful.

6.1.2.2 Meteorology

The modeled emissions from the existing facilities at INTEC, adjacent to the ISF Facility, used meteorological data from the NOAA Grid III monitoring station. Elevated (tall stack) releases were modeled using observations from the 200-foot (61-meter) level; ground-level releases were modeled using data from the 10-meter level. The Grid III monitoring station is maintained by NOAA and it collects hourly data on wind speed, direction, and temperature.

6.1.2.3 Models

For the radiological air quality assessment in the *DOE Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (Ref. 1-1), DOE identified physical measurements (ambient air monitoring) and calculation techniques (atmospheric dispersion modeling) to assess existing levels of radiation in and near the INEEL. DOE performed atmospheric transport modeling based on meteorological conditions measured at eight locations at the INEEL (Ref 2-3). This information, as well as the CAP-88 model (Ref. 5-1) will be used by FWENC for atmospheric dispersion modeling.

6.1.3 Land

The following section discusses the scope and methodology of the terrestrial environment data collection and evaluation programs.

6.1.3.1 Geology and Soils

Investigations to determine the ISF Facility site geotechnical characteristics were completed in July 2000. The scope of the ISF Facility site geotechnical investigation included site preparation activities, drilling soil borings, excavating test pits, performing field geotechnical tests, collecting soil samples and performing geophysical surveys and tests. The following summarizes techniques and findings of the geotechnical investigation report.

Exploratory borings and test pits were used to collect soil samples and define what was known of the subsurface stratigraphy.

Techniques. Geophysical testing was performed to determine site-specific dynamic soil properties for use in dynamic soil-structure interaction analyses and to develop time histories. Four seismic refraction lines and two downhole surveys were performed to characterize subsurface conditions.

Findings. The site investigation determined that subsurface solid consists of 5 feet of uncontrolled fill, or loose silt, overlaying about 25 feet of dense sand and gravel. Basalt bedrock was encountered at depths between 25 and 30 feet. The silt soils represent aeolian (wind blown) and fluvial deposits. Because of the low energy in deposition, silt soils typically have a loose to medium-dense consistency. Conversely, the poorly graded sand and gravel soils are associated with the Snake River, and typically have a dense consistency because of the high energy of deposition.

6.1.3.2 Land Use and Demographic Surveys

The *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (Ref. 1-1) investigated and documented existing and planned land uses of the INEEL. Sources included the *INEEL Institutional Plan for Fiscal Years 1994 –1999* (Ref. 6-2) and *INEEL Technical Site Information Report* (Ref. 6-3). The Institutional Plan provides a general overview of INEEL facilities, outlines strategic program directions and major construction projects, and identifies specific technical program and capital equipment needs. The Technical Site Information Report presents the 20-year plan for development activities at the INEEL. Because these surveys reflect the current plans and usage of the INEEL and surrounding area, FWENC undertook no new surveys.

Lands surrounding the INEEL are subject to Federal, state, and county planning laws and regulations. Information related to use of these lands is public domain information, regulated under the respective state or country code. Land use planning in the State of Idaho is derived from the Local Planning Act of 1975 (Ref. 6-4) County plans applicable to the lands bordering the INEEL include the *Clark County Planning and Zoning Ordinance and Interim Land Use Plan* (Ref. 6-5); *Bonneville County Comprehensive Plan* (Ref. 6-6); *Bingham County Zoning Ordinance and Planning Handbook* (Ref. 6-7); *Jefferson County Comprehensive Plan* (Ref. 6-8); and *Butte County Comprehensive Plan* (Ref. 6-9).

Population data and trends for the INEEL region were developed from 2000 census data.

6.1.3.3 Ecological Parameters

The INEEL has undergone a variety of ecological assessments in the last 10 years. Two of the most recent were for the *Idaho High-Level Waste & Facilities Disposition Draft Environmental Impact Statement* (Ref. 2-3) and the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (Ref. 1-1). Because the assessments did not include the ISF Facility site, FWENC sponsored a separate assessment by the S.M. Stoller Corporation (Appendix A). The parameters and results of this assessment are summarized in Section 4.3, Ecological Impacts.

Because the ISF Facility is within the INEEL boundary, annual environmental assessments prepared for the DOE provide information updates related to the INEEL ecological monitoring program.

6.1.4 Radiological Monitoring

The environmental radiation monitoring program to be carried out before ISF Facility operation is based on two considerations: (1) the site is not radiologically contaminated, and (2) the monitoring area is limited to the ISF Facility site. The program is established to provide background information to serve as a baseline for later comparison to operational data, and to ensure that the site is restored to its original state during decommissioning. The data collected by the programs will measure:

- direct radiation exposure
- airborne radionuclide concentrations within the ISF Facility site boundaries
- radionuclide concentrations in the ISF Facility site soil

Three types of samples or measurements, corresponding directly to the media, will be obtained: direct radiation measurement, particulate air samples, and soil samples.

Direct radiation will be measured at the ISF Facility site boundary to develop a baseline level of background radiation, using environmental thermoluminescent dosimeters (TLD) placed on the ISF Facility site perimeter fence. The TLDs will be exchanged quarterly and processed to determine background radiation levels.

Air sampling will commence after dust-generating activities are complete and electric power is available. Particulate air samplers will be set up in four locations on the ISF Facility site, oriented 90 degrees from the predominant wind direction, west-southwest. The air samplers will continuously pull airflow across filter papers, which will be routinely replaced and analyzed to determine radionuclides.

Soil samples will be collected periodically from within the ISF Facility site boundaries and analyzed to determine radionuclides.

6.2 OPERATIONAL ENVIRONMENTAL MONITORING

Operational environmental radiation monitoring will continue the methods and frequencies of monitoring established during the preoperational phase for direct radiation and airborne monitoring.

6.2.1 General Scope

An evaluation of the expected source term from the spent nuclear fuel to be received and processed at the ISF Facility indicates the presence of particulate and gaseous radionuclides. The primary particulate radionuclides are $^{137}Cs/^{137m}Ba$ and $^{90}Sr/^{90}Y$, and the primary gaseous radionuclides of concern are ^{129}I, ^{85}Kr and ^{3}H. Fuel packaging operations conducted in the Fuel Packaging Area are the predominant activities that could liberate any gaseous isotopes. ISF Facility effluent monitoring consists of exhaust stack sampling for particulate radionuclides and stack sampling for ^{129}I and ^{3}H.

6.2.2 Parameters

The limits, from planned discharges and direct radiation from nuclear fuel operations in the region, are established as 25 mrem per year (whole body), 75 mrem per year (thyroid), and 25 mrem per year (to critical organs). In addition, the ISF Facility shall comply with the public exposure limit of 10 mrem per year, to ensure that the INEEL meets the emission limits agreed to with the Idaho Department of Environmental Quality (Ref. 6-10).

6.2.3 Standards

The operational monitoring program will verify compliance with exposure limits to the public, established by 10 CFR Part 72.104 (Ref. 1-5). In addition, the ISF Facility shall comply with the 40 CFR Part 61 Subpart H public exposure limits, to ensure that the INEEL meets the emission limits agreed to with the Idaho Department of Environmental Quality (DEQ) (Ref. 6-10).

6.2.4 Anticipated Measurements

Measured effluent air from the exhaust stack is anticipated to have the presence of ^{129}I and ^{3}H.

Radiation exposure rates at the ISF Facility site perimeter fence will be directly measured using environmental TLDs.

Radiation exposure from ground released airborne contamination will be measured by sampling the ambient air within the ISF Facility site boundary. The calculated radionuclide concentrations at the site boundary are then converted to radiation dose using conversion factors.

6.3 ENVIRONMENTAL MEASUREMENT AND MONITORING PROGRAMS BY OTHERS

The ISF Facility is one of many in the INEEL. The Idaho Operations Office (DOE-ID) is the principal INEEL manager, responsible for site services, environmental control and management, and overall safety and emergency planning functions. Under the privatization plan for the ISF Facility, FWENC is responsible for operational monitoring programs within the ISF Facility site, and relies on DOE-ID programs outside the ISF Facility site. This situation is not uncommon at the INEEL. 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 the organizations: DOE, the INEEL Maintenance & Operations (M&O) contractor, Argonne National Labs-West (ANL-W), INEEL contractors, Shoshone-Bannock Tribes, Idaho DEQ, NOAA, U.S. Geological Survey (USGS), and the Environmental Science and Research Foundation. It is expected that FWENC will participate in this committee and share in the exchange of information related to monitoring and analytical methodologies and quality assurance, to coordinate efforts and avoid unnecessary duplication.

The environmental monitoring programs on the INEEL include:

- Effluent Monitoring Program
- Drinking Water Program
- Stormwater Monitoring Program
- Site Environmental Surveillance Program
- Offsite Environmental Surveillance Program
- USGS Groundwater Monitoring Program
- Meteorological Monitoring Program
- INEEL Oversight Program

The information on the INEEL Environmental Monitoring Programs was consolidated from the *INEEL Site Environmental Report for Calendar Year 1998* (Ref. 6-11).

6.3.1 Effluent Monitoring Program

This section summarizes the environmental monitoring programs conducted by others for the DOE-ID operations office at the INEEL.

6.3.1.1 Radiological Effluents

There are six airborne emission sampling points for continuous monitoring of radionuclides on the INEEL, outside the ISF Facility site. Of the six sample locations, two are at INTEC, adjacent to the ISF Facility site. Data from each airborne sample location is reported monthly to a centralized database, the Radioactive Waste Management Information System, operated by the INEEL M&O contractor.

6.3.1.2 Non-Radiological Effluents

Non-radiological airborne effluents are monitored at the sources, the New Calcining Facility and ANL-W. The results are published in the INEEL Non-radiological Waste Management Information System annual reports. Non-radiological liquid effluents are monitored from discharge points within the INEEL and in Idaho Falls.

6.3.2 Drinking Water Program

The INEEL M&O contractor monitors the INEEL production and drinking water wells for radiological, chemical, and bacteriological contamination at INEEL facilities operated by the INEEL M&O contractor. The program uses laboratories certified by the states where the analysis is accomplished.

In the facilities not operated by the INEEL M&O contractor and that have a production well, ANL-W provides samples to the INEEL M&O Contractor for analysis. No production wells are within the ISF Facility site boundaries; therefore, FWENC will not need to provide samples to the INEEL M&O contractor.

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 ISF Facility site. Water samples are also tested for coliform bacteria, volatile organic compounds (lead and copper), nitrates, and dissolved solids.

6.3.3 Stormwater Monitoring Program

As a requirement of the National Pollutant Discharge Elimination System (NPDES) General Permit, the INEEL developed a program for monitoring snow melt and rain runoff. Samples are collected and analyzed in accordance with NPDES sampling standards.

6.3.4 Site Environmental Surveillance Program

The site environmental surveillance program has the overall responsibility for sampling of air and soil, as well as the measurement of environmental radiation at various onsite locations. Some sampling is also conducted off site for comparison. The INEEL M&O contractor 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
- environmental dosimeters

6.3.5 Offsite Environmental Surveillance Program

The Environmental Science and Research Foundation conducts environmental monitoring independent of the INEEL M&O contractor, using independent offsite laboratories to perform radiological and radiochemical analyses. Samples are collected from a network of offsite low-volume air and atmospheric moisture samplers. The Foundation also analyses samples from sample stations in Rexburg and Blackfoot to determine concentrations of fine particulates; and 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 TLDs.

The INEEL M&O contractor also does offsite monitoring by collecting periodic precipitation samples in Idaho Falls for tritium analysis by liquid scintillation counting.

The National Park Service manages a program (IMPROVE) to measure fine particles that are the primary cause of visibility degradation. The program uses two samplers: one at Craters of the Moon National Monument, and one inside the INEEL.

6.3.6 USGS Groundwater Monitoring Program

Since 1949, the USGS has monitored INEEL ground- and surface water. The USGS maintains aquifer-observation wells on or near the INEEL. The wells are monitored for water levels and radiological and non-radiological substances.

The USGS 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 USGS Water Resources Investigation Reports and Open-File Reports.

6.3.7 Meteorological Monitoring Program

The NOAA Air Resources Laboratory maintains meteorological stations in the vicinity of the INEEL, which continuously measure parameters including temperature, wind direction and speed, relative humidity, and precipitation. A wind-profiling radar system on the INEEL also makes continuous measurements. Data from the stations is telemetered to the NOAA Idaho Falls facility and archived.

6.3.8 Idaho Oversight Program

Since 1990, the State of Idaho has operated an environmental surveillance program that includes collection and analysis of air, precipitation, and atmospheric moisture, water, soil, and milk samples taken on and around the INEEL. The program also has a network of pressurized ion chambers, electric ion chambers, and environmental dosimeters.

6.4 REFERENCES

6-1. EPA (1993), *Guidelines of Air Quality Models (revised),* EPA-450/2-78-027R, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, July.

6-2. DOE-ID (1993), *Institutional Plan for Fiscal Years 1994-1999 (Draft),* U.S. Department of Energy, Idaho Operations Office, Idaho Falls, Idaho, June.

6-3. DOE-ID (1993), *INEEL Technical Site Information Report,* DOE/ID-10401, U.S. Department of Energy, Idaho Operations Office, Idaho Falls, Idaho.

6-4. State of Idaho Code (1975*), Local Planning Act of 1975 (I.C. #67-6501 et seq.),* Boise, Idaho.

6-5. Clark County (1994), *Clark County Planning and Zoning Ordinance and Interim Land Use Plan,* Clark County Commissioners, Dubois, Idaho.

6-6. Bonneville County (1976), *Bonneville County Comprehensive Plan,* Bonneville County Planning Commission, Idaho Falls, Idaho, November.

6-7. Bingham County (1986), *1986 Bingham County Zoning Ordinance and Planning Handbook,* Bingham County Planning Commission, Blackfoot, Idaho.

6-8. Jefferson County (1988), *Jefferson County Idaho Comprehensive Plan*, Jefferson County Planning Commission, Rigby, Idaho, May.

6-9. Butte County (1992), *Butte County Comprehensive Plan*, Butte County Planning Resource Board, Arco, Idaho.

6-10. Title 40, Code of Federal Regulations, Part 61, *National Emission Standards for Hazardous Air Pollutants*, Office of the Federal Register, Washington, D.S.

6-11. DOE-ID (2000), *Idaho Engineering and Environmental Laboratory Site Environmental Report for Calendar Year 1998*, DOE/ID-12082 (July).

7.0 ENVIRONMENTAL EFFECTS OF ACCIDENTS

This chapter discusses the potential environmental effects of accidents involving the ISF Facility. This evaluation examines the most severe and bounding accidents to demonstrate that, under worst-case scenarios, the resulting dose to members of the public and the environment is lower than regulatory limits.

7.1 FACILITY ACCIDENTS INVOLVING RADIOACTIVITY

The ISF SAR, Chapter 8, *Accident Analysis*, describes and evaluates the consequences of hypothetical accidents to demonstrate that an adequate safety margin exists to protect the public and the environment (Ref. 3-3). In accordance with applicable NRC regulations, postulated accidents analyzed in the ISF SAR include seismic events, tornado missiles, fire, dropping a fuel assembly, and loss of a shield plug.

7.2 TRANSPORTATION ACCIDENTS INVOLVING RADIOACTIVITY

The spent nuclear fuel is currently stored at the adjacent INTEC. In accordance with DOE regulations, the spent nuclear fuel will be transported approximately 500 yards, from the INTEC to the ISF Facility, under a DOE-approved Transport Plan. Transport of spent nuclear fuel will not involve movement over public highways. Because transport of the spent nuclear fuel to the ISF Facility is a DOE-ID responsibility, transportation-related accidents are addressed in the *ISF SAR, Appendix A*.

The transportation of solid radioactive waste to an INEEL disposal site is the responsibility of the DOE. These transfers would be no different than the transfers of radioactive waste currently accomplished by the DOE and addressed in the *Idaho High-Level Waste and Facilities Disposition Draft Environmental Impact Statement* (Ref. 7-1).

Liquid radioactive waste will be transported by those licensed to do so under Title 49, CFR, Part 173, (Ref. 7-2). Any potential accidents during the transportation will be addressed for that licensing process.

7.3 OTHER ACCIDENTS

The SAR, Chapter 8, *Accident Analysis*, evaluates the potential consequences of a number of other accidents and natural phenomena that could occur over the life of the facility (Ref. 3-3). None of these accidents will result in a release that exceeds regulatory standards.

7.4 REFERENCES

7-1. DOE (1999) *Idaho High-Level Waste and Facilities Disposition Draft Environmental Impact Statement,* DOE/EIS-0287D, December.

7-2. Title 49, Code of Federal Regulations, Part 173, *Shippers - General Requirements for Shipments and Packagings*.

THIS PAGE INTENTIONALLY LEFT BLANK.

8.0 ECONOMIC AND SOCIAL EFFECTS OF CONSTRUCTION AND OPERATION

This chapter discusses economic and social effects of construction and operation of the ISF Facility site.

8.1 BACKGROUND

The communities nearest to the INEEL boundary are Atomic City (1 mile south), Arco (7 miles west), Idaho Falls (29 miles east), Blackfoot (32 miles southeast), and Pocatello (50 miles southeast). The workforce at INEEL facilities, as of December 2000, was approximately 4965. These employees live in the communities adjacent to the INEEL; the largest percentage lives in Idaho Falls.

In 2000, the population of the region around the INEEL was approximately 128,000, with an annual growth rate of approximately 0.8 percent[1]. The nearest populated area to the INEEL is Atomic City, population approximately 25, about 11 miles from the ISF Facility site (Ref. 2-2).

No permanent residents or communities are within 10 miles of the ISF Facility site, but several INEEL facilities are within 10 miles (Figure 8-1). Institutional control will continue to restrict access to INEEL lands; thus, population within 10 miles of the ISF Facility site is unlikely to change throughout the life of the ISF Facility.

U.S. Highways 20 and 26 pass through the INEEL within 10 miles of ISF Facility site. Highway traffic, other than the daily site traffic, is related to travel to nearby cities and recreational opportunities.

The *DOE Programmatic Spent Nuclear Fuel Management and INEEL Environmental Restoration and Waste* Management *Programs Final Environmental Impact Statement* reviewed the environmental impacts of implementing the spent nuclear fuel management approach, including the activities associated with a dry spent fuel storage facility (Ref. 1-1). This environmental analysis indicates that the impacts of a dry fuel storage facility would be minimal or negligible in most areas.

8.2 EFFECTS OF CONSTRUCTION

ISF Facility construction is expected to employ a maximum of 250 workers. Construction is scheduled to begin in July 2003 and be completed in 2005. These 250 employees constitute approximately 5 percent of the current INEEL workforce. Because most of the workforce will likely come from the existing INEEL workforce, ISF Facility construction will not have a significant economic or social impact.

8.3 EFFECTS OF OPERATION

ISF Facility operations are scheduled to begin in June 2005, requiring about 60 employees for the first 4 years (when fuel receipt and packaging occur). Once fuel receipt and packaging is complete, storage operations will likely require fewer staff. Most operations personnel will be from the local workforce.

A previous DOE environmental impact study did not identify any adverse impacts to land use, social economics, water and air resources, ecology, cultural resources, or cumulative impacts stem from the DOE Spent Nuclear Fuel Program, which includes the ISF Facility (Ref. 1-1).

---

[1] Based on changes between 1990 census and 2000 census (128162/118644)/10 years.

The ISF Facility will operate similarly to other facilities at the INEEL. Therefore, neither facility operations nor the number of operation, maintenance, storage, and monitoring personnel for the ISF Facility will result in significant economic or social impacts. Chapter 11, Summary Cost-Benefit Analysis, provides additional information regarding economic benefits.

8.4 ENVIRONMENTAL JUSTICE

The minority population near the INEEL is predominately Hispanic, American Indian, and Asian. These groups comprise approximately 7 percent of the population within the 50-mile radius. The low-income population in this area comprises approximately 14 percent of the population (Ref. 2-1).

DOE has determined that facility operations and foreseeable accidents associated with a dry fuel storage facility (ISF Facility) present no significant risk or impact to the surrounding population; therefore, there are no impacts to low-income and minority populations (Ref. 1-1).

8.5 SUMMARY

The *Programmatic Spent Nuclear Fuel Management and INEEL Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* analyzed the environmental impacts associated with implementation of the DOE spent nuclear fuel management approach, including the activities associated with a dry spent fuel storage facility. This environmental analysis found that a dry fuel storage facility would have no significant social or economic impact.

The spent nuclear fuel will be transported from the INTEC to the ISF Facility under the control of the DOE. It will eventually be transported from the ISF Facility to a geologic repository. The FEIS addresses the potential impact of spent nuclear fuel shipments from the INEEL (Ref. 1-1). Because the ISF Facility will store only spent nuclear fuel included in the FEIS, the construction and operation of the ISF Facility will not alter the basis for conclusions reached in the FEIS relative to the eventual offsite transportation of spent nuclear fuel.

The environmental justice evaluation indicates that minority and low-income populations are not disproportionately affected by the operation of a dry fuel storage facility. In conclusion, there are no reasonably foreseeable cumulative adverse impacts on surrounding populations, including minority and low-income populations.

Construction and operation of the ISF Facility will have some local and regional economic benefits (see Section 11). Because its construction and operation are consistent with current and anticipated activities at the INEEL, the social and economic impacts associated with the ISF Facility are insignificant.

9.0 SPENT FUEL STORAGE ALTERNATIVES

9.1 PURPOSE

This chapter describes the spent nuclear fuel transfer, packaging and storage alternatives considered for the non-defense related spent nuclear fuel from Peach Bottom, Shippingport, and TRIGA reactors.

9.2 BACKGROUND

During the past 40 years, the DOE and its predecessor agencies have stored spent nuclear fuel at DOE facilities around the country, including the INEEL. The spent nuclear fuel has been stored wet (in spent fuel pools/canals), or dry (in casks, vaults or dry wells). In 1992, the DOE ceased spent fuel reprocessing operations, thereby increasing the need for spent fuel storage.

The DOE evaluated both national programmatic alternatives and INEEL-specific alternatives for spent nuclear fuel storage. The State of Idaho initiated litigation against the DOE (Ref. 1-4) related to the environmental impacts of spent nuclear fuel storage and transportation. During litigation, the DOE completed the *DOE Programmatic Spent Nuclear Fuel Management and INEEL Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (Ref. 1-1). In June 1995, the DOE published a record of decision (ROD) (Ref. 9-1) regarding the management of the spent nuclear fuel inventory through 2035. In October 1995, the State of Idaho, the U.S. Department of the Navy, and the DOE signed a Settlement Agreement to resolve the Idaho lawsuits (Ref. 1-3). The Settlement Agreement included a requirement that the spent nuclear fuel from Peach Bottom, Shippingport, and TRIGA be placed in dry storage until they are removed from the State of Idaho.

As part of the implementation of the Settlement Agreement, on May 19, 2000, the DOE awarded FWENC the dry fuel storage project for the repackaging and interim storage of the Peach Bottom, Shippingport, and TRIGA spent nuclear fuel.

9.3 DOE NATIONAL AND INEEL SPENT NUCLEAR FUEL STORAGE ALTERNATIVES

The DOE effort to manage the national issue of spent nuclear fuel involved the evaluation of several alternatives, documented in *DOE Programmatic Spent Nuclear Fuel Management and INEEL Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (Ref. 1-1). The national level alternatives were:

- **No Action:** Minimal activities for safe and secure management of spent nuclear fuel at or near the generation site or storage location.
- **Decentralization:** Storage and stabilization of most spent nuclear fuel at or near the generating site with limited shipments to DOE facilities.
- **1992/1993 Planning Basis:** Shipment and storage of newly generated spent nuclear fuel at the INEEL or Savannah River Site, and consolidation of some existing spent nuclear fuel at the INEEL.
- **Regionalization:** Distribution of existing and projected spent nuclear fuel among DOE sites based on nuclear fuel type or geographic location.

- **Centralization:** One site to manage existing and projected spent nuclear fuel until ultimate disposition. The naval sites would handle only naval spent nuclear fuel. The DOE site would handle only DOE spent nuclear fuel.
- **Examine or Store Spent Nuclear Fuel in Foreign Facilities:** The storage of spent nuclear fuel on foreign soil.
- **Leave Naval Spent Nuclear Fuel in Nuclear Powered Ships:** Vessels would not be refueled, and would be moored in place at end of core life.

The DOE selected the Regionalization by Nuclear Fuel Type national alternative, as it better supported the ultimate disposition of spent nuclear fuel. For this alternative, aluminum clad spent nuclear fuel is to be consolidated at the Savannah River Site, non-aluminum spent nuclear fuel is to be consolidated at the INEEL, and defense production spent nuclear fuel is to be retained at Hanford.

Once the national alternative for spent nuclear fuel was selected, the DOE sites were evaluated to determine how each would support the national alternative. Support alternatives for the DOE INEEL were identified and evaluated, including:

- **No Action:** Complete near-term actions and continue to operate most of the existing facilities.
- **10-Year Plan:** Complete identified actions and initiate new projects that would enhance cleanup and management of laboratory wastes and spent nuclear fuel.
- **Minimum Treatment, Storage, and Disposal:** Conduct minimum cleanup and decontamination and decommissioning activities prescribed by regulation, and transfer spent nuclear fuel and environmental restoration activity waste to another site.
- **Maximum Treatment, Storage, and Disposal:** Maximize the treatment, storage, and disposal functions at INEEL to accommodate wastes and spent nuclear fuel from the DOE complex.

The preferred alternative selected for the INEEL was the 10-Year Plan, which includes the dry fuel storage project. In selecting this alternative, the DOE considered environmental impacts. Because the alternatives were determined to have small environmental impacts, they were then assessed with additional decision criteria such as regulatory compliance, DOE programmatic missions, public comments, and impacts to air, water, land use, and transportation.

To implement the selected alternative, DOE awarded FWENC a contract to design, license, construct, and operate a dry fuel storage facility for the Peach Bottom and Shippingport spent nuclear fuel, and a portion of the TRIGA spent nuclear fuel currently stored at the INEEL. FWENC chose a completely enclosed storage facility using relatively small diameter storage canisters. Canisters of this size can be placed in a seismically stable storage vault, and can be shipped by either truck or rail when a geologic repository becomes operational.

9.4 SUMMARY

DOE planning, lawsuits by the State of Idaho, and the Settlement Agreement required an expedited resolution for spent nuclear fuel storage at the INEEL. This resolution process included DOE evaluation of long-term spent nuclear fuel storage alternatives and DOE publishing a ROD regarding the alternatives for storage of spent nuclear fuel (Ref. 9-1).

The selected alternatives addressed the national DOE and INEEL-specific issues and environmental concerns. The DOE evaluated these alternatives and found them to have minimal environmental impact. The design being implemented by FWENC complies with both the DOE selected alternative and the agreement between DOE and the State of Idaho.

9.5 REFERENCES

9-1. DOE Record of Decision 1995, *Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs,* Federal Register Volume 60, Number 105, June 1, p. 28680.

THIS PAGE INTENTIONALLY LEFT BLANK.

10.0 FACILITY DESIGN ALTERNATIVES

This chapter describes design alternatives considered for the dry storage of spent nuclear fuel at the ISF Facility.

10.1 PURPOSE

The ISF Facility will receive, repackage, and store non-defense related spent nuclear fuel from the Peach Bottom, Shippingport, and TRIGA reactors. The facility design alternatives considered for the storage of this spent nuclear fuel are described below.

10.2 DESIGN ALTERNATIVES

The selected DOE alternative, dry fuel storage, was based on the *DOE Programmatic Spent Nuclear Fuel Management and INEEL Environmental Restoration and Waste Management Programs Final Impact Statement* that evaluated several alternatives (Ref. 1-1). The selection of the dry fuel storage alternative was announced in the Federal Register as a ROD on June 1, 1995 (Ref. 9-1). This ROD also formed the bases for settlement of a lawsuit between the United States government and the State of Idaho (Ref. 1-3).

In compliance with the ROD and the Settlement Agreement, DOE requested proposals from the private sector to design, license, construct, and operate a spent nuclear fuel dry storage facility. One of DOE's contract requirements (Ref. 3-2) was that the dry storage of the spent nuclear fuel must be licensed by the NRC in accordance with 10 CFR Part 72 for a site-specific application (Ref. 1-5).

In addition to providing site-specific characteristics, DOE also specified operational performance characteristics and specific design criteria, including: year-round operation, storage canisters that could be transported by truck or rail, personnel exposures ALARA, and minimization of decommissioning activities (Ref. 3-2). Spent nuclear fuel canister dimensions were specified in an effort to meet the anticipated acceptance criteria of a geologic repository.

During the design selection process, DOE evaluated the design approach of three vendors, and based selection on evaluation of submitted proposals through a competitive bid process. Relevant evaluation factors included facility design, cost, and value to the government. The evaluation factors were weighted and on May 19, 2000, the DOE selected FWENC to design, license, construct, and operate an ISFSI. The bases for their selection are contained in a report to Congress (Ref. 10-1).

10.3 FWENC-SELECTED ALTERNATIVE

The selected design was based primarily on satisfying the following requirements:

- DOE-specified storage canister dimensions (to meet anticipated acceptance criteria at a geologic repository)
- facility must be licensed by NRC in accordance with 10 CFR 72 (Ref. 1-5)
- year-round operations (must accommodate wide variations in Idaho weather)
- spent nuclear fuel canister to be transportable by truck or rail

Because the storage canister dimensions were specified as a condition of the contract, design alternatives focused on meeting the licensing requirements of 10 CFR 72 (Ref. 1-5), permit year-round operations, and allow shipment of the spent nuclear fuel canisters by either truck or rail.

To meet 10 CFR 72 licensing requirements for a redundant sealing of confinement systems, FWENC's design approach specified a redundant confinement barrier without reliance on fuel cladding. The primary confinement barrier would be the canister, which would be placed in a sealed metal storage tube. This design approach was considered conservative, providing equivalent or better confinement of the spent nuclear fuel than provided by the original fuel cladding.

The next design option to be decided was the method for providing shielding and passive cooling for the spent nuclear fuel. Based on current dry spent nuclear fuel storage technology, two design options are available: individual storage casks, or a vault design.

Individual concrete storage casks are widely used in the commercial nuclear power industry. Concrete casks provide shielding and natural convection air-cooling. Typically, this design provides for storage of multiple spent nuclear fuel assemblies in a metal storage canister about 5 to 6 feet in diameter. Because of shielding requirements, the concrete cask is typically 11 to 12 feet in diameter. Because of the size and weight of the concrete casks, they are typically stored outdoors on a concrete basemat where natural convection transfers heat to the atmosphere. This design approach presented challenges with placement on storage pads and with transportation from the INEEL to a geologic repository.

Vault storage was also considered. The vault design was readily adaptable to storage of the DOE-specified canisters. Individual storage tubes in each storage location could provide double confinement of the spent nuclear fuel. The individual storage of the DOE-specified canisters allowed flexibility for eventual transport to a geologic repository. The relatively small diameters of the DOE-specified canisters (18-inch and 24-inch) allow transport by truck or rail without special permitting for size and weight. The storage vault design also allows year-round access for loading or retrieval of the spent nuclear fuel canisters. Other factors favoring the vault design were low radiation exposure to workers and good seismic stability. The vault design was selected as best meeting the design requirements for storage of the spent nuclear fuel. The vault design is similar to that of the ISFSI at Fort St. Vrain.

Besides storing the spent nuclear fuel, the ISF Facility must receive, transfer, and repackage it. The design of the Receipt and Fuel Packaging Areas is driven by several factors. DOE-specified facility design requirements included the capability to:

- operate year-round
- receive and handle specific transportation casks
- receive, handle, and package specific fuel types
- maintain personnel exposure ALARA
- be licensed by NRC in accordance with 10 CFR 72 (Ref. 1-5)

In addition to DOE-specified criteria, FWENC established design goals that included:

- minimizing the probability and consequences of operational events and design basis accidents
- avoiding new or unproven technologies
- providing for ease of facility decommissioning
- providing for ease of export of storage canisters to a geologic repository
- preventing the spread of radiological contamination from fuel handling operations
- avoiding the use of active safety systems
- maintaining loaded canisters in controlled atmosphere during transfer to Storage Area

To meet DOE design requirements and FWENC design goals, an integrated, enclosed facility design was selected. This design allows spent nuclear fuel to be received in an enclosed Cask Receipt Area where the transfer cask is off-loaded onto a rail-mounted cask trolley. The cask trolley with receipt cask moves through a Transfer Tunnel to the Fuel Packaging Area, where the transfer cask lid is removed and the spent nuclear fuel is remotely extracted and placed in storage canisters. The Fuel Packaging Area provides for shielding and confinement of the spent nuclear fuel, thus protecting workers and the public from potential release of radioactive material. The Fuel Packaging Area contains a ventilation system with HEPA filter. Ventilation exhaust is continuously monitored to ensure that radioactive material is not released. Once the spent nuclear fuel is sealed in an ISF canister, the canister is remotely transferred and placed in a storage tube/location in the Storage Area vault. The spent nuclear fuel will remain in storage until shipment to an offsite storage facility or to a geologic repository when it becomes available. Figure 3-2 illustrates the overall ISF Facility; Figure 3-3 illustrates the Storage Area.

10.4 SUMMARY

The alternatives for storage of non-defense related spent nuclear fuel from the Peach Bottom, Shippingport, and TRIGA reactors were previously evaluated. The results of that evaluation are in *DOE Programmatic Spent Nuclear Fuel Management and INEEL Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (Ref. 1-1). Based on the results of this evaluation, dry fuel storage was the selected design alternative, as it allows a progression towards preparing the spent nuclear fuel for the geologic repository.

Through a government procurement based on a competitive bid process, FWENC was awarded the contract to design, license, construct, and operate the dry fuel storage facility. The FWENC design for the ISF Facility is consistent with DOE evaluations and complies with DOE design criteria. The ISF Facility design is an integrated facility providing an enclosure for year-round receipt, transfer, packaging, and storage of the spent nuclear fuel. The design uses a modular vault storage design, which will be designed, licensed, constructed, and operated in accordance with the requirements of 10 CFR 72 (Ref. 1-5).

10.5 REFERENCES

10-1. Department of Energy Idaho Operations Office, *Spent Nuclear Fuel Dry Storage Project*, DOE-ID-10717.

THIS PAGE INTENTIONALLY LEFT BLANK.

11.0 SUMMARY COST-BENEFIT ANALYSIS

The following cost-benefit analysis was completed to provide input for preparation of the NRC cost-benefit analysis for the ISF Facility. This assessment does not examine the monetary aspect of the facility in quantitative terms, but rather, it summarizes the information to be applied in weighing the benefit of the facility against the irreversible and irretrievable commitment of resources to make it possible.

11.1 BENEFITS OF THE ISF FACILITY

In 1996, the DOE and the State of Idaho agreed to fulfill the actions of the Idaho Settlement Agreement (Ref. 1-3), which established specific activities required to remove spent nuclear fuel from Idaho by 2035. Construction and operation of the ISF Facility supports this effort. It is addressed in concept in the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Program Final Environmental Impact Statement* (Ref. 1-1). This section discusses this and other social, economical, and environmental benefits.

11.1.1 Purpose of the Proposed Facility

The ISF Facility will be used to receive spent nuclear fuel, remotely package and seal it into new canisters, and store the sealed canisters in storage tubes until the canisters of spent nuclear fuel are transferred out of Idaho to a geologic repository. This action is required to continue to meet the INEEL mission and comply with negotiated agreements and commitments (Ref. 1-3).

Currently, most of the spent nuclear fuel to be received by the ISF Facility is stored at the INTEC. Although this storage configuration has worked well, it does not prepare the spent nuclear fuel for shipment from INEEL to a geologic repository. The ISF Facility provides the ability to remotely remove the spent nuclear fuel from existing canisters, place it in specially designed metal canisters, then seal and place the loaded canisters in interim storage. The new canisters are designed to be compatible with transportation systems and with the eventual permanent storage systems. Therefore, once the spent nuclear fuel is placed in the canisters, it need not be repackaged for shipment to or disposal at a geologic repository.

The ISF Facility uses a passive heat removal system that circulates air around the sealed canister. The small amount of heat generated is dissipated to the surrounding air. This feature provides a safe and reliable environment for storage of the 10 CFR Part 72 licensed spent nuclear fuel canisters.

11.1.2 Economic and Social Effects of Facility Construction and Operation

Materials required for construction and operation of the ISF Facility will be similar to those for an industrial construction project. The regional economy has seen many fluctuations over the history of the INEEL. Construction and operation of the ISF Facility will have a minor positive effect on the regional economy, but will not result in a regional growth spurt. Benefits include using regional workers for construction and increased sales for regional suppliers for the duration of construction. However, the regional infrastructure of public services and transportation systems will not be adversely affected.

The ISF Facility is a step in the complex process of preparing the spent nuclear fuel for removal from Idaho. After the spent nuclear fuel is placed in dry storage, it will be in a more stable environment, independent of support systems needed to maintain the spent nuclear fuel storage. The more stable storage environment ensures that the spent nuclear fuel will not affect the environment and the general public.

11.2 COSTS

This section examines the environmental, economic, and social impacts of ISF Facility construction and operation, based on reviewing the qualitative effects on the environment, internal costs, and external costs attributable to the facility.

11.2.1 Environmental Effects of Site Preparation, Facility Construction, and Transmission Facilities Construction

ISF Facility construction will result in physical changes to the 8-acre tract where it will be constructed and a contiguous 10-acre construction laydown tract (see Section 4). Because the 8-acre ISF Facility site and the 10-acre laydown area are small compared to the 890-square-mile INEEL, the physical changes are minor. These changes will restrict land use and will have a small impact during construction of the ISF Facility. The restriction of land use does not affect the value of the land, as the property is classified as least productive. The minor physical impacts from construction, such as generation of dust, risk of fire, and control of construction wastes, can be mitigated.

11.2.2 Environmental Effects of Facility Operation

A passive heat removal system will dissipate heat from the ISF Facility. The heat discharges to the air surrounding the facility, and does not interface with surface or subsurface hydrology.

The ISF Facility's potential pathways of radiation exposure include direct radiation from the Receipt, Transfer, and Storage Areas; immersion in or inhalation of stack effluent; radionuclides deposited on the ground surface and flora; and internal exposure from ingestion of drinking water, fish, game, and plants.

Direct radiation from the Receipt, Transfer, and Storage Areas is possible for an individual near these areas. Shielding will minimize direct radiation, ensuring that radiation levels are below Federal limits to the public, and that those radiation levels are ALARA, even though the public cannot access the area around the ISF Facility site.

Atmospheric transport is the most likely of the potential pathways by which radioactive material from the ISF Facility can be transported offsite. The highest dose to the maximally exposed individual was determined to be at Frenchman's Cabin, at the southern boundary of the INEEL, where a hypothetical dose of approximately 3.0×10^{-5} mrem/year was calculated. This dose is 0.0003 percent of the EPA 40 CFR 61, Subpart H, protection standard of 10 mrem (Ref. 6-10).

Within the ISF Facility site, the areas where loose surface contamination can exist are maintained at a negative pressure, so that air flows into these areas. Exhaust airflow from the buildings is routed through HEPA filters and exhausted through the exhaust stack. Therefore, the design of the ISF Facility ventilation system ensures that radioactive particulate is not exhausted, eliminating the potential of radiation exposure to a person immersed in stack exhaust.

There are three possible sources for an ingestion pathway: (1) game animals, (2) aquatic life, and (3) plants. For this pathway to exist, radioactive materials from the ISF Facility would need to be transported to areas where plants and animal live or migrate. The design of the ISF Facility ventilation system ensures that radioactive particulate is filtered before being exhausted; therefore, the ISF Facility will not contribute significantly to the transport of radioactive material to flora and fauna.

11.2.3 Economic and Social Effects of Facility Construction and Operation

The ISF will be constructed on 8 acres of the INEEL, an 890-square-mile Federal reserve under the jurisdiction of the DOE-ID. Therefore, there will be no costs associated with the purchase of land.

Construction materials 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, spent nuclear fuel canisters, trolley, and crane, materials are available regionally.

ISF Facility operation is likely to have minimal effect on the regional economy. Transfer of spent nuclear fuel into new canisters and placement in the vault will require consumable materials such as filters, welding supplies, and other housekeeping materials. Storage operations will require materials such as HEPA filter media and other housekeeping materials.

Once the spent nuclear fuel is transferred from the ISF Facility to a geologic repository, the ISF Facility will be decommissioned. A small portion of the materials used in construction will not be available for release, and will require disposal at a radioactive waste site. The rest will be available to be recycled. Therefore, most of the ISF Facility construction materials will be available for reuse or recycling.

Because the ISF Facility is to be on the INEEL, approximately 11 miles from the nearest community (Atomic City), there will be minimal impact on regional communities. Because of the distances of communities from the construction site, noise and other construction disturbances will not affect them.

Construction and operation will utilize regional labor resources; therefore, there will not be an influx of workers, nor will housing availability or costs, transportation, or community infrastructures be affected.

Because the ISF Facility site is within the INEEL, public access is limited to the highways (US 20/26), which pass through the INEEL boundaries. The ISF Facility will not restrict public access to these rights of way, nor will the ISF Facility restrict access to archeological, cultural, or recreational sites.

11.3 CONCLUSION

The cost-benefit analysis presented in this chapter concluded that aggregate benefits of construction and operation of the ISF Facility outweigh the aggregate costs. Benefit information was summarized and weighed against the irreversible and irretrievable commitment of resources needed to make it possible. The analysis concluded that placing the spent nuclear fuel in dry cask storage at the ISF Facility, and ultimately transferring this spent nuclear fuel from Idaho is in the best interest of both the human population and the environment.

THIS PAGE INTENTIONALLY LEFT BLANK.

12.0 ENVIRONMENTAL APPROVALS AND CONSULTATION

This chapter provides a listing and status of licenses, permits, and other approvals required for the protection of the environment in connection with construction and operation of the ISF Facility..

12.1 FEDERAL LICENSES AND PERMITS

12.1.1 Clean Air Act

The Clean Air Act (CAA), as amended, Title V (Ref. 2-19) establishes permit requirements and identifies how permits are regulated; 40 CFR Part 70 (Ref. 12-1) authorizes individual states to manage permits under the CAA (Ref. 12-1). Title 40 CFR Part 52 provides approval of the State of Idaho Plan (Ref. 12-2), Idaho Administrative Procedures Act (IDAPA) 58.01.01, Rules for the Control of Air Pollution in Idaho (Ref. 12-3). Compliance with State of Idaho requirements meets CAA requirements.

12.1.2 Clean Water Act

The Clean Water Act (CWA), as amended, Section 402(a) (Ref. 12-4) establishes water quality standards for contaminants in surface waters. The CWA requires a NPDES permit before discharging any pollutant into navigable waters. Although the CWA permits the EPA to delegate permitting, administrative, and enforcement aspects of the law to individual states, the State of Idaho has not been authorized for this delegation of authority. Therefore, provisions of the CWA must be met.

The ISF Facility will not have process discharges. However, rainwater and snow melt from the ISF Facility are classified as stormwater discharge and must be considered by the NPDES permitting process. Stormwater permits fall into two classifications: (1) construction, and (2) industrial activities.

For the construction stormwater permit process, DOE-ID filed for a Construction General Permit in accordance with 40 CFR Part 122 (Ref. 4-3). Under its provisions, FWENC is required to submit a Notice of Intent (EPA Form 3510-9) at least 2 days before the start of ISF Facility construction. A site specific Construction Stormwater Pollution Prevention Plan will be developed, but does not need to be submitted to the EPA. Under 65 FR 64746 (Ref. 12-5), the ISF Facility is exempt from the industrial activities stormwater permit, as it is not included in EPA-identified sectors or subsectors requiring this permitting process.

12.1.3 Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA), as amended, Section 6922 (Ref. 12-6) requires the EPA to establish standards for hazardous waste generators. As permitted by Section 6926, 40 CFR Part 272 approved the Idaho Hazardous Waste Management Program for permitting, administrative, and enforcement aspects of RCRA (Ref. 12-7). Therefore, compliance with State of Idaho requirements will meet RCRA requirements.

12.2 STATE LICENSES AND PERMITS

12.2.1 Rules for the Control of Air Pollution in Idaho

The State of Idaho regulates facilities that are potential pollution emitters through IDAPA 58.01.01. Because the ISF Facility is not a major facility as defined by IDAPA 58.01.01 Part 006.55, and expected radionuclide emissions are less than 1 percent of 10 mrem (unmitigated), it is exempt from the need for a National Emissions Standards for Hazardous Air Pollutants (NESHAP) application[1]. FWENC shall submit a *Permit to Construct Categorical Exemption* request for Idaho DEQ approval before construction (Ref. 12-3).

12.2.2 Idaho Hazardous Waste Management Program

The Idaho Rules and Standards for Hazardous Waste for the Idaho Hazardous Waste Management Program, IDAPA 58.01.05, incorporates by reference the EPA RCRA requirements (Ref. 12-8). Specifically, 40 CFR Part 270.1(c)(2)(iii) excludes small quantity generators (less than 100 kilograms of hazardous waste per month) from the need for a RCRA permit (Ref. 12-9). FWENC is considered a conditionally exempt, small-quantity generator of hazardous waste at the ISF Facility, and thus exempt from the RCRA permit process.

12.3 CONSULTATIONS

12.3.1 Historical and Cultural Consultation

During preparation of this Environmental Report, the INEEL Cultural Resource Management Office was consulted for information on the historic, scenic, archeological, architectural, and cultural aspects of the ISF Facility site area. Results of this investigation are in a report prepared by that office (Appendix B).

12.3.2 Ecological Consultation

The S.M. Stoller Corporation was consulted for an assessment of the ecological resources in the ISF Facility area and the impact on them from facility construction and operation. The results of this assessment are contained in a report (Appendix A).

12.3.3 Idaho Department of Environmental Quality

Several informal discussions and one formal presentation (August 15, 2001) have been provided to staff in the Idaho DEQ Idaho Falls Regional Office, which is responsible for the geographic area that includes the INEEL. In the State of Idaho, the Regional Administrator is responsible for approving air *Permit to Construct*, including categorical exemption requests. Discussions have included notification of FWENC's intent to submit a *Permit to Construct Categorical Exemption* request 1 year before start of construction.

---

1 IDAPA 58.01.01 establishes a state categorical exclusion from requiring an EPA NESHAP application if the radionuclide emissions are less than 1 percent of the site boundary dose limit.

12.3.4 Idaho Department of Environmental Quality INEEL Oversight Committee

A formal presentation was made to the Idaho DEQ INEEL Oversight Committee on August 15, 2001. This committee is made up of health physicists, nuclear analysts, hydrologists, environmental scientists, and others who provide independent oversight for INEEL activities related to the Idaho DEQ.

12.4 REFERENCES

12-1. Title 40, Code of Federal Regulations, Part 70, *State Operating Permit Programs.*

12-2. Title 40, Code of Federal Regulations, Part 52, *Approval and Promulgation of Implementation Plans.*

12-3. Idaho Administrative Procedures Act 58.01.01, *Rules for the Control of Air Pollution in Idaho,* Idaho Department of Environmental Quality, Boise, Idaho.

12-4. United States Congress Regulation, 33 USC s/s 1251, et seq. (1972), *Clean Water Act.*

12-5. 65 FR 64746, *Final Reissuance of National Pollutant Discharge Elimination Systems (NPDES) Storm Water Multi-Sector General Permit for Industrial Activities,* October 2000.

12-6. United States Congress Regulation, 42 USC s/s 6901, et seq. (1972), *Resource Conservation and Recovery Act.*

12-7. Title 40, Code of Federal Regulations, Part 272, *Approved State Hazardous Waste Management Programs.*

12-8. Idaho Administrative Procedures Act 58.01.05, *Rules and Standards for Hazardous Waste,* Idaho Department of Environmental Quality, Boise, Idaho.

12-9. Title 40, Code of Federal Regulations, Part 270, *EPA Administered Permit Programs: The Hazardous Waste Permit.*

THIS PAGE INTENTIONALLY LEFT BLANK.

Table 2-1
Listed Threatened and Endangered Species and Species of Concern

Scientific Name	Common Name	Federal Status	Idaho Status
ANIMALS			
Canis lupus	Gray wolf	Listed Threatened, Experimental/ Nonessential	N/A
Haliaeetus leucocephalus	Bald eagle	Listed Threatened	Listed Threatened
Buteo regalis	Ferruginous hawk	Watch	Priority
Centrocercus urohasianus	Sage grouse	Species of Concern	N/A
Athene cunicularia hypugaea	Western burrowing owl	N/A	Priority
Numenius americanus	Long-billed curlew	Species of Concern	Priority
Sorex merriami	Merriam's shrew	Species of Concern	Unprotected Nongame
Myotis evotis	Long-eared myotis	Watch	Unprotected Nongame
Myotis ciliolabrum	Western small-footed myotis	Watch	Unprotected Nongame
Corynorhinus townsendii	Townsend's big-eared bat	Species of Concern	Species of Special Concern
Brachylagus idahoensis	Pygmy rabbit	Watch	Game/ Species of Special Concern
Sceloporus graciosus graciosus	Northern sagebrush lizard	Species of Concern	N/A
PLANTS			
Spiranthes divuvialis	Ute lady's tresses	Listed threatened	N/A
Botrychium lineare	Slender moonwort	Species of Concern	N/A
Astrychium ceramicus var. apus	Painted milk vetch	Species of Concern	N/A
Artragalus aquilonius	Lemhi milk vetch	N/A	Global Priority 3
Camissonia pterosperma	Winged-seed evening primrose	N/A	Sensitive
Ipomopsis polycladon	Spreading gilia	N/A	Priority

Table developed from Appendix A, Ecological Resources of the Idaho National Engineering and Environmental Laboratory and Potential Effects of the Independent Spent Fuel Facility (Appendix A).

Table 2-2
Production Wells on the INEEL

Well Name[1]	Depth of Well (ft bls)[2]	Depth to Water (ft bls)[2]	Annual Volume (gal)
ANP-01	360	208	2.561E+06
ANP-02	340	211	1.433E+06
ANP-08	309	218	3.908E+05
BADGING FACILITY WELL	644	489	5.76E+04
CFA-1	639	468	1.473E+07
CFA-2	681	471	1.448E+05
CPP-01	586	460	1.834E+08[3]
CPP-02	605	460	1.834E+08[3]
CPP-04	700	462	1.834E+08[3]
CPP-05	695	447	1.834E+08[3]
EBR-1	1075	596	4.491E+04
EBR II-1	745	632	2.767E+06[4]
EBR II-2	753	630	2.767E+06[4]
FET-1	330	199	1.427E+06
FET-2	455	200	5.067E+05
FIRE STATION WELL	516	420	1.057E+04
NRF-1	535	363	2.594E+06
NRF-2	529	362	9.368E+06
NRF-3	546	363	9.802E+04
NRF-4	597	363	1.649E+07
RIFLE RANGE WELL	620	508	9.115E+04
RWMC PRODUCTION	685	568	4.824E+05
SPERT-1	653	456	3.871E+05
SPERT-2	1217	463	3.450E+05
TRA-01	600	453	3.595E+07
TRA-03	602	456	2.074E+06
TRA-04	965	463	9.006E+07

(1) All wells withdraw water from the main body of the Snake River Plain Aquifer and are used as drinking water wells, with the exception of wells ANP-08, Fire Station Well, and NRF-4, which are production wells for facility operations.

(2) Feet below land surface.

(3) Annual volume data is the total for wells CPP-1, CPP-2, CPP-4, and CPP-5.

(4) Annual volume data is the total for wells EBR II-1 and EBR II-2.

Table 2-3
Plants Used by Shoshone-Bannock within the INEEL Boundary

Plant Family	Type of Use	Location	Abundance
Balsamroot	Food, medicine	Around buttes	Common, but scattered
Beggar's ticks	Food	Throughout	Common, abundant
Bluegrass	Food, medicine	Throughout	Common, abundant
Cactus	Food	Throughout	Common, abundant
Calochortus spp.	Food	Buttes	Common
Cattail	Food	Sinks	Uncommon
Chokecherry	Food, fuel, medicine, tools	Buttes	Common where found
Coyote tobacco	Medicine, smoking	Big Lost River, Webb Springs	Uncommon
Dandelion	Food, medicine	Throughout	Common
Desert parsley	Food, medicine	Scattered	Common
Dogwood	Food, medicine, tools	Birch Creek, Webb Springs	Common where found
Douglas fir	Medicine	Big Southern Butte	Common
Fireweed	Food	Throughout	Common
Gooseberry	Food	Scattered throughout	Common
Goosefoot	Food	Throughout	Common, abundant
Gumweed	Medicine	Disturbed areas	Common
Honeysuckle	Food, tools	Big Southern Butte	Common on butte
Indian ricegrass	Food	Throughout	Common, abundant
Juniper	Food, medicine, tools	Throughout	Common to abundant
Mentha arvensis	Medicine	Big Lost River	Uncommon
Milkweed	Food, tools	Roadsides	Scattered, uncommon
Pine	Food, medicine, tools	Big Southern Butte	Common on butte
Plantain	Food, medicine	Throughout	Uncommon
Red raspberry	Food, medicine	Big Southern Butte	Uncommon
Russian thistle	Food	Distributed areas throughout	Common, abundant
Sagebrush	Medicine, tools	Throughout	Common, abundant
Serviceberry	Medicine, tools	Buttes	Common where found
Sunflower	Food, medicine	Roadside	Common
Tansy mustard	Food, medicine	Disturbed areas	Common
Thistle	Food	Scattered throughout	Common but scattered
Wild onion	Dye, food, medicine	Throughout	Common
Wild rye	Food, tools	Throughout	Common, abundant
Willow	Medicine	Throughout in moist areas	Common
Woods rose	Food, medicine, ritual, smoking	Big Lost River, Big Southern Butte	Common, abundant

THIS PAGE INTENTIONALLY LEFT BLANK.

Table 3-1
ISF Facility Chemical Use

Chemical[2]	Use at ISF	Nominal Annual Quantity
Propylene glycol	Chilled water anti-freeze	150 gallons[1]
Refrigerant (R-22)	HVAC systems	325 pounds[1]
Sodium nitrite	Chilled water corrosion inhibitor	25 gallons
Herbicides and pesticides[3]	Weed and pest control	Indeterminate
Liquid nitrogen	Laboratory	25 gallons

1 Quantity reflective of system volume, not actual usage.

2 Miscellaneous chemicals generally used in quantities under 25 gallons per year are not listed (e.g., lab chemicals, NDE chemicals, lubricants).

3 Note: Information related to approved herbicides and pesticides in use on the INEEL can be obtained at: http://home.inel.gov/envaffairs/er.html.

THIS PAGE INTENTIONALLY LEFT BLANK.

Table 5-1
Radionuclides that Contribute to the Dose at Frenchman's Cabin

Radionuclide	mrem/year	Percent of Total
^{3}H	1.43×10^{-5}	51.6
^{129}I	7.74×10^{-6}	27.9
^{137m}Ba	2.32×10^{-6}	8.4
^{238}Pu	1.61×10^{-6}	5.8
^{85}Kr	1.53×10^{-6}	5.5
^{241}Am	7.91×10^{-8}	0.3
Others	1.2×10^{-7}	0.5

Note: The sum of dose values is 2.77×10^{-5} mrem/year rounded to 3.0×10^{-5} mrem/year

THIS PAGE INTENTIONALLY LEFT BLANK.

Figure 1-1
Location of the INEEL in Southeastern Idaho

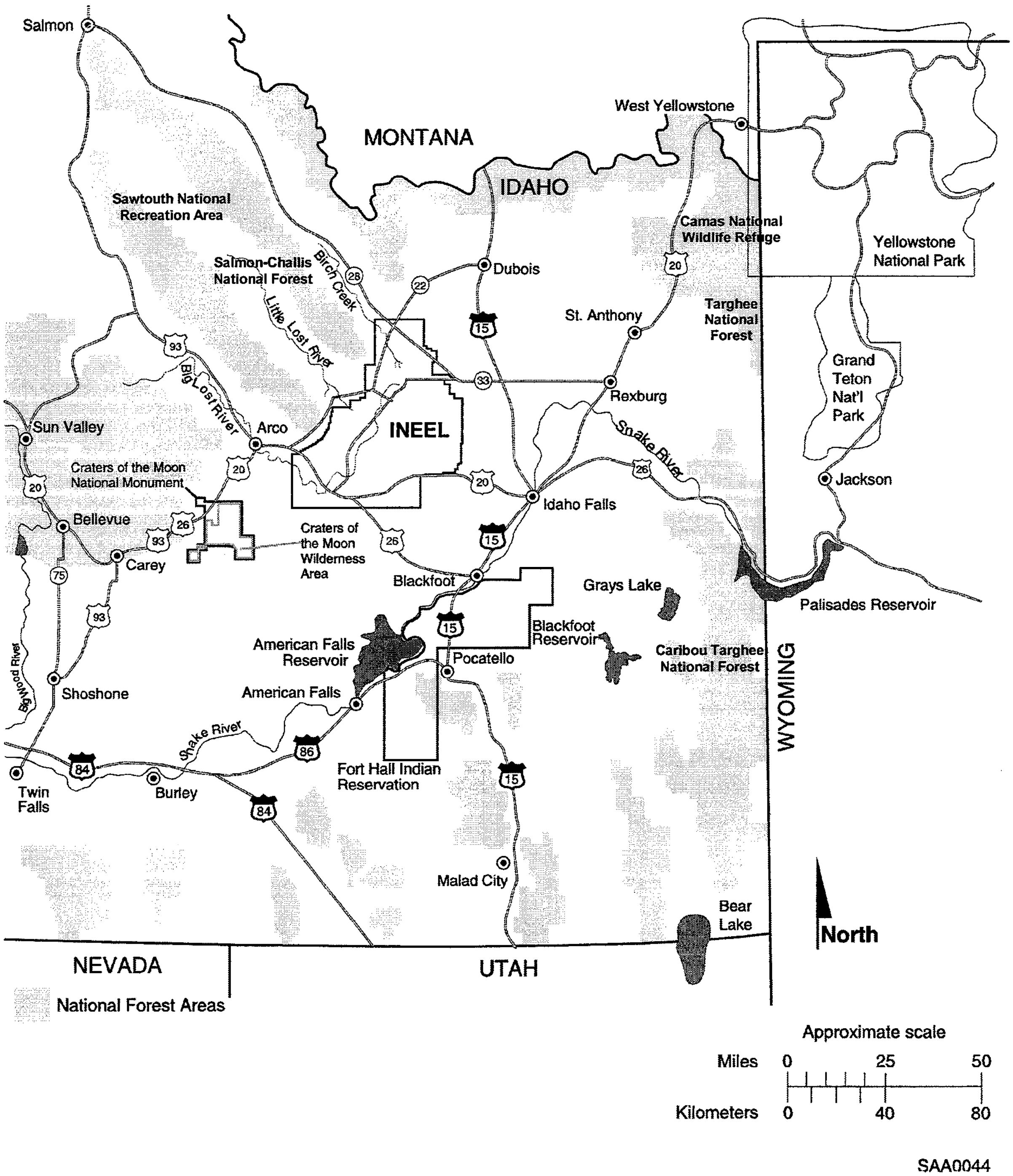


Figure 2-1
Location Map of the INEEL

Figure 2-2
INTEC Area Plot

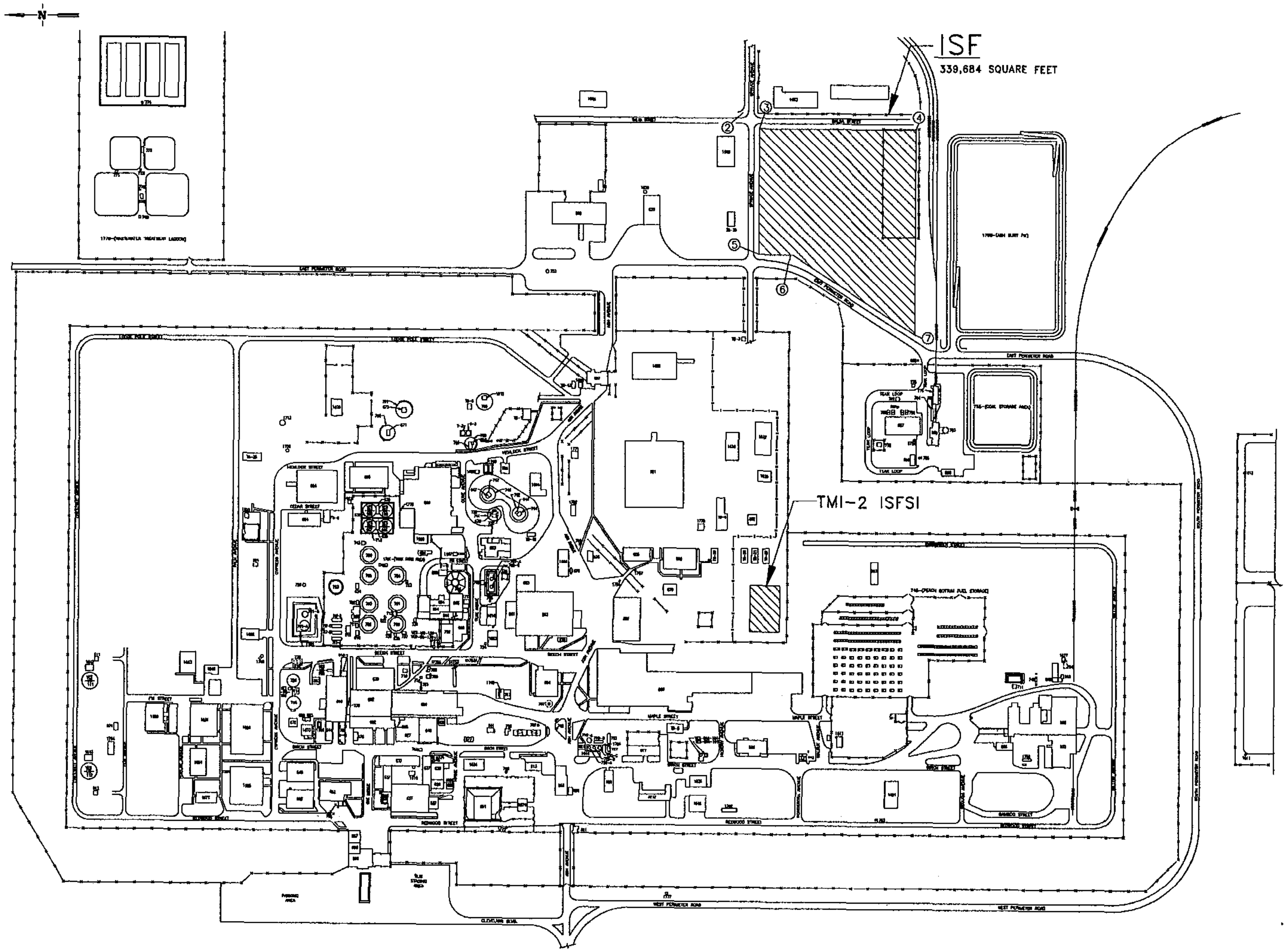


Figure 2-3
Map of INEEL

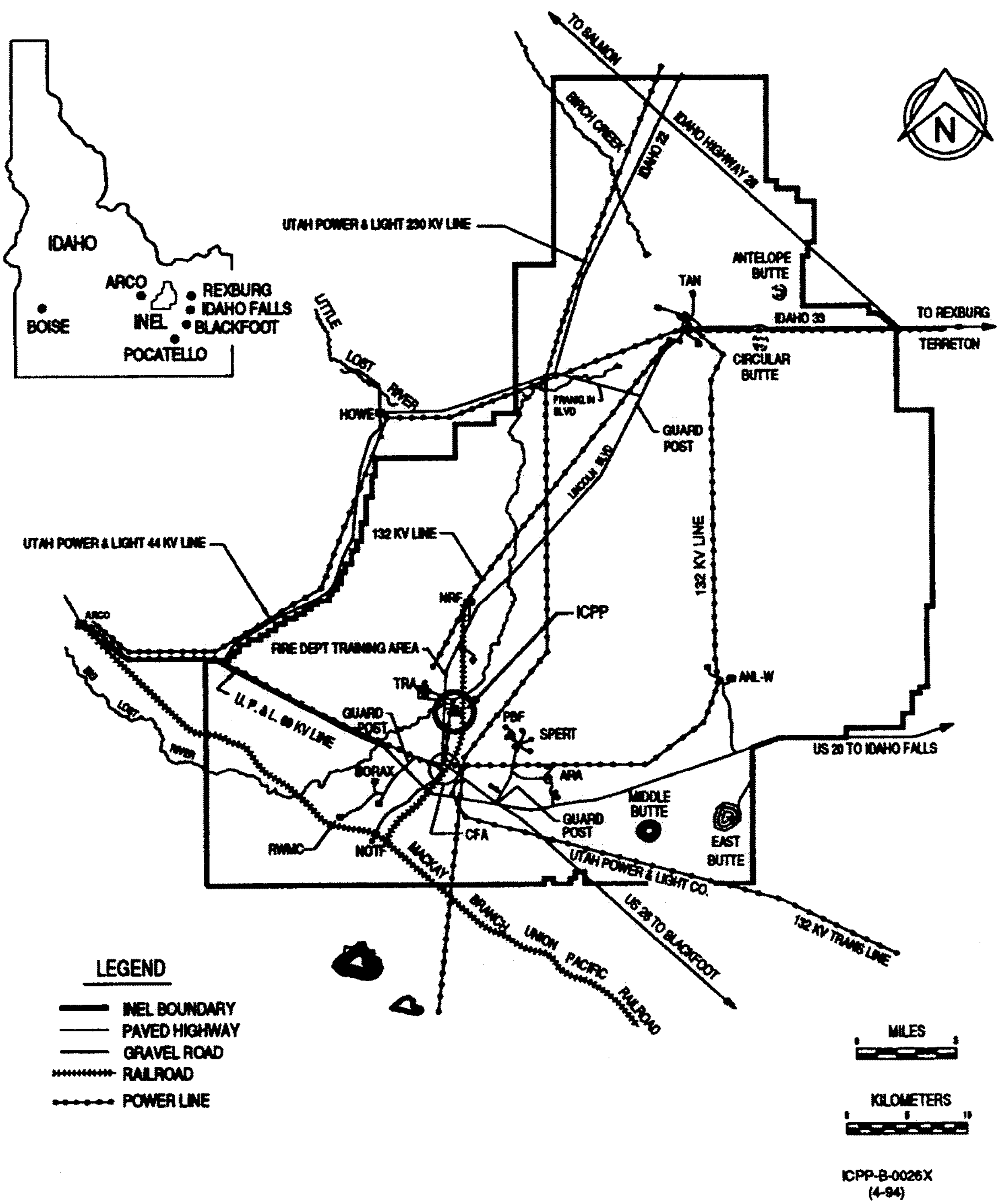
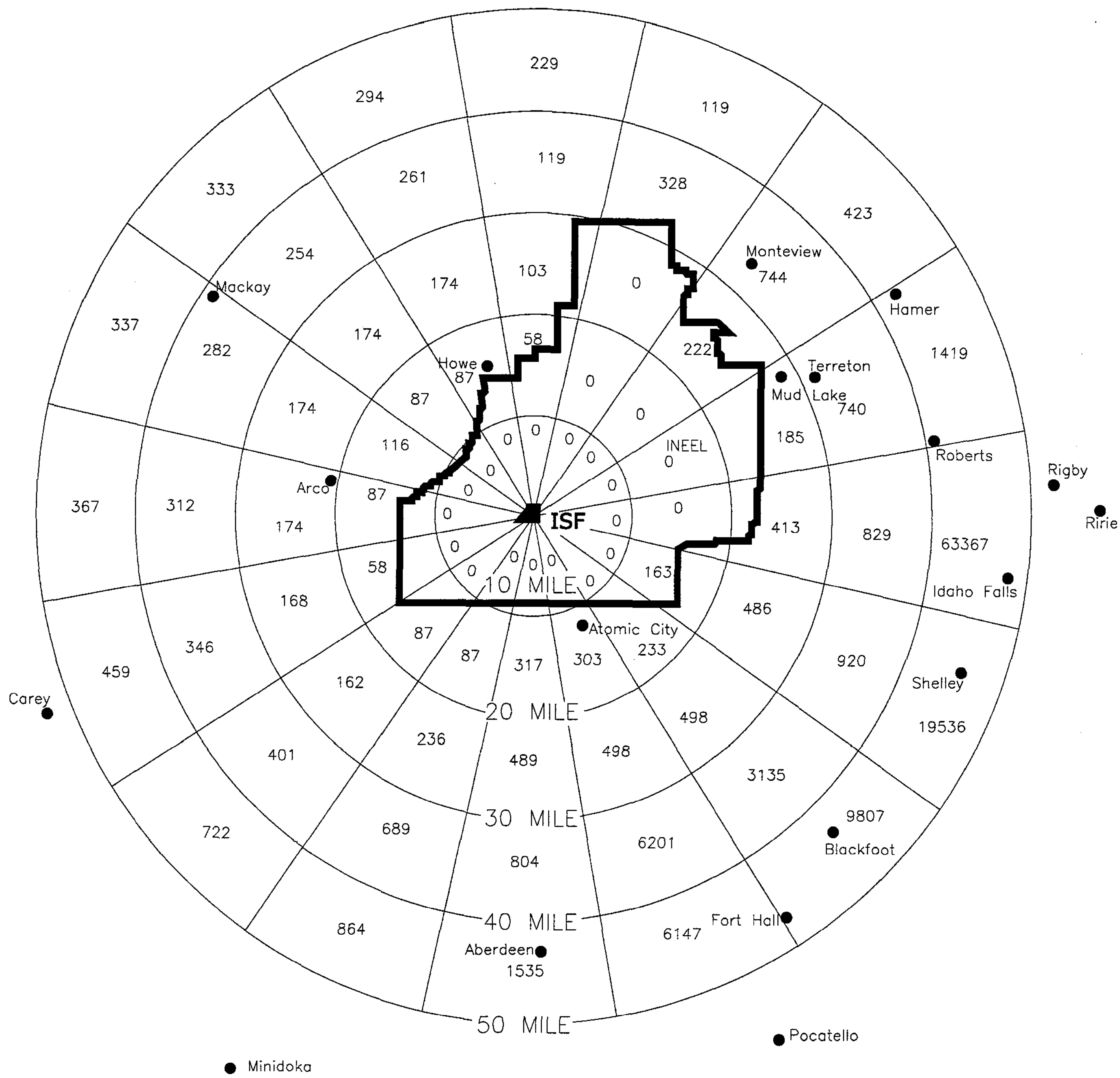


Figure is adapted from the TMI-2 ISFSI SAR (Ref. 1-2) The ICPP is an earlier name for the INTEC, which is adjacent to the ISF Facility site.

Figure 2-4
2000 Census Population Distribution Within 50 Miles of the ISF Facility



TOTAL = 128162

Figure 2-5
Selected Land Uses at the INEEL and Surrounding Region

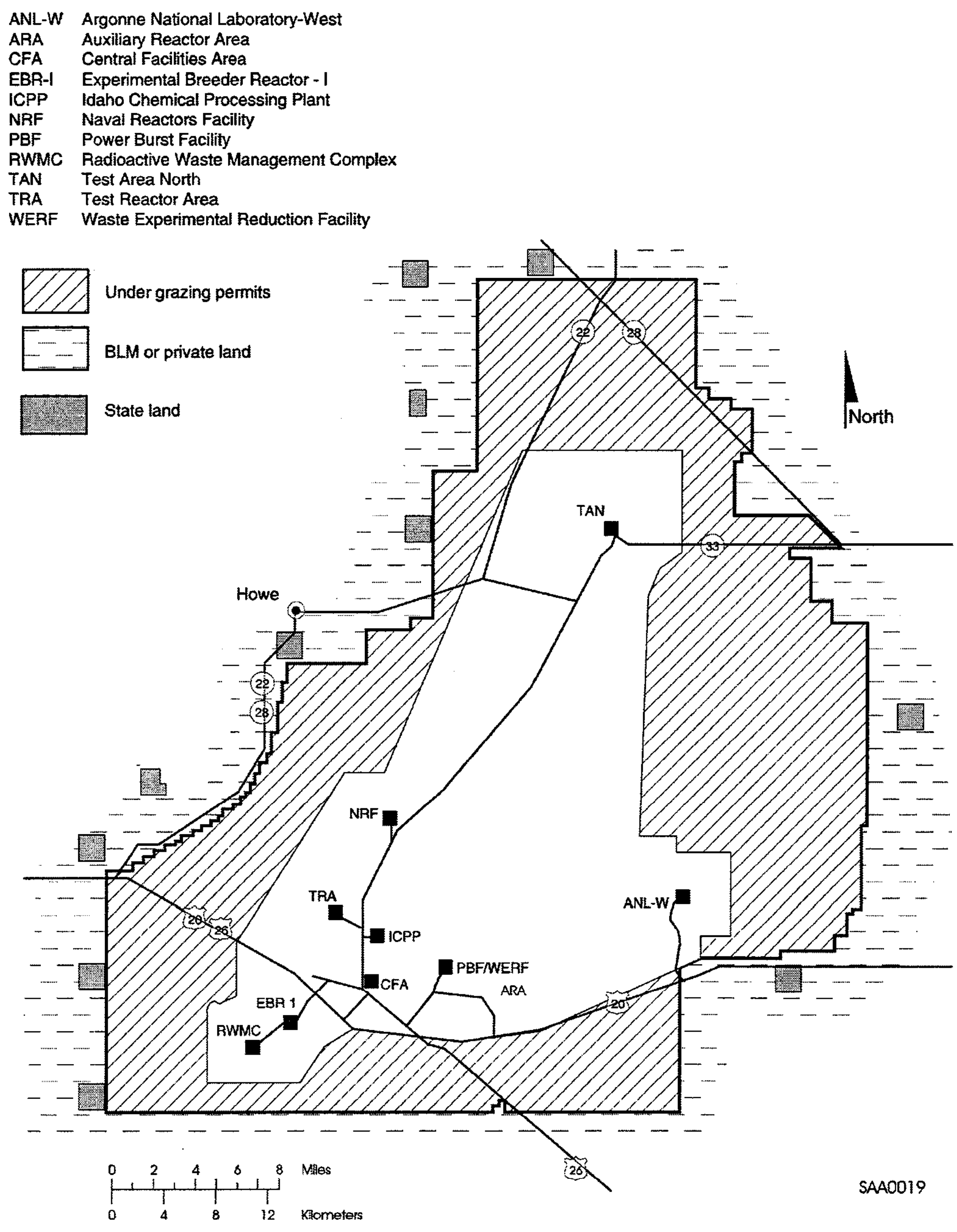
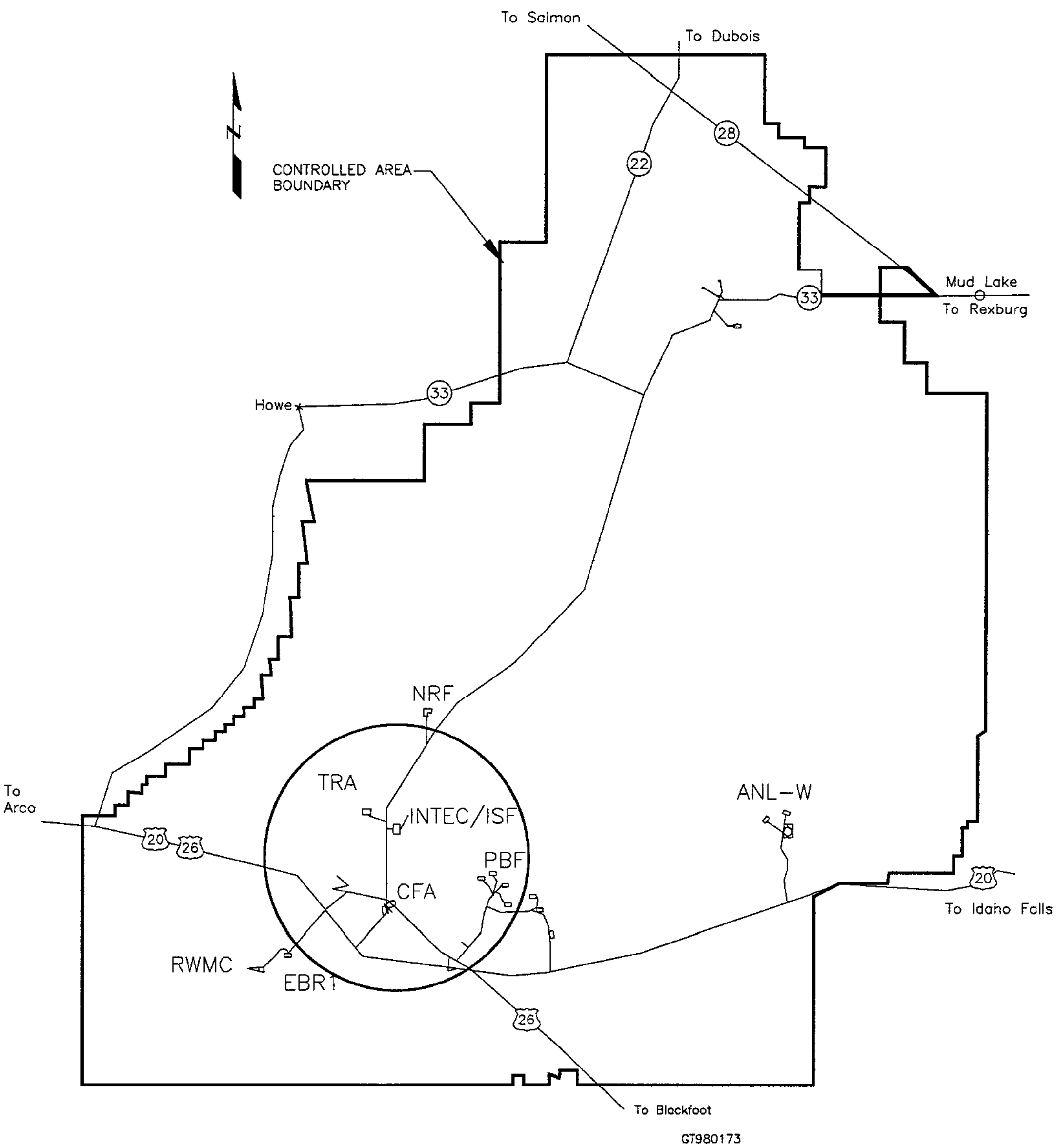


Figure is adapted from the TMI-2 ISFSI SAR (Ref. 1-2) The ICPP is an earlier name for the INTEC, which is adjacent to the ISF Facility site.

Figure 2-6
INEEL Primary Facility Areas
(showing 5-mile radius from INEEL ISF)



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 2-7
Approximate Distribution of Vegetation at the INEEL

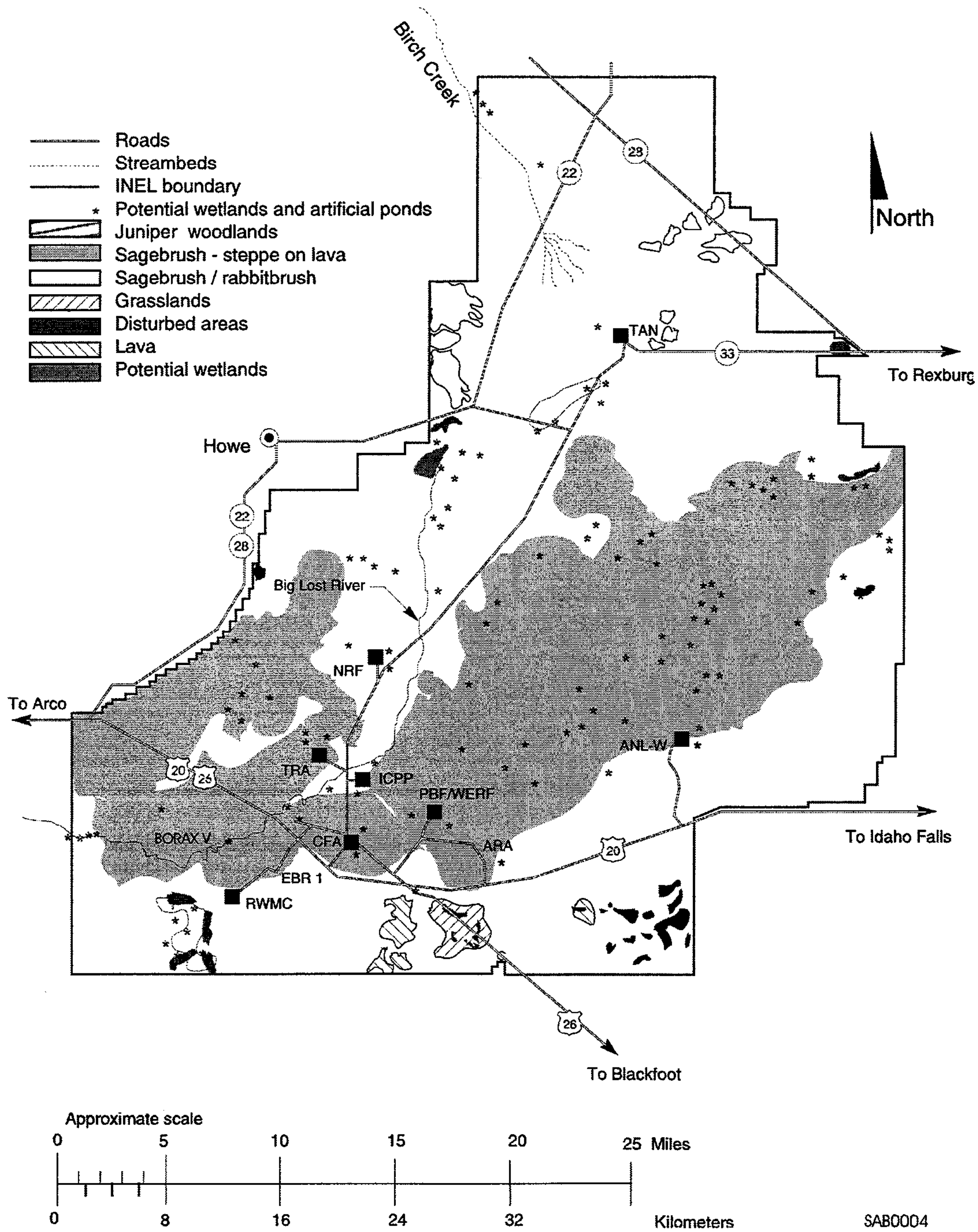


Figure is adapted from the TMI-2 ISFSI SAR (Ref. 1-2) The ICPP is an earlier name for the INTEC, which is adjacent to the ISF Facility site.

Figure 2-8
INEEL Map with Major Drainages

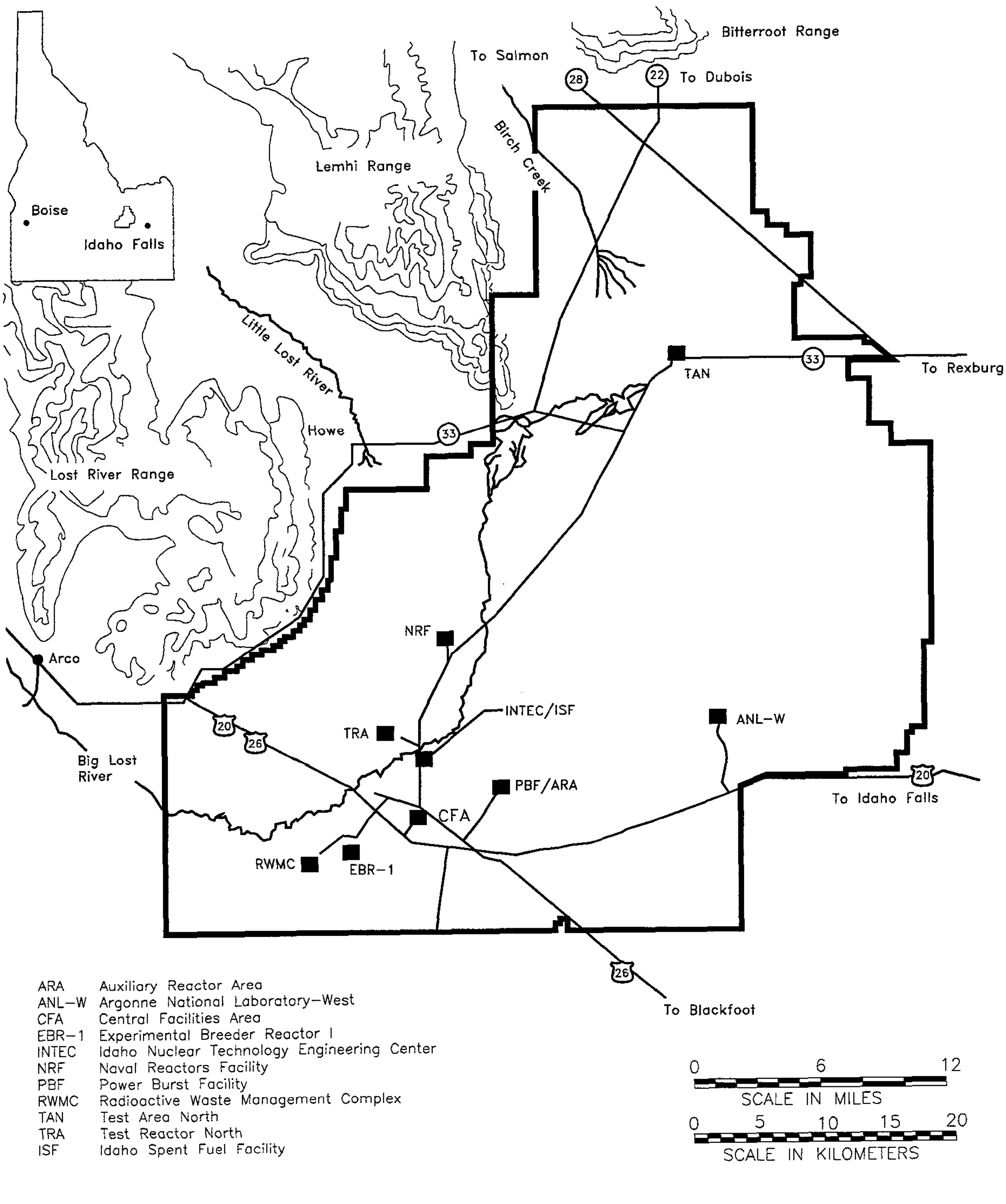


Figure 2-9
Physiographic Province Map of the Western United States

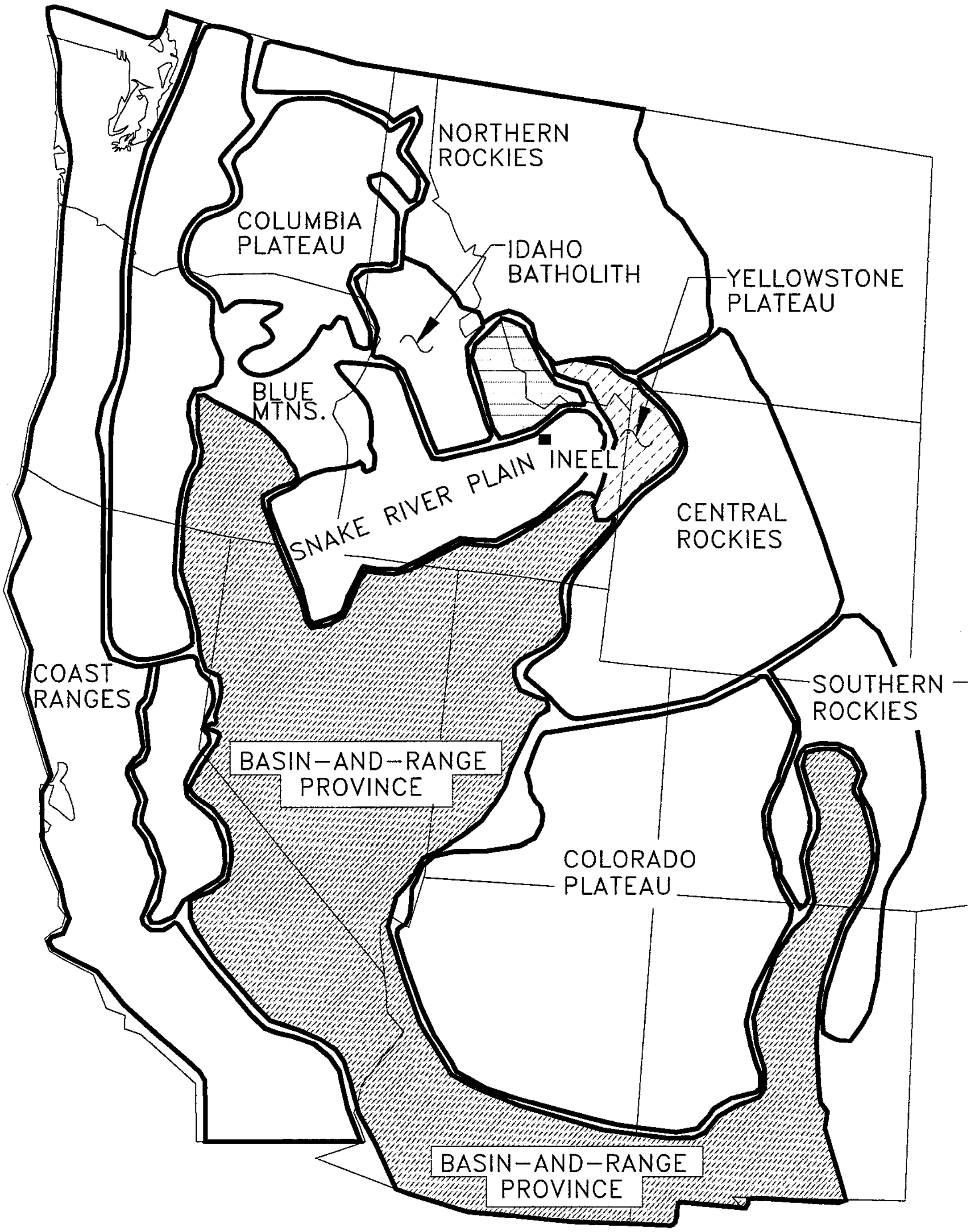
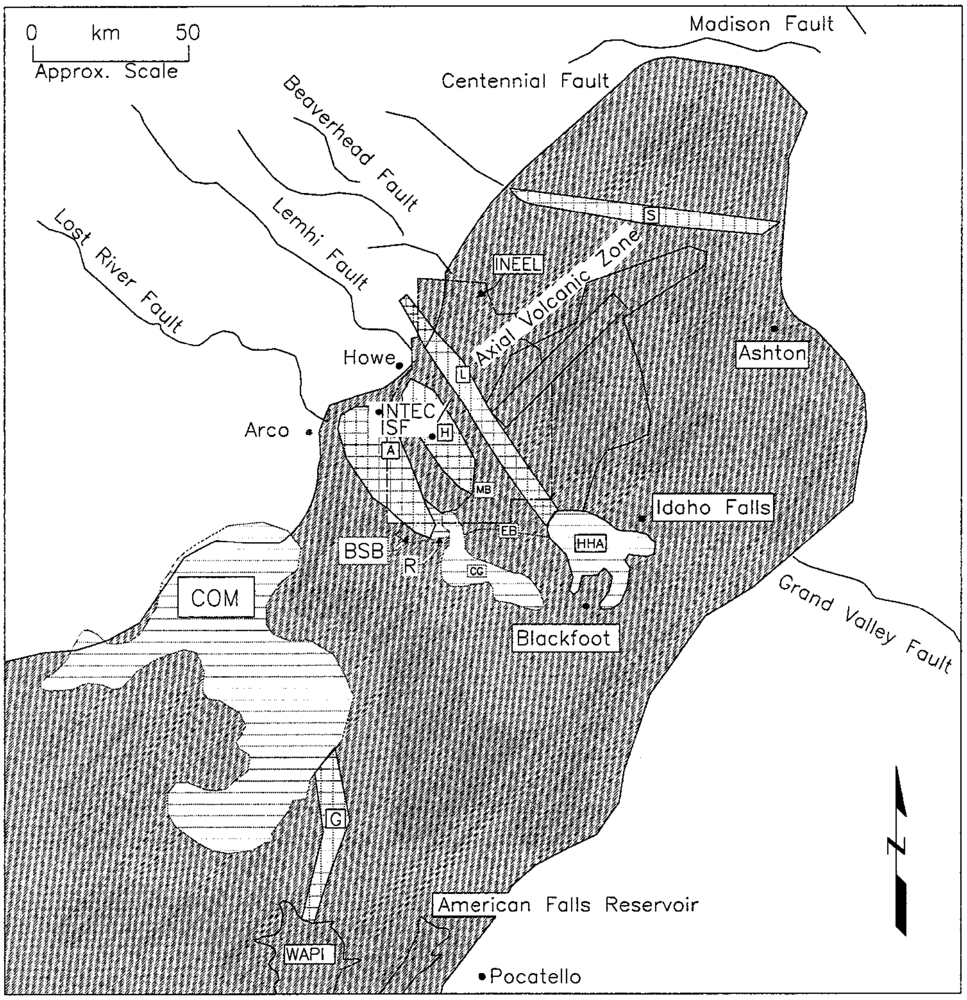


Figure 2-10
Volcanic Zones on the Eastern Snake River Plain



Holocene Lava Fields

Volcanic Rift Zones

Eastern Snake River Plain

COM=Craters of the Moon
CG=Cerro Grande
HHA=Hells Half Acre
R=North & South Robbers

S=Spencer–High Point
L=Lava Ridge–Hells Half Acre
H=Howe–East Butte
A=Arco
G=Great Rift

BSB=Big Southern Butte
MB=Middle Butte
EB=East Butte

Basin and Range Province

Figure 3-1
External Appearance of the ISF Facility

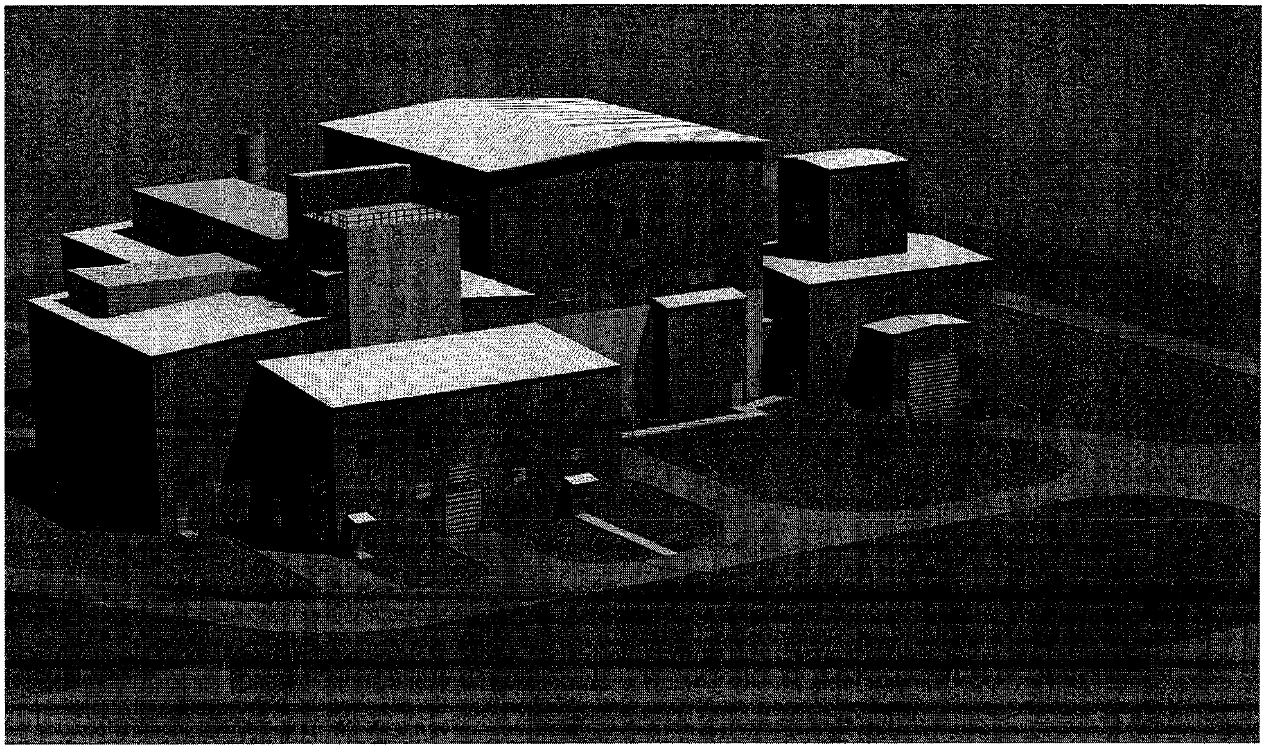


Figure 3-2
General Layout of the Major Areas of the ISF Facility

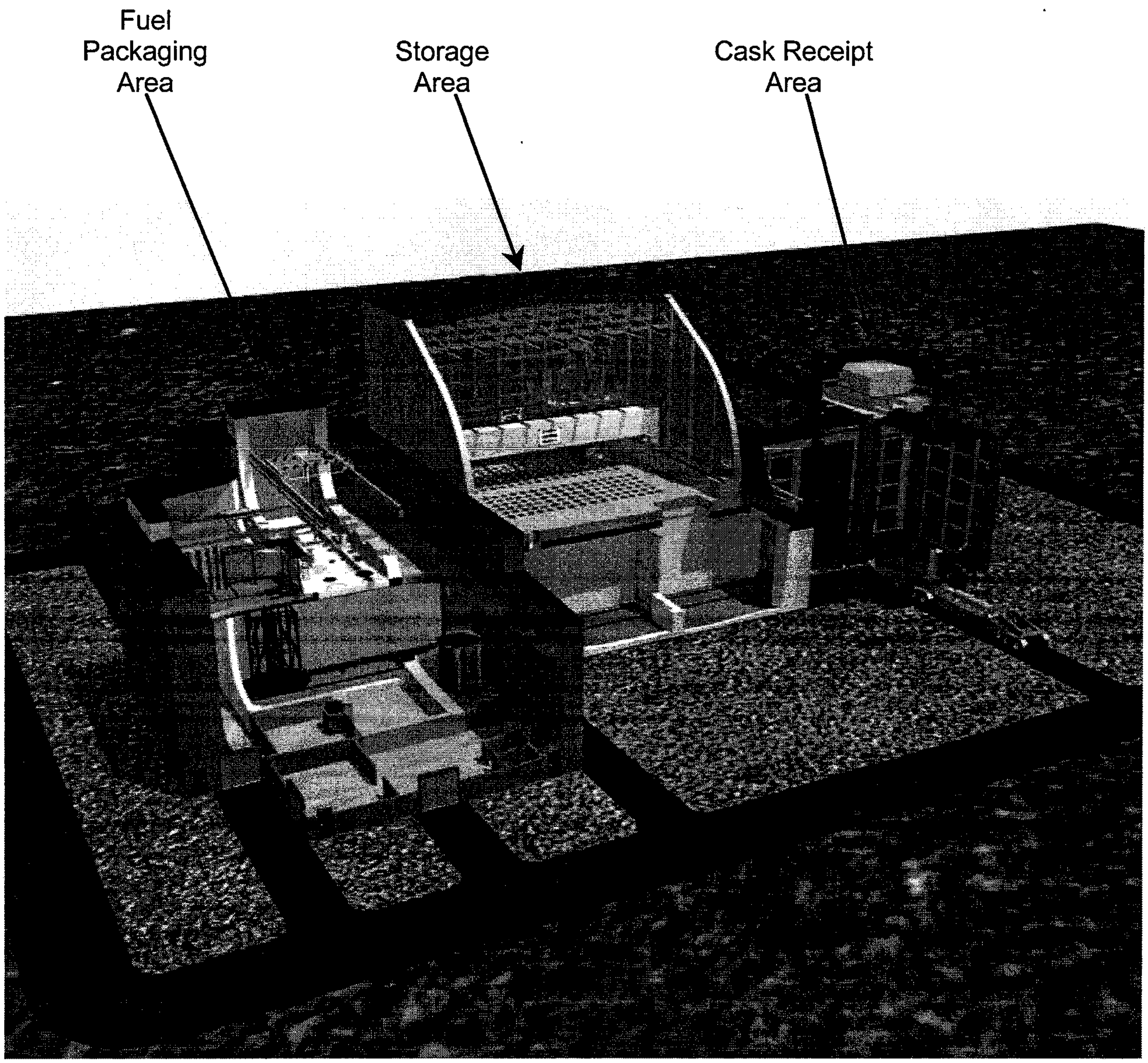


Figure 3-3
Storage Vault Configuration

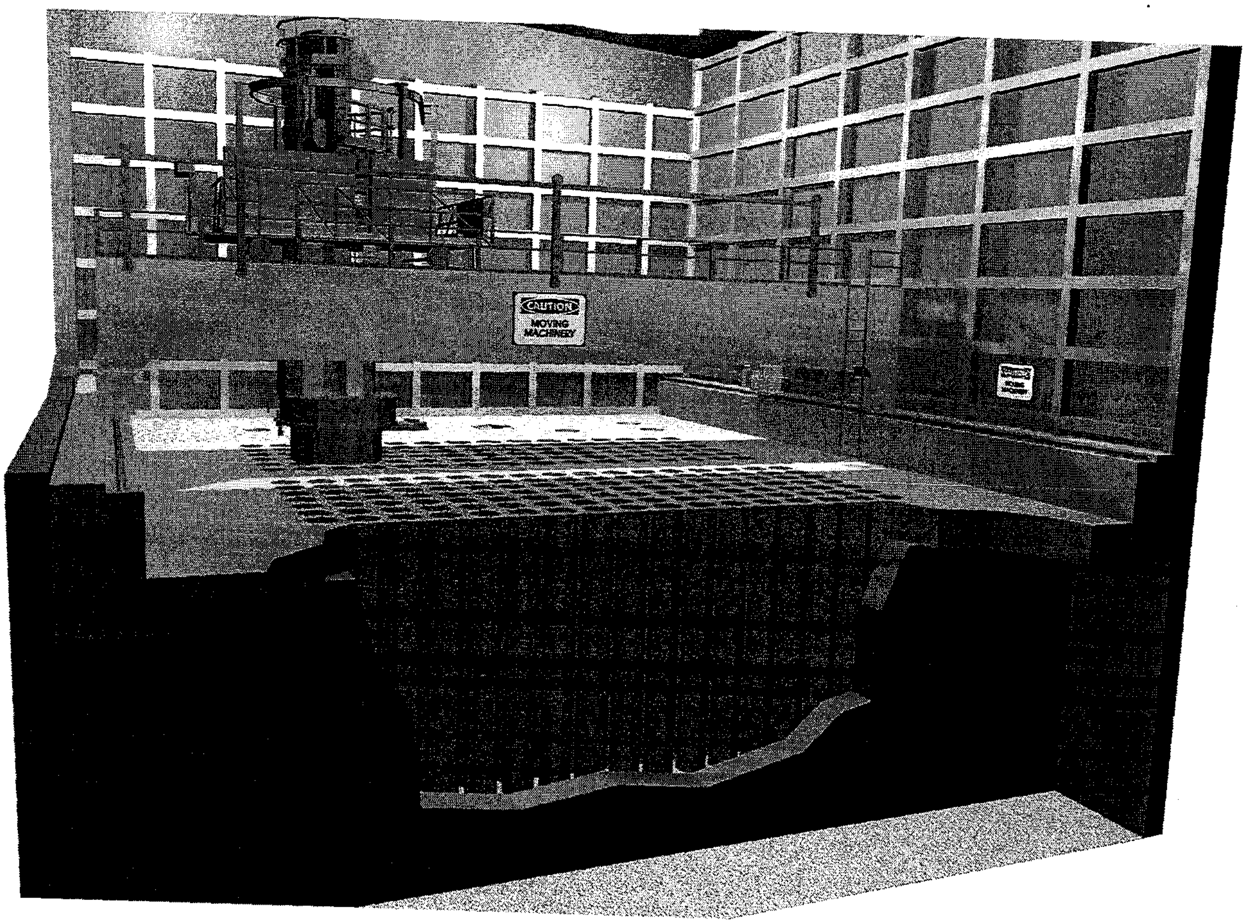


Figure 4-1
Predicted Inundation Area at INEEL Site for PMF-Induced Overtopping of Mackay Dam
(Bennett 1990)

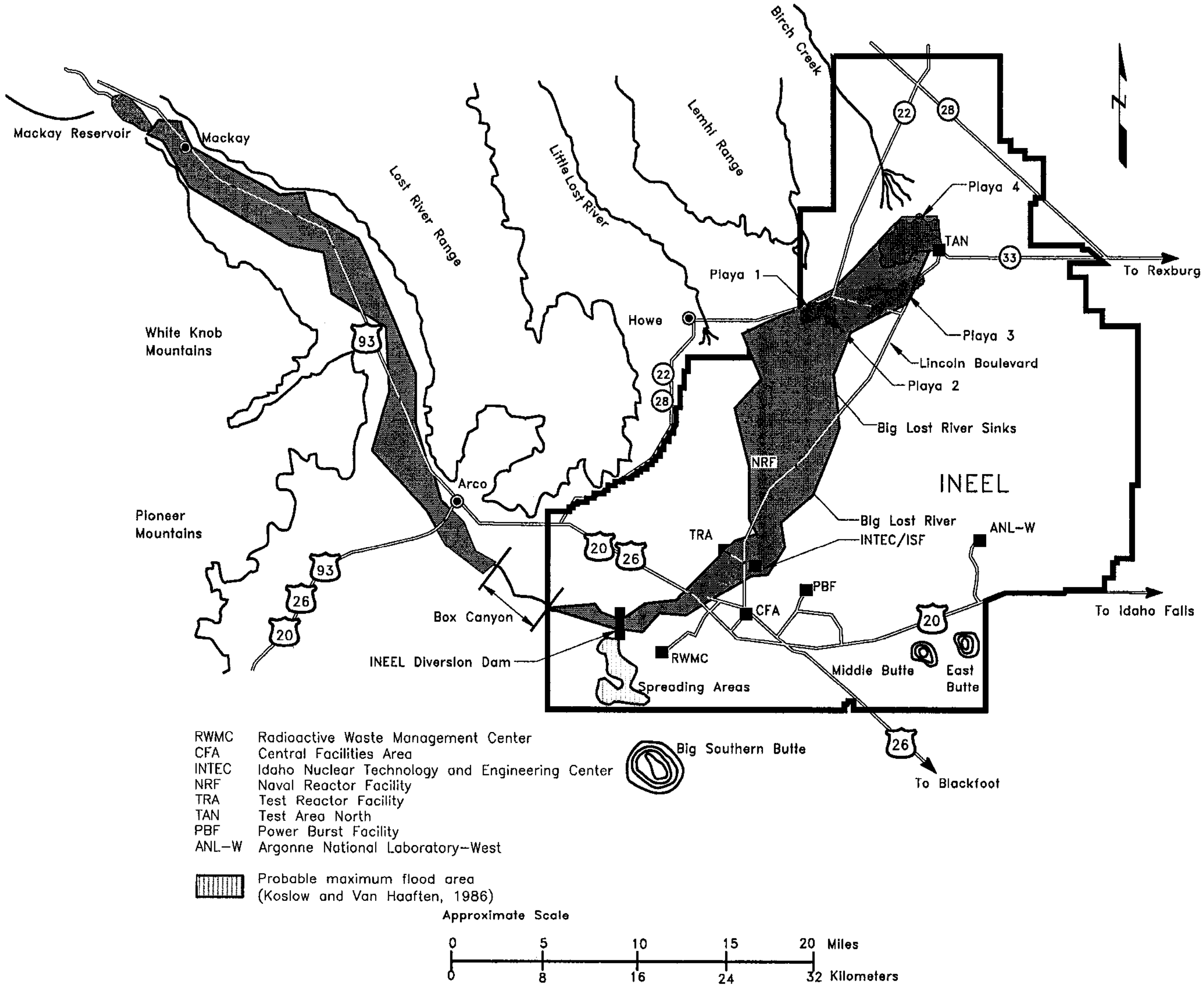
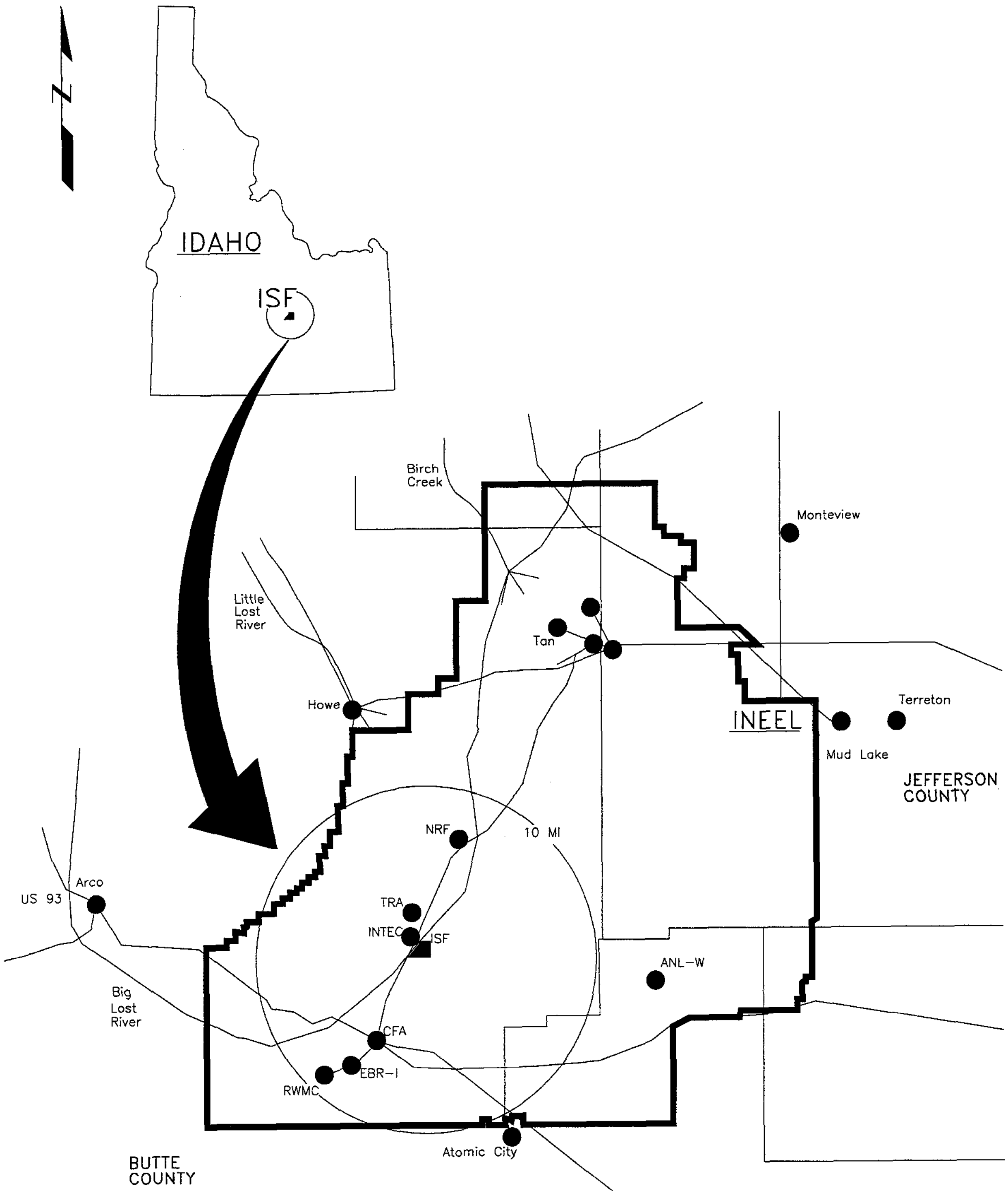


Figure 8-1
INEEL Facilities Within 10-Mile Radius of ISF Site



Appendix A.
Ecological Resources of the Idaho National Engineering and Environmental Laboratory and Potential Effects of the Independent Spent Fuel Facility
S.M. Stoller Corporation (2001)

Ecological Resources of the Idaho National Engineering and Environmental Laboratory and Potential Effects of the Independent Spent Fuel Facility

Final

May 18, 2001

Stoller
established 1959

1780 First Street
Idaho Falls, Idaho 83401
Phone: (208) 525-9358
Fax: (208) 525-3364

Ecological Resources of the Idaho National Engineering and Environmental Laboratory and Potential Effects of the Independent Spent Fuel Facility

Roger D. Blew, Ph.D.
S.M. Stoller Corp.

May 17, 2001

INTRODUCTION

The Independent Spent Fuel Facility (ISF) will be located on the Idaho National Engineering and Environmental Laboratory (INEEL) near the Idaho Nuclear Technology and Engineering Center (INTEC). The INEEL is located on the upper Snake River Plain of eastern Idaho. The INEEL occupies approximately 890 mi^2. It is bounded on the north and west by the Bitterroot, Lemhi, and Lost River mountain ranges. The INEEL is relatively flat with some volcanic buttes and lava flows. Mean annual precipitation is approximately nine inches. About one third of the precipitation falls during the growing season.

AREA OF POTENTIAL IMPACTS

This evaluation covers two sites; the ISF site itself and a nearby construction laydown area (Appendix A). The ISF site covers approximately seven acres and the construction laydown area covers approximately nine acres. Both of these areas are immediately east of INTEC. Any impacts will likely be due to soil disturbance on these two sites.

METHODS OF INVESTIGATION

Surveys for ecological resources on the INEEL and near the ISF site were completed using two methods. First we searched records of previous surveys on the INEEL and for surveys that may have been conducted near the proposed site of the ISF. We also conducted a field survey of the ISF site and the construction laydown area on May 7, 2001. That survey included a list of plant species present, approximate vegetative cover and suitable wildlife habitat.

ECOLOGICAL RESOURCES OF THE INEEL

Vegetation

The flora of the INEEL and adjacent foothills includes 472 species of vascular plants representing 59 families. The vegetation of the INEEL is primarily shrub-steppe having a shrub overstory and an understory of perennial grasses and forbs. A total of 15 vegetation community classes were recognized as a result of a vegetation mapping effort (Kramber et al. 1992). These classes can be grouped into six, structurally distinct habitat types. They are shrub-steppe, juniper woodland, grasslands, wetland, playas and exposed lava.

The most common vegetation community on the INEEL is sagebrush steppe (Figure 1). It is dominated by Wyoming big sagebrush (*Artemisia tridentata* subspecies *wyomingensis*) and basin big sagebrush (*Artemisia tridentata* subspecies *tridentata*). Green rabbitbrush (*Chrysothamnus viscidiflorus*) is also common. The most common grasses are thickspike wheatgrass (*Elymus lanceolatus*), bluebunch wheatgrass, (*Psuedoreognaria spicata*), bottlebrush squirreltail (*Elymus elymoides*), Indian ricegrass (*Oryzopsis hymenoides*), and needle-and-thread (*Stipa comata*).

Figure 1. Sagebrush steppe typical of the INEEL.

Wetlands on the INEEL are primarily limited to the Big Lost River Sinks at the terminus of the Big Lost River (Anderson et al. 1996). These wetlands are periodically flooded during years of above normal precipitation. The dominant species in these wetlands is common spike rush (*Eleocharis palustris*). Anderson et al. (1996) also reported these wetlands have very low diversity. No wetlands occur within the vicinity of INTEC or the ISF.

A large portion of the interior of the INEEL is undeveloped and provides important habitat for native flora and fauna. About 60% of the INEEL is grazed by sheep and cattle (Figure 2). Grazing is administered by the Bureau of Land Management. The ISF is approximately four miles from the nearest grazing allotment border.

Animals

A total of 219 species of vertebrates have been recorded on the INEEL (Reynolds et al. 1986). This includes 37 mammals, 164 birds, 1 amphibian, 10 reptiles, and six fish species. These include a number of sagebrush-obligate species including pygmy rabbits (*Sylvilagus nuttalii*), sage grouse (*Centrocercus urophasianus*), sage thrasher (*Oreoscoptes montanus*), sage sparrow (*Amphispiza bilineata*), and northern sagebrush lizard (*Sceloperous graciousus*). The most common predators are coyote (*Canis latrans*) and badger (*Taxidea taxus*). Common ungulates include pronghorn (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), and elk (*Cervus elaphus*).

Aquatic communities on the INEEL are dependent on the flow of the Big Lost River. Drought and upstream irrigation diversions greatly limit the flow of water on to the INEEL. In years when water does flow, six species of fish have been observed on the INEEL. They include rainbow trout (*Oncorhynchus mykiss*), mountain whitefish (*Prosopium*

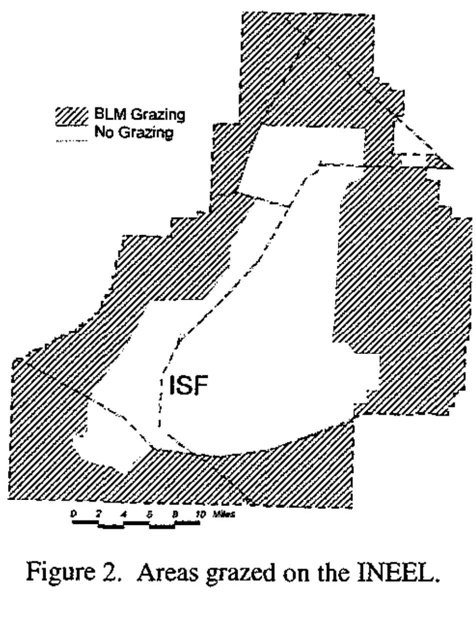


Figure 2. Areas grazed on the INEEL.

williamsoni), shorthead sculpin (*Cottus confuses*), kokanee salmon (*Oncorhynchus nerka*), brook trout (*Salvelinus fontinalis*) and speckled dace (*Rhinichthys osculus*)(Overton 1977, Arthur et al. 1984).

ECOLOGICAL RESOURCES ON OR NEAR THE ISF

The area where the ISF will be constructed and the construction laydown area have been previously disturbed (Figures 3 and 4). Vegetative cover on these sites is less than five percent. Native plant species present include green rabbitbrush (*C. viscidiflorus*), gray rabbitbrush (*C. nauseosus*), desert parsley (*Lomatium foeniculaceum*), and long-leafed phlox (*Phlox longifolia*). Non-native plants on the site included cheatgrass, (*Bromus tectorum*), Russian thistle (*Salsola kali*), crested wheatgrass (*Agropyron cristatum*), tansy mustard (*Descurainia sophia*), and dandelion (*Taraxacum officinale*). The site likely provides little habitat value to wildlife.

The nearest native vegetation community is sagebrush steppe (Appendix A map) and likely supports a diverse complement of small mammals, reptiles, and breeding bird species common to the sagebrush steppe. These nearby areas are also likely used by pronghorn and mule deer throughout the year.

THREATENED AND ENDANGERED SPECIES ON THE INEEL

The U.S. Fish and Wildlife Service (USFWS) and the Idaho Department of Fish and Game Conservation Data Center were contacted for their lists of species of special status that might occur on the INEEL (see Appendix B for correspondence). Those species and their status are listed in Table 1.

The status categories of "Watch" and "Species of Concern" are categories designated by the USFWS Snake River Basin Field Office, Boise. Species in these categories have no protection under the Endangered Species Act, but should be considered for planning purposes because of potential future listings as threatened or endangered. The USFWS also advises an evaluation of potential effects on Candidate species that may occur in project areas. Species listed as threatened or endangered and occur on the INEEL include the Gray Wolf, Bald Eagle, and Ute ladies'-tresses.

In most of Idaho the Gray Wolf is listed as an experimental, non-essential

Figure 3. Proposed location for the ISF .

Figure 4. Construction laydown area for ISF.

Table 1. Special status species that may occur within the boundaries of the INEEL.

Scientific Name	Common Name	Federal Status[1]	Idaho Status[2]
Animals			
Canis lupus	Gray wolf	LT/XN	
Haliaeetus leucocephalus	Bald eagle	LT	LT
Buteo regalis	Ferruginous hawk	W	P
Centrocercus urophasianus	Sage grouse	SC	
Athene cunicularia hypugaea	Western burrowing owl		P
Numenius americanus	Long-billed curlew	SC	P
Sorex merriami	Merriam's shrew	SC	U
Myotis evotis	Long-eared myotis	W	U
Myotis ciliolabrum	Western small-footed myotis	W	U
Corynorhinus townsendii	Townsend's big-eared bat	SC	SC
Brachylagus idahoensis	Pygmy rabbit	W	G,SC
Sceloporus graciosus graciosus	Northern sagebrush lizard	SC	
Plants			
Spiranthes diluvialis	Ute ladies'-tresses	LT	
Botrychium lineare	Slender moonwort	SC	
Astragalus ceramicus var. apus	Painted milkvetch	SC	
Astragalus aquilonius	Lemhi milkvetch		GP3
Camissonia pterosperma	Winged-seed evening primrose		S
Ipomopsis polycladon	Spreading gilia		2

[1] LT = Listed Threatened, XN = Experimental/Nonessential Population, SC = Species of Concern, W = Watch.
[2] E = Endangered, SC = Species of Special Concern, P = Protected nongame, U = Unprotected nongame, G = Game, S = Sensitve, 2 = Priority 2, GP3 = Global Priority 3.

population. There have been several unconfirmed sightings of the gray wolf on the INEEL during the past decade. None of these sightings were near facility complexes or the Big Lost River. Critical habitat for the Gray Wolf does not exist on the INEEL. The USFWS does not designate Critical Habitat for experimental, non-essential populations. Gray wolves in Idaho west of Interstate 15 and south of Interstate 90 are in the area designated as experimental, non-essential population. This includes the INEEL.

Inventories for Bald Eagles on the INEEL are conducted annually as part of the USFWS Mid-winter Bald Eagle Count. Bald Eagles occur on the INEEL only during winter and primarily near the north end of the site near the towns of Howe and Mud Lake. On rare occasions bald eagles may congregate at the spreading areas near the Radioactive Waste Management Complex near the southern boundary of the INEEL.

The USFWS lists Ute ladies'-tresses (*Spiranthes diluvialis*) as a threatened species possibly occurring on the INEEL. Although specific surveys for it have not been conducted, it has never been recorded on the INEEL. Suitable habitat for this (moist soils in mesic or wet meadows near springs, lakes, and perennial streams) does not occur on the proposed ISF site.

Potential Threats Due to Construction or Operation of ISF

It is unlikely the proposed activities at this site will have any measurable impact on species of federal or state concern. There are no federally listed or proposed threatened or endangered species, species of special concern, or records thereof, or designated critical habitat in proximity to the project area.

Ecological and Biological Research in Progress

Ecologists and biologists from the Department of Energy's Environmental Surveillance, Education and Research program, the INEEL, and regional universities were contacted about research activities in the vicinity of the ISF. The result of that inquiry was that no ecological or biological research would likely be affected by activities at the ISF.

One long-term monitoring program that does collect data nearby is the Breeding Bird Survey. This survey on the INEEL includes 13 permanent routes established in 1985. Five of these routes are in remote locations and the data from these is reported to the U.S. Geological Survey, Biological Resources Division annually. There are also eight routes near INEEL facilities and complexes including INTEC and the ISF site (Appendix A map). These facility routes are used to assess the impacts of INEEL activities on breeding bird use of areas near facilities. Because the purpose of this monitoring is to detect effects, the monitoring program itself will not be negatively affected by activities at ISF.

LITERATURE CITED

Anderson, J. E., K. T. Ruppel, J. M. Glennon, K. E. Holte, and R. C. Rope. 1996. Plant communities, ethnoecology, and flora of the Idaho National Engineering Laboratory. ESRF-005. Environmental Science and Research Foundation, Idaho Falls, Idaho. 111 pp.

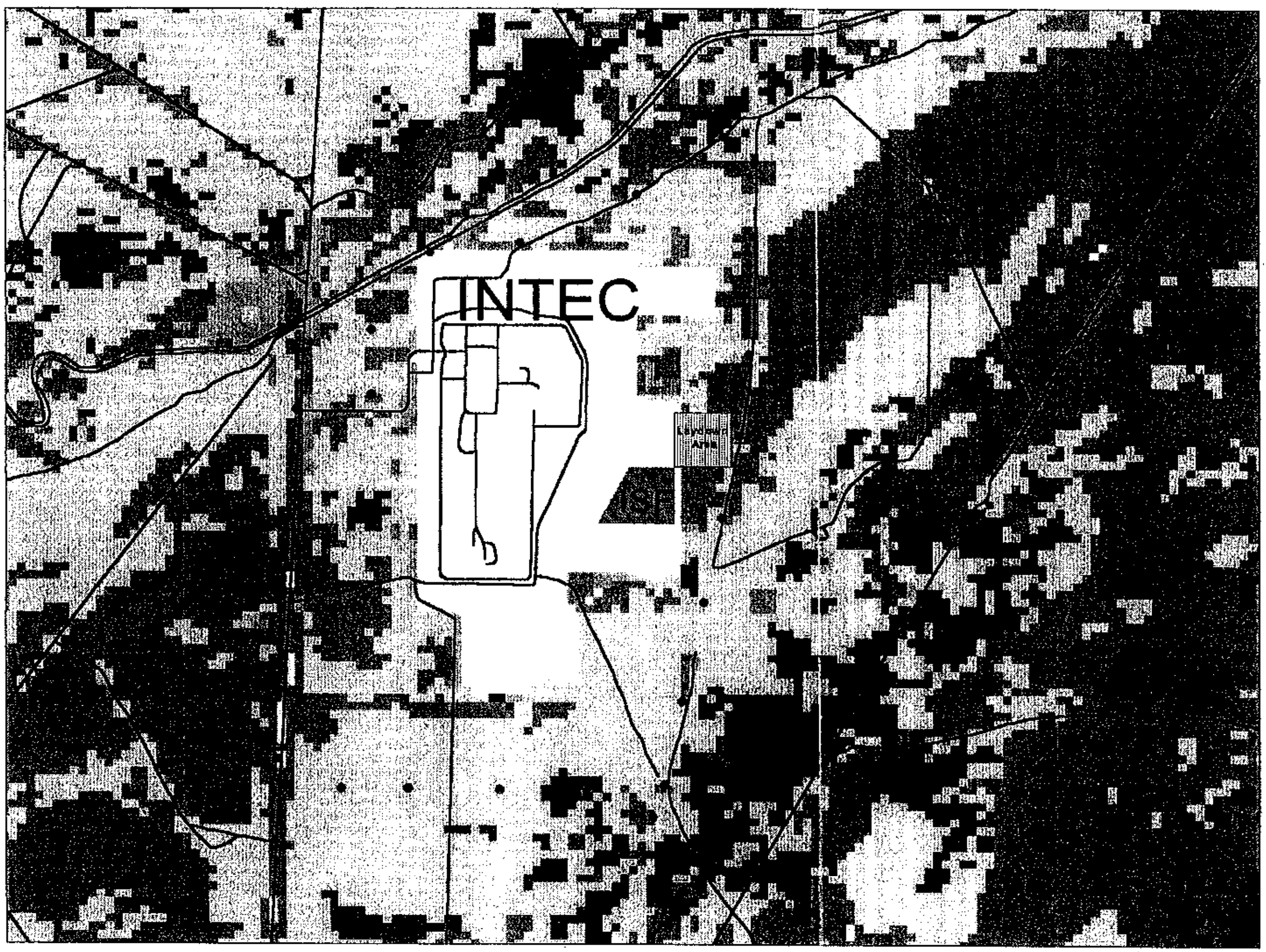
Arthur, W. J. , J. W. Connelly, D. K. Halford, and T. D. Reynolds. 1984. Vertebrates of the Idaho National Engineering Laboratory. DOE/ID-12099. U.S. Department of Energy, Idaho Operations Office, Idaho Falls. 40 pp.

Kramber, W.L., R. C. Rope, J. Anderson, J. Glennon, and A. Morse. 1992. Producing a vegetation map of the Idaho National Engineering Laboratory using Landsat Thematic Mapper data. Proceedings of the American Society for Photogrammetry and Remote Sensing/American Congress on Surveying and Mapping Annual Meeting Technical Papers Vol. 1:217-226.

Overton, C. K. 1977. Description, distribution, and density of Big Lost River salmonid populations. M. S. Thesis. Idaho State University, Pocatello. 51 pp.

Reynolds, T. D., J. W. Connelly, D. K. Halford, and W. J. Arthur. 1986. Vertebrate fauna of the Idaho National Environmental Research Park. Great Basin Naturalist 46:513-527.

APPENDIX A



INTEC, ISF and Vicinity

Stoller

APPENDIX B

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Snake River Basin Office, Columbia River Basin Ecoregion
1387 South Vinnell Way, Room 368
Boise, Idaho 83709

MAR 0 1 2001

Roger D. Blew, Ph.D.
Plant Ecologist
The S. M. Stoller Corporation
1780 First Street
Idaho Falls, Idaho 83401

Subject: Department of Energy, Idaho National Engineering and Environmental Laboratory Species List Update
1-4-01-SP-364/Updates #1-4-01-SP-75/506.0000

Dear Mr. Blew:

The U.S. Fish and Wildlife Service (Service) is writing to provide you with an updated list of endangered, threatened, proposed, and/or candidate species which may occur within the boundaries of the Department of Energy, Idaho National Engineering and Environmental Laboratory. We have enclosed the current list. This letter officially updates species list number 1-4-01-SP-75 of December 1, 2000, and provides you with a new number 1-4-01-SP-364. You should refer to the new number in subsequent correspondence and documentation.

Information concerning Federal agency obligations under the Endangered Species Act has been provided to you in the past. If you would like us to send you any of this information again or if you have questions, please contact Carol Wanstrom of this office at (208) 378-5388.

Thank you for your continued interest in endangered species conservation.

Sincerely,

Acting for Supervisor, Snake River Basin Office

Enclosure

cc: FWS-ES, Chubbuck

ENCLOSURE

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES, AND CANDIDATE SPECIES, THAT MAY OCCUR WITHIN THE BOUNDARIES OF THE INEEL-DOE PROJECT
1-4-01-SP-364

LISTED SPECIES	COMMENTS
Gray wolf (XN) *(Canis lupus)*	Experimental/Non-essential population
Bald eagle (LT) *(Haliaeetus leucocephalus)*	Occasionally winter on part of INEEL
Ute ladies'-tresses (LT) *(Spiranthes diluvialis)*	

PROPOSED SPECIES

None

CANDIDATE SPECIES

None

The Fish and Wildlife Service has concerns about the following plants and animals. Although these species have no status under the Endangered Species Act, we are concerned about their population status and threats to their long-term viability. In context with ecosystem-level management, we suggest that you consider these species and their habitats in project planning and review.

Mammals

Long-eared myotis
(Myotis evotis)

Small-footed myotis
(Myotis ciliolabrum)

Townsend's big-eared bat
(Corynorhinus townsendii)

Pygmy rabbit
(Brachylagus idahoensis)

Merriam's shrew
(Sorex merriami)

Birds

Greater sage-grouse
(Centrocercus urophasianus)

Long-billed curlew
(Numenius americanus)

Ferruginous hawk
(Buteo regalis)

Amphibians and Reptiles

Northern sagebrush lizard
(Sceloporus graciosus graciosus)

Plants

Slender moonwort
(Botrychium lineare)

Painted milkvetch
(Astragalus ceramicus var. *apus)*

GENERAL COMMENTS

LE - Listed endangered
LT - Listed threatened
XN - Experimental/non-essential population
PT - Proposed threatened
C - Candidate

GRAY WOLF (*Canis lupus*) -- The gray wolf is listed as endangered in the coterminous United States, except where it is listed (1) as threatened (Minnesota) or (2) as a nonessential experimental population including Wyoming, and portions of Idaho and Montana. Within the central Idaho area, the nonessential experimental population areas are those portions of Idaho that are south of Interstate Highway 90 and west of Interstate Highway 15, and those portions of Montana south of Interstate Highway 90, Highway 93 and 12 from Missoula, Montana west of Interstate Highway 15. Portions of the Yellowstone Management Area (YMA) in Idaho and Montana are designated as the nonessential experimental population area. The boundaries of the YMA include that portion of Idaho that is east of Interstate Highway 15; that portion of Montana that is east of Interstate Highway 15 and south of the Missouri River from Great Falls, Montana, to the eastern Montana border; and all of Wyoming.

Federal action agencies are required to confer with the Service if their actions are likely to jeopardize the continued existence of gray wolves; or you have the option of conferring with the Service regardless of the determination.

UTE LADIES'-TRESSES (*Spiranthes diluvialis*) has the potential to occur in wetland and riparian areas including springs, wet meadows, and river meanders. The plant is known to occur at sites ranging from 1,500 to 7,000 feet in elevation. This species generally flowers from mid-July through September, and can be identified definitively only at that time. The orchid can remain dormant for several years; therefore, we suggest surveys for the orchid be scheduled for sequential years. The species may be adversely affected by modification of riparian and wetland habitats associated with livestock grazing, vegetation removal, excavation, construction for residential or commercial purposes, stream channelization, hydroelectric development and operation, and actions that alter hydrology.

IDAHO CONSERVATION DATA CENTER
Idaho Department of Fish and Game • 600 South Walnut • P.O. Box 25, Boise, Idaho 83707 • (208) 334-3402 • FAX 334-2114

21 February 2001

Dr. Roger D. Blew, Plant Ecologist
S. M. Stoller Coporation
1780 First Street
Idaho Falls, ID 83401

Dear Dr. Blew:

I am responding to your request for a list of special status species associated with the Idaho National Engineering and Environmental Laboratory. The accompanying list has to be understood in the context of the lack of data made available to the CDC. Data transfers, over the years, have been one way---i.e., the CDC has provided data to INEEL and contractors but has received very little in the way of updated information or new occurrences. For example, we know from literature that western burrowing owl occurs at INEEL, but our database contains no site-specific data.

If you have questions regarding this response, please contact me.

Sincerely,

George Stephens

George Stephens
Fish and Game Data Coordinator

Please note: The quantity and quality of data collected by the Idaho Conservation Data Center (CDC) are dependent on the research and observations of many individuals and organizations. In most cases, these data are not the result of comprehensive or site-specific field surveys; many natural areas in Idaho have never been thoroughly surveyed. For these reasons, the CDC cannot provide a definitive statement on the presence, absence, or condition of biological elements in any part of Idaho. CDC reports summarize the existing information known to the CDC at the time of the request regarding the biological elements or locations in question. They should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments.

IDAHO CONSERVATION DATA CENTER
IDAHO DEPARTMENT OF FISH AND GAME
21 FEBRUARY 2001
REPORT FOR: DR. ROGER D. BLEW, S. M. STOLLER CORP.

SPECIAL STATUS SPECIES

IDAHO NATIONAL ENGINEERING
AND ENVIRONMENTAL LABORATORY

SCIENTIFIC NAME	COMMON NAME	USFWS STATUS	STATE	BLM	COMMENTS
ANIMALS					
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	LT	E		PRESENCE IS TIED TO JACKRABBIT POPULATIONS
BUTEO REGALIS	FERRUGINOUS HAWK	W	P	S	NESTING TERRITORIES
ATHENE CUNICULARIA HYPUGAEA	WESTERN BURROWING OWL	SC	P	S	
NUMENIUS AMERICANUS	LONG-BILLED CURLEW	SC	P	S	NESTING AREA
SOREX MERRIAMI	MERRIAM'S SHREW		U		MUSEUM SPECIMENS
MYOTIS EVOTIS	LONG-EARED MYOTIS	W	U	S	MATERNITY ROOST CONFIRMED SPECIMENS
MYOTIS CILIOLABRUM	WESTERN SMALL-FOOTED MYOTIS	W	U	S	ROOSTS HIBERNACULA
CORYNORHINUS TOWNSENDII	TOWNSEND'S BIG-EARED BAT	SC	SC	S	HIBERNACULA ROOST
BRACHYLAGUS IDAHOENSIS	PYGMY RABBIT	W	GSC	S	
PLANTS					
ASTRAGALUS AQUILONIUS	LEMHI MILKVETCH		GP3	S	
CAMISSONIA PTEROSPERMA	WINGED-SEED EVENING PRIMROSE		S	S	
IPOMOPSIS POLYCLADON	SPREADING GILIA		2	S	

USFWS

LT = Listed Threatened
SC = Species of Concern
W = Watch

STATE (animals = Idaho Dept. of Fish and Game)

P = Protected nongame
E = Endangered
U = Unprotected nongame
SC = Species of Special Concern
G = Game

STATE (plants = Idaho Native Plant Society)

S = Sensitive
2 = Priority 2
GP3 = Global Priority 3

BLM

S = Sensitive species

For definitions of the various categories of status, please refer to http://www.state.id.us/fishgame/cdchome.htm

Appendix B.
Cultural Resources Investigation for the Idaho Spent Fuel Facility at the Idaho National Engineering and Environmental Laboratory
INEEL/EXT-2001-457, DOE (2001)

INEEL/EXT-2001-457

Cultural Resource Investigations for the Idaho Spent Fuel Facility at the Idaho National Engineering and Environmental Laboratory

Brenda Ringe Pace

Published March 2001

Idaho National Engineering and Environmental Laboratory
Cultural Resource Management Office
Idaho Falls, Idaho 83415

Prepared for the
U.S. Department of Energy
Assistant Secretary for Environmental Management
Under DOE Idaho Operations Office
Contract DE-AC07-94ID13223

ABSTRACT

The U.S. Department of Energy proposes to construct a new facility for managing spent nuclear fuel at the Idaho National Engineering and Environmental Laboratory (INEEL). The Idaho Spent Fuel Facility (ISFF) will be designed, licensed, constructed, and operated by the Foster-Wheeler Environmental Corporation (FWENC). The preferred location for construction of this new facility is adjacent to the Idaho Nuclear Technology and Engineering Center, an existing INEEL facility. Cultural resource investigations of this proposed construction site and the surrounding historic landscape indicate that the proposed project will have no effect on significant cultural resources.

CONTENTS

ABBREVIATIONS AND ACRONYMS

ACHP	Advisory Council on Historic Preservation
CFR	Code of Federal Regulations
CRM	Cultural Resource Management
DOE-ID	Department of Energy, Idaho Operations Office
DOI	Department of Interior
FWENC	Foster Wheeler Environmental Corporation
IMACS	Intermountain Antiquities Computer System
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
ISFF	Idaho Spent Fuel Facility
NPS	National Park Service
NRC	Nuclear Regulatory Commission
NRHP	National Register of Historic Places
SHPO	State Historic Preservation Office
US	United States

Cultural Resource Investigations for the Idaho Spent Fuel Facility at the Idaho National Engineering and Environmental Laboratory

1. INTRODUCTION

The following report documents investigations to identify and assess cultural resources that might be impacted by activities associated with the construction of a new storage and packaging facility for spent nuclear fuel, the Idaho Spent Fuel Facility (ISFF), on the Idaho National Engineering and Environmental Laboratory (INEEL) in southeastern Idaho. The report follows a specific format preferred by the Idaho State Historic Preservation Office (SHPO) (Idaho SHPO 1995).

2. PROJECT DESCRIPTION

2.1 Description of Project and Potential Impacts

The INEEL is an 890 square mile federal reserve covering portions of five counties on the northeastern edge of the Snake River Plain in southeastern Idaho. The INEEL lands are under the jurisdiction of the U.S. Department of Energy, Idaho Operations Office (DOE-ID), and have been gradually set aside since the 1940s, through withdrawal and purchase, for scientific and engineering research. The vast land holding has also been designated as a National Environmental Research Park, dedicated to the study of the environmental impacts of energy research. Recently, approximately 74,000 acres of high desert terrain within the Laboratory were designated as an INEEL Sagebrush Steppe Ecosystem Reserve, recognizing the undisturbed nature of the area and the many resources present within.

There are eleven main operational facility areas at the INEEL (Map 1, Appendix C). The proposed area for construction of the ISFF is adjacent to the Idaho Nuclear Technology and Engineering Center (INTEC) in the south-central portion of the Laboratory. INTEC, formerly the Idaho Chemical Processing Plant (ICPP), is a multipurpose plant originally constructed in 1951. Throughout its long operational history, INTEC has successfully received and stored spent nuclear fuels, processed those fuels to recover uranium-235, and managed the waste generated by those functions. In 1992, the spent fuel processing mission was terminated. INTEC's current mission is to receive and temporarily store spent nuclear fuel and waste fission products.

The proposed ISFF will be the newest facility devoted to the interim storage of spent nuclear fuel. The proposed location of the new facility is adjacent to a small complex of existing office buildings, warehouses, and trailers immediately to the east of the INTEC perimeter fence and north of INTEC's coal-fired power plant (Map 2, Appendix C). The ISFF will receive spent nuclear fuel stored within the INEEL complex and transfer this fuel into storage canisters designed to meet the acceptance criteria for the proposed national repository at Yucca Mountain, Nevada. The Nuclear Regulatory Commission (NRC) will license the ISFF and the receipt, transfer, and storage of this fuel will be under their jurisdiction.

Members of the INEEL Cultural Resource Management (CRM) Office reviewed archaeological survey records and cultural resource inventories to determine if the activities associated with the construction of this new facility will cause any impacts to cultural resources, particularly those exhibiting potential for nomination to the National Register of Historic Places (NRHP). The results of these efforts are summarized in this report.

2.2 Area of Potential Effects

There are two distinct, but related, areas of potential effect for the ISFF project (Map 3, Appendix C). The first area is the proposed ISFF construction site, which is an 8-acre parcel bounded on the west by INTEC's East Perimeter Road, on the north by Spruce Avenue, on the east by Balsa Street, and on the south by a large ash pit associated with INTEC's coal-fired power plant. The second area of potential effects is the construction laydown area located a short distance to the northeast of the proposed ISFF site. It is a 4-acre construction laydown area to support the project. Both parcels are east of the main INTEC facility and south of a small concentration of offices and other structures, permanent and temporary, which are also peripheral to the main facility.

Ground disturbance associated with construction of the ISFF and other temporary support facilities will be localized but extensive in both areas. No modifications to existing structures or buildings within the INTEC facility are planned.

2.3 Project Acreage

NAME OF AREA	PROJECT ACREAGE	ARCHAEOLOGICAL SURVEY COVERAGE
Idaho Spent Fuel Facility	~ 8 acres	> 8 acres
Construction Laydown Area	~ 4 acres	> 4 acres

2.4 Landowner(s)

The U.S. Department of Energy, Idaho Operations Office (DOE-ID) and DOE-ID's prime contractor, now Bechtel BWXT, Idaho, LLC, jointly administer most INEEL lands, excluding those that are within the Naval Reactors Facility and Argonne National Laboratory-West. Within certain grazing areas on the INEEL, generally located near the outer boundaries of the Laboratory, administration is also shared with the Bureau of Land Management, Idaho Falls District, who issues all permits and takes responsibility for environmental compliance associated with grazing activities. The proposed ISFF is located within the area administered by DOE-ID. The new facility will be built and operated by Foster Wheeler Environmental Corporation (FWENC), under lease with the DOE-ID. In recognition of the value of a consolidated approach, all cultural resource investigations are managed and coordinated through the INEEL Cultural Resource Management (CRM) Office, currently within Bechtel BWXT, Idaho, LLC.

3. STATEMENT OF OBJECTIVES FOR INVESTIGATION

3.1 Description of Area Investigated

The cultural resource investigations reported herein were conducted to satisfy three basic and interrelated goals:

1. to identify and evaluate cultural resources within the areas of potential effect for construction of the ISFF,
2. to conduct a preliminary assessment of the potential impact of construction activities on any identified cultural resources, and
3. to develop preliminary avoidance strategies, monitoring plans and/or data recovery plans if necessary to avoid any adverse effects to identified cultural resources and particularly those that are eligible or potentially eligible for nomination to the National Register of Historic Places.

3.2 Amount and Types of Information Collected

All cultural resources investigations on the INEEL must meet the Secretary of the Interior's standards under 36 CFR 800, as well as the requirements outlined in the draft INEEL Cultural Resources Management Plan (Braun et al. 2000). Ground disturbing projects on the INEEL are preceded by several types of data collection including: CRM archive searches, archaeological reconnaissance surveys in previously examined areas, and/or intensive archaeological surveys in areas that have never been systematically inventoried for cultural resources. All of these activities are designed to identify cultural resources in the area(s) of potential effect for the proposed activities. In some instances, consultation with the Shoshone-Bannock Tribes is also needed to identify resources of traditional cultural or religious importance.

INEEL CRM archive searches clearly indicate that both areas of potential effect for the proposed ISFF have been subject to repeated intensive archaeological surveys, so additional field activities were not deemed necessary. The archives also demonstrate that neither of the areas of potential effect for the project contain any historic architectural properties, nor are any historic buildings located in the immediate vicinity. Finally, the lack of archaeological resources and highly disturbed nature of the proposed construction area and construction laydown area also indicate that no sensitive tribal resources are present, so no special communications (beyond the standard review process for this report) were conducted with the with the Shoshone-Bannock Tribes.

4. LOCATION AND GENERAL ENVIRONMENTAL SETTING

4.1 Legal Locations

The INTEC and proposed construction site for the ISFF are located in the south-central portion of the INEEL in Butte County approximately 50 miles west of Idaho Falls, Idaho. Appendix C contains a variety of visuals including:

- a map showing the location of INTEC and the ISFF in relation to INEEL boundaries and other facilities (Map 1),
- a plot-plan of the proposed ISFF in relation to roads and buildings at INTEC (Map 2),
- a partial 7.5' topographic map showing the specific locations of the areas of potential effect (Map 3), and
- the same topographic map showing these areas in relation to archaeological survey coverage and known archaeological sites (Maps 4 and 5).

The specific legal locations for the ISFF construction site and associated construction laydown area are:

NAME OF AREA	LEGAL LOCATION	7.5' MAP
Idaho Spent Fuel Facility	SE ¼, SW ¼, Sec. 19, T3N, R30E	Circular Butte 3 SW, Idaho
Construction Laydown Area	NE ¼, SE ¼, SW ¼, Sec. 19, T3N, R30E	Circular Butte 3 SW, Idaho

4.2 Setting

The INEEL is located in the high cool desert environment of the northeastern Snake River Plain. Within the 890 square mile complex, aeolian, alluvial, and lacustrine sediments of varying thicknesses overlie basaltic lava flows. The Big Lost River flows in a northeasterly direction from the southwestern corner of the Laboratory to eventually terminate in a series of natural sinks near the foothills of the Lemhi Mountains. An extensive floodplain follows the course of the River and in the vicinity of the sinks, a myriad of channels is cut into the bed of Pleistocene Lake Terreton. Vegetation is generally sparse throughout the INEEL and dominated by a community of low shrubs like sage and rabbitbrush, a wide variety of grasses and forbs, and occasional juniper trees. Many animals make their homes in this sagebrush grassland including proghorn, deer, elk, coyotes, badgers, rabbits, many birds including raptors, game birds, and waterfowl, a wide variety of small rodents, and several types of small reptile.

For human populations, the area has always had much to offer. For Native American hunter-gatherers who probably utilized the area on a seasonal basis for more than 12,000 years, game animals and useful plants were found in abundance and nearby Big Southern Butte was attractive for the obsidian tool stone that outcrops near it's crest. Within the last 150 years, emigrants began to pass through the area along a northern spur of the Oregon Trail (Goodale's Cutoff). Soon thereafter, early homesteaders sought to harness the fickle flows of the Big Lost River and transform sagebrush flats into green pastures. Few were successful, but the failure of their efforts opened the area for use of another kind. The remote and largely uninhabited expanse of the northeastern Snake River Plain was well suited for the test firing of guns and ordnance testing in support of US military applications. Then, after 1949, the INEEL was designated as the National Reactor Testing Station and became an ideal testing ground for the developing U.S. nuclear research program. The Laboratory has filled a similar role for more than 50 years, ultimately influencing nearly every power reactor in the world particularly in regard to design and safety.

Both areas of potential effect for construction of the ISFF are located on the Big Lost River floodplain just southeast of the main channel of the Big Lost River. In this physiographic zone, alluvial gravels from the River cover a broad expanse nearly six kilometers wide. Basalt lava flows border the floodplain on the southeast and northwest. Close to INTEC and throughout the floodplain, the topography is relatively featureless. Flat expanses of alluvial gravel are broken only by occasional isolated sand dunes and abandoned channels and even these features are rare around INTEC. Elevations consistently average approximately 4,920 ft above sea level and vegetation is dominated by low shrubs such as sage and rabbitbrush along with a variety of native grasses.

5. PRE-FIELD RESEARCH

5.1 Sources of Information Checked

[x] General Overviews	[ ] Ethnographic studies
[ ] National Register	[x] Historic records/maps
[x] Archaeological site records/maps	[ ] Interviews
[x] Architectural site records/maps	[x] INEEL CRM Files
[x] Survey records	[ ] Other

5.2 Summary of Previous Investigations

The INEEL CRM Office maintains a complete record of all cultural resource investigations conducted on the INEEL. Less detailed records are maintained for reconnaissance-level investigations completed before 1984. Of particular importance are the inventories of archaeological and architectural properties with potential for nomination to the National Register of Historic Places produced during intensive surveys over the past two decades. Archaeological sensitivity maps based on a preliminary predictive model (Ringe 1995), maps and survey notes from original land surveys of the INEEL area, and sensitive records of resources that are of continuing importance to the Shoshone-Bannock Tribes are also housed at this Office.

A check of the INEEL CRM archives revealed that both of the areas of potential effect for ISFF construction east of INTEC had been repeatedly subject to intensive archaeological survey with negative results. The archive search also showed that no historic architectural properties are located within or even near the areas of potential effect for ISFF construction. Finally, due to a high level of modern disturbance and low archaeological sensitivity, the archive review indicated a low probability of encountering resources of interest to the Shoshone-Bannock Tribes.

Archaeological survey coverage in the vicinity of INTEC is quite expansive (Map 4, Appendix C). The earliest surveys conducted there, from 1979 – 1984, relied on methodologies typically less stringent than those required today. The first was conducted in 1979 when B. R. Butler inspected 111 acres of the area now enclosed by the INTEC perimeter fence (Butler 1979). No cultural resources were recorded during this original survey. In 1981, S. J. Miller (Miller 1985) conducted a cultural resources inventory of approximately nine acres proposed for the coal-fired steam generation plant immediately south of the proposed ISFF 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 (10-BT-269) was identified in an undisturbed area some distance to the north. Archaeological survey coverage surrounding INTEC was significantly expanded by the Swanson/Crabtree Anthropological Research Laboratory in 1985 (Reed et al. 1987a), 1986 (Reed et al. 1987b), and 1989

(Ringe 1989); more than 1000 acres surrounding the facility were encompassed by these surveys. Most of the six cultural resources identified during this effort were related to agricultural pursuits spurred by the Carey Land Act of 1894. Only two isolates (10-BT-1244 and 10-BT-1245) are located in the vicinity of the proposed ISFF project.

Periodically over the past decade, the INEEL CRM Office has revisited the eastern perimeter zone of the INTEC to verify that no archaeological resources are present there and to relocate the historic homestead (10-BT-269) for avoidance. In FY2000 alone, the area was monitored on four separate occasions. In each case, the negative results of previous surveys were verified. No archaeological resources have ever been identified within the areas of potential effect for the ISFF project.

During more than 50 years of operational history, INTEC has been the site of a number of significant advances in the science of spent fuel storage and processing as well as waste management (Stacey 2000). Several facilities located there are eligible for nomination to the National Register because of these important contributions (Arrowrock 1997, Stacey 1998, Pace and Braun 2000). No existing buildings or structures are located within the areas of potential effect for the ISFF project and all of the buildings and structures located in the vicinity were constructed after 1980. None are eligible for the National Register.

The proposed construction and laydown areas associated with the ISFF have been subject to intensive ground disturbance over the past five decades. Nonnative plant species are dominant and no unique topographic features (i.e. buttes, river channels, sand dunes, etc.) are present. These factors combine to decrease the likelihood that these areas contain resources of special importance to the Shoshone-Bannock Tribes.

5.3 Evaluation of Previous Investigations

Both areas of potential effect for the ISFF project have been intensively investigated for cultural resource concerns. Original intensive archaeological surveys from the 1980s, subsequent archaeological reconnaissance by the INEEL CRM Office, historic building inventories and lists of other structures, and previous and ongoing consultation with the Shoshone-Bannock Tribes have combined to ensure that all significant cultural resources with visible surface remains in the area have been identified. To date, none have been found within the areas of potential effect for the ISFF project.

6. EXPECTED HISTORIC AND PREHISTORIC LAND USE AND SITE DENSITY

6.1 Known Cultural Resources

Despite the intensive surveys, few cultural resources have been identified in the vicinity of INTEC. On the eastern side of the facility, where the ISFF will be constructed, only three archaeological localities have been identified. Two of these are isolated finds unlikely to be eligible for nomination to the National Register (10-BT-1244 and 10-BT-1245), but the single historic homestead (10-BT-269) also located in this area exhibits potential for nomination. Importantly however, all of these resources are located outside of the areas of potential effect for the ISFF project and should not be affected (Map 5, Appendix C).

6.2 Expected Cultural Resources

Cultural resources are widespread and numerous across the entire INEEL. However, previous surveys conducted on the Big Lost River floodplain near INTEC have revealed a low density of archaeological sites and other cultural resources. Given these results, additional archaeological sites and isolates from the historic and prehistoric periods were not expected to occur and sensitive tribal resources were considered to be unlikely.

6.3 Known or Expected Distribution of Cultural Resources

No additional cultural resources are expected to occur within previously surveyed areas. In unsurveyed areas, archaeological sites are expected to occur in frequencies and distributions similar to those previously observed.

6.4 Known or Expected General Themes and Time Periods

THEMES		TIME PERIODS
[x] Archaeology	[ ] Military	[x] Prehistoric
[x] Agriculture	[ ] Mining	[x] Historic Native American
[ ] Architecture	[x] Native Americans	[ ] Exploration: 1805-1860
[ ] Civilian Conservation Corps	[ ] Politics/Government.	[x] Settlement: 1855-1890
[ ] Commerce	[ ] Public Land Management	[x] Statehood: 1890-1904
[ ] Communication	[ ] Recreation/Tourism	[x] Statehood: 1904-1920
[ ] Culture and Society	[x] Settlement	[ ] Interwar: 1920-1940
[ ] Ethnic heritage	[ ] Timber	[ ] Pre-Modern: 1940-1958
[ ] Exploration/Fur Trade	[x] Transportation	[..] Modern: 1958-present
[..] Industry	[..] Other	

6.5 Known or Expected INEEL Contexts

[x] Prehistoric Native American: 15,000 – 150 BP	[ ] Ordnance Testing, Naval Proving Ground: 1942 – 1949	[ ] Nuclear Reactor Testing, Development: 1955 – 1970
[x] Historic Native American: 150 BP - present	[ ] Ordnance Testing, Vietnam War: 1968 – 1970	[..] Post Nuclear Reactor Research: 1971 – present
[x] Euroamerican Contact/ Settlement: 1805 - 1942	[ ] Nuclear Reactor Testing, Establishment: 1949 – 1971	[ ] Remediation of Nuclear Waste: 1971 – present

7. METHODS OF INVESTIGATION

7.1 Field Techniques

All work during the cultural resources investigations for the proposed ISFF project was performed in a manner consistent with formal and informal standards and guidelines issued by the Idaho State Historic Preservation Office (SHPO), the Advisory Council on Historic Preservation (ACHP), the National Park Service (NPS), and Department of Interior (DOI) as outlined in DOE-ID's draft INEEL Cultural Resources Management Plan (Braun et al. 2000). No new field activities were necessary to identify cultural resources and evaluate the potential effects of ISFF construction on them.

7.2 Surface Conditions

No fieldwork was conducted for the ISFF cultural resources investigation. During previous investigations, ground visibility in the area was unobscured.

7.3 Areas Not Examined

All areas proposed for ground disturbance during ISFF construction have been intensively surveyed through previous efforts.

7.4 Field Personnel

No fieldwork was conducted for this project.

7.5 Dates of Fieldwork

No fieldwork was conducted for this project.

7.6 Problems Encountered

No problems were encountered.

8. RESULTS

8.1 All Cultural Resources Identified in the Area of Potential Effects

Archive searches revealed no cultural resources within the previously surveyed areas of potential effect for the ISFF project. Only three archaeological localities are nearby. Two are isolated artifacts unlikely to yield any additional information and evaluated as ineligible for nomination to the National Register and one is a historic homestead that is evaluated as eligible for nomination. Again, all are outside the areas of potential effect for the ISFF project.

8.2 Cultural Resources Noted but Not Recorded:

Intensive surveys have revealed no cultural resources within the areas of potential effect for the ISFF project. All cultural resources with visible surface remains in the vicinity have been recorded.

8.3 Summary of Important Characteristics of Identified Resources

No cultural resources are located within the areas of potential effect for ISFF construction.

8.4 National Register Eligibility

No cultural resources are located within the areas of potential effect for ISFF construction.

8.5 Recommendations for Further Investigations

No further cultural resource investigations are recommended in advance of ISFF construction. However, if cultural resource materials are unexpectedly encountered during project activities, FWENC employees are authorized to stop work and immediately contact the INEEL CRM Office for assistance. Additional investigations will be initiated in this unlikely event. Ongoing monitoring efforts of active project areas, (INEEL facility perimeters, known archaeological sites, etc.) by the INEEL CRM Office should also help to ensure that any newly exposed resources are discovered and protected in a timely and appropriate fashion.

9. CONCLUSIONS AND RECOMMENDATIONS

9.1 Summary of Investigations

Cultural resource investigations completed to determine if the proposed ISFF project will have any effect on significant cultural resources were limited to archive searches. The INEEL CRM Office is confident that all cultural resources within the project area were identified through previous survey and consultation. Since no cultural resources have been identified in the areas of potential effect for the project, it is clear that ISFF construction will have no effect on significant properties.

9.2 Potential Threats to the Integrity of Identified Properties

The proposed ISFF project is expected to have no effect on significant cultural resources.

9.3 Relationship of Identified Properties to Project Impacts

There are no potential threats to any cultural resources, particularly those properties that are eligible or potentially eligible for nomination to the National Register, as a result of the proposed construction of the ISFF adjacent to INTEC.

9.4 Avoidance or Mitigation Options

No avoidance or mitigation is necessary because the proposed activities will have no effect on significant cultural resources.

9.5 Recommendations for Additional Investigations or Protection Measures

No additional work or protective measures are recommended in advance of construction activities associated with the ISFF project east of INTEC. INEEL facility perimeters, like the one at INTEC where this project is located are routinely sampled for archaeological monitoring. These ongoing investigations should ensure that any unexpected impacts to sensitive properties as a result of the new construction or any other INEEL program will be identified in a timely fashion and mitigated as appropriate. Observance of the INEEL Stop Work Authority, which authorizes all INEEL employees (including those working at the ISFF) to stop work if cultural resources are unexpectedly discovered at any time and in any place on the INEEL, should also ensure that resources are protected from inadvertent harm.

10. REPOSITORY

Southeastern Idaho Regional Archaeological Center, Idaho Museum of Natural History, Idaho State University, Pocatello, Idaho. Records are also maintained and artifacts may be temporarily stored at the INEEL CRM Office, Bldg IF-601, 2251 N. Blvd, Idaho Falls, Idaho.

11. REFERENCES

Arrowrock Group, 1997, "Historic Context, Idaho National Engineering and Environmental Laboratory," *INEEL/EXT-97-01021*, Idaho Falls, ID.

Braun, J. B. et al., 2000, "Idaho National Engineering and Environmental Laboratory Cultural Resources Management Plan," *DOE/ID-10316*, Rev 2., Idaho Falls, ID.

Butler, B. R., 1970, "A Report on the 1967-1969 Archaeological Survey of the National Reactor Testing Station, Idaho," *Tebiwa* 13(1):58-75.

Idaho State Historic Preservation Office, 1995, Idaho Archaeological and Historical Survey Manual: Guidelines for Identifying and Evaluating Cultural Properties, *Historic Preservation Series No. 8*, Boise, ID.

Miller, S. J., 1985, "Archaeological Clearance Surveys and Cultural Resource Inventories on the Idaho National Engineering Laboratory, April 1967 – March1985," unpublished report on file at the INEEL CRM Office, Idaho Falls, ID.

Pace, B. Ringe and J. B. Braun, 2000, "Draft Historic American Engineering Record for INTEC Chemical Processing Facilities," *INEEL/EXT-2000-0129*, Idaho Falls, ID.

Reed, W. G., J. W. Ross, B. L. Ringe, and R. N. Holmer, 1987a, "Archaeological Investigations on the Idaho National Engineering Laboratory: 1984-1985, Revised Edition," *Swanson/Crabtree Anthropological Research Laboratory Reports of Investigations: 87-1*, Pocatello, ID.

Reed, W. G., J. W. Ross, B. L. Ringe, and R. N. Holmer, 1987b, "Annual Review of Archaeological Investigations on the Idaho National Engineering Laboratory: 1986," *Swanson/Crabtree Anthropological Research Laboratory Reports of Investigations: 87-2*, Pocatello, ID.

Ringe, B. L., 1989 "Archaeological Investigations on the Idaho National Engineering Laboratory: the CPP/TRA Gravel Pit" *Swanson/Crabtree Anthropological Research Laboratory Reports of Investigations: 89-1*, Pocatello, ID. Document on file at the INEEL CRM Office, Idaho Falls, ID.

Ringe, B. L., 1995, *Locational Analysis and Preliminary Predictive Model for Prehistoric Cultural Resources on the Idaho National Engineering Laboratory*, MA thesis, Department of Anthropology, Idaho State University, Pocatello, ID.

Stacey, S. M., 1998, "Historic American Engineering Record No. ID-33-C: Idaho National Engineering and Environmental Laboratory, Idaho Chemical Processing Plant, Old Waste Calcining Facility," *INEEL/EXT-97-01370*, Idaho Falls, ID.

Stacey, S. M., 2000, "Proving the Principle: A History of the Idaho National Engineering and Environmental Laboratory 1949- 1999," *DOE/ID-10799*, Idaho Falls, ID.

APPENDIX A:
Key Information

A. Project name:
Idaho Spent Fuel Facility

B. Project number:
BBWI-2001-09

C. Agency name:
INEEL Cultural Resource Management Office for Foster Wheeler Co. for the Department of Energy Idaho Operations Office

D. Report author:
Brenda Ringe Pace

E. Principal Investigator:
Brenda Ringe Pace

F. Report date:
March 12, 2001

G. County:
Butte County

H. Legal locations:

NAME OF AREA	LEGAL LOCATION	7.5' MAP
Idaho Spent Fuel Facility	SE ¼, SW ¼, Sec. 19, T3N, R30E	Circular Butte 3 SW, Idaho
Construction Laydown Area	NE ¼, SE ¼, SW ¼, Sec. 19, T3N, R30E	Circular Butte 3 SW, Idaho

9. **Survey acreage:** (Note: project involved no new intensive survey).

0 acres	**Intensive (20 meter interval)**
0 acres	**Reconnaissance (> 20 m interval)**
> 18acres	**Previously surveyed (intensive)**
0 acres	**Previously surveyed (reconnaissance)**

APPENDIX B:
Certification of Results

CERTIFICATION OF RESULTS:

I certify that this investigation was conducted and documented according to Secretary of Interior's Standards and Guidelines and that this report is complete and accurate to the best of my knowledge.

Original signed by B.R. Pace

Signature of Principal Investigator   **Date**

APPENDIX C:
Project Maps

Appendix C contains a variety of maps. One of them shows the locations of cultural resources in the vicinity of the Idaho Nuclear Technology and Engineering Center and proposed Idaho Spent Fuel Facility. The locational information presented in this particular map is distributed for Official Use Only and may have been removed from some versions of the document. It is exempted from the Freedom of Information Act under Section 9 of the Archaeological Resources Protection Act of 1979 (as amended) and under Section 304 of the National Historic Preservation Act of 1966 (as amended). Distribution of any cultural resource locational information from this document and particularly from this Appendix must be approved in advance by contacting the INEEL CRM Office, PO Box 1625-2105, Idaho Falls, ID 83415, telephone: (208) 526-0916.

The following maps are included here:

Map 1: General location of the Idaho Nuclear Technology and Engineering Center and proposed Idaho Spent Fuel Facility on the Idaho National Engineering and Environmental Laboratory.

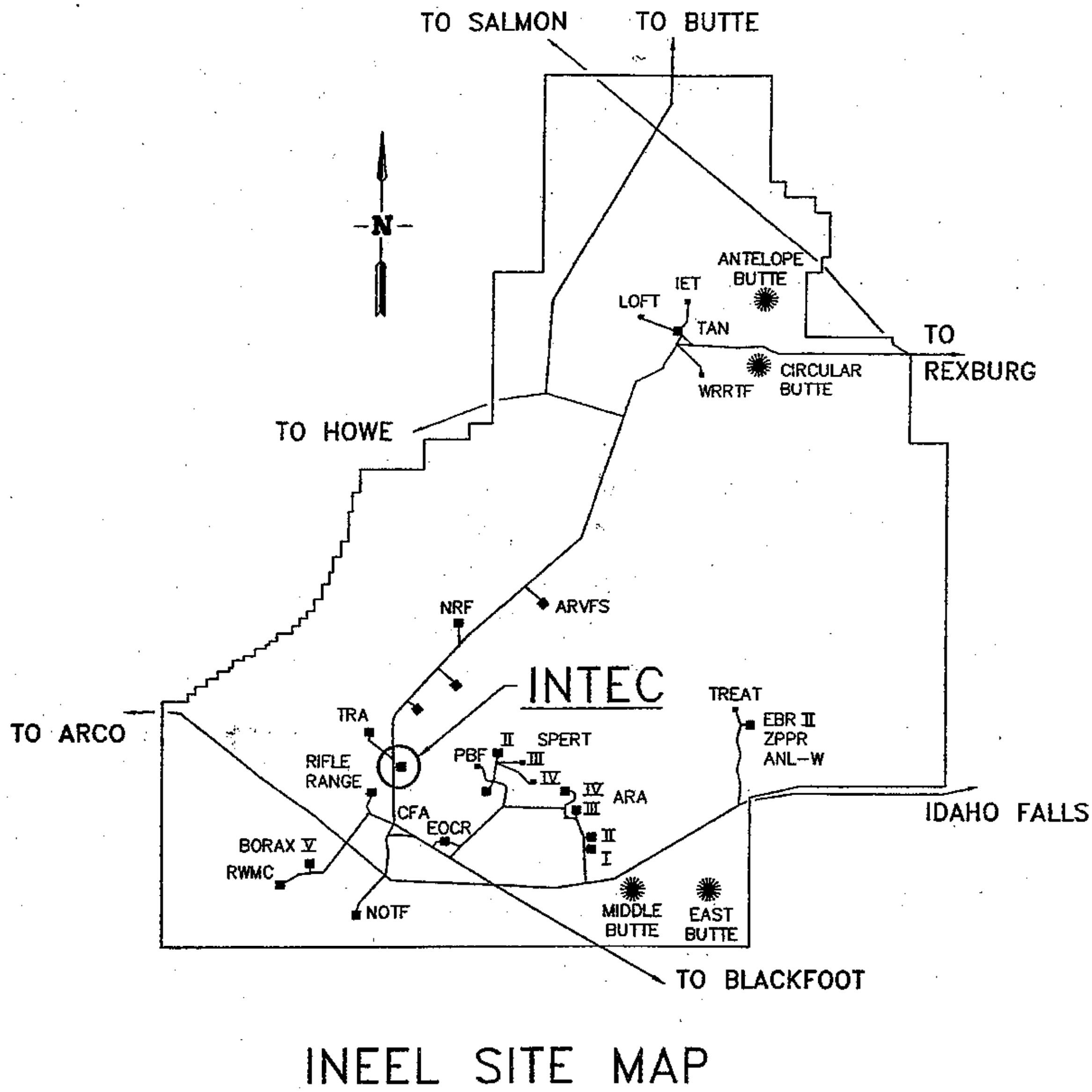
Map 2: Plot plan of the proposed Idaho Spent Fuel Facility and associated construction laydown area east of the Idaho Nuclear Technology Center.

Map 3: Partial 7.5' topographic map (Circular Butte 3SW) showing the two areas of potential effect for the Idaho Spent Fuel Facility project.

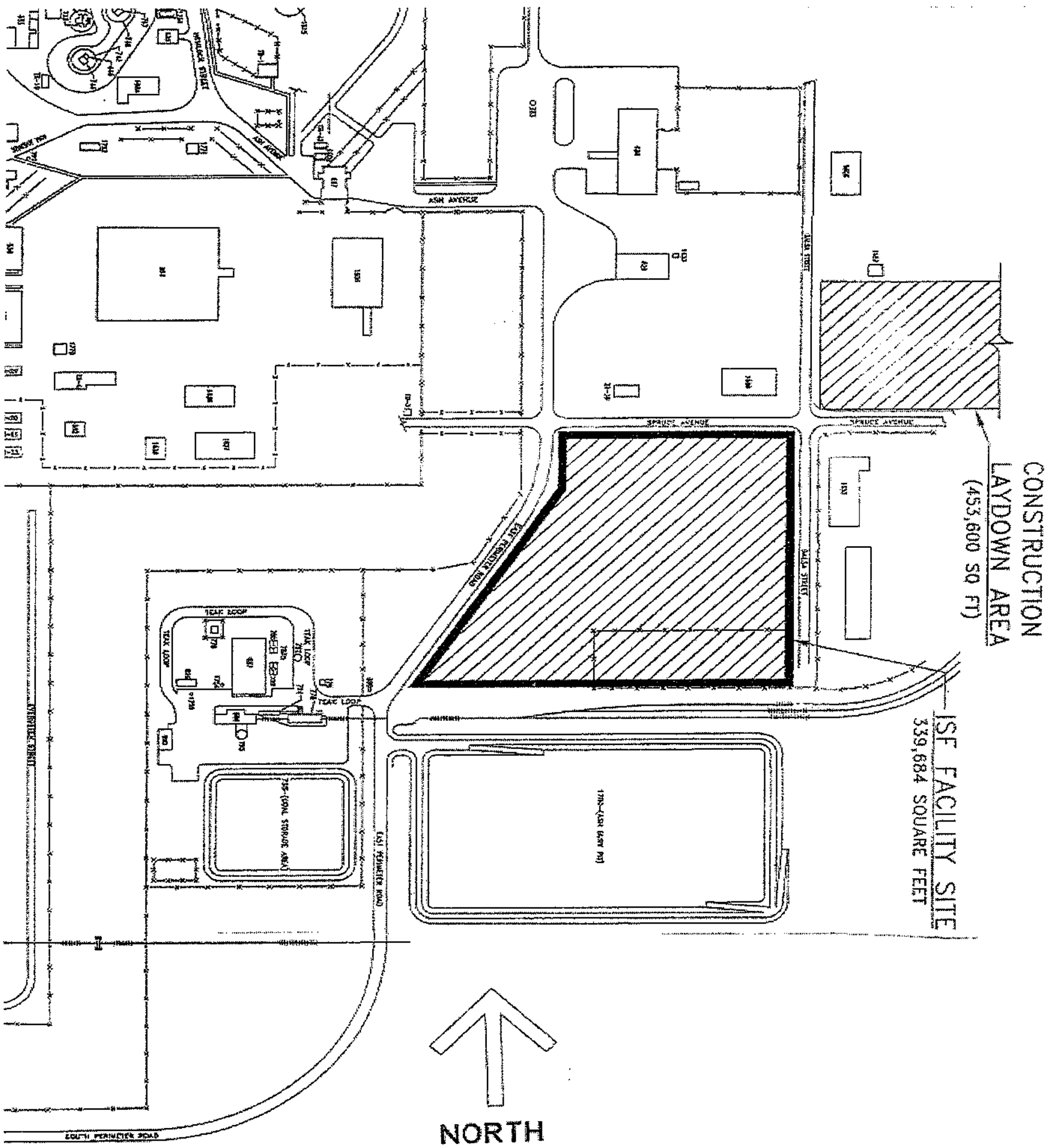
Map 4: Partial 7.5' topographic map (Circular Butte 3SW) showing previous archaeological survey coverage in the vicinity of the Idaho Nuclear Technology and Engineering Center and proposed Idaho Spent Fuel Facility.

Map 5: Partial 7.5' topographic map (Circular Butte 3SW) showing the areas of potential effect for the Idaho Spent Fuel Facility project in relation to known cultural resources in the vicinity. For Official Use Only.

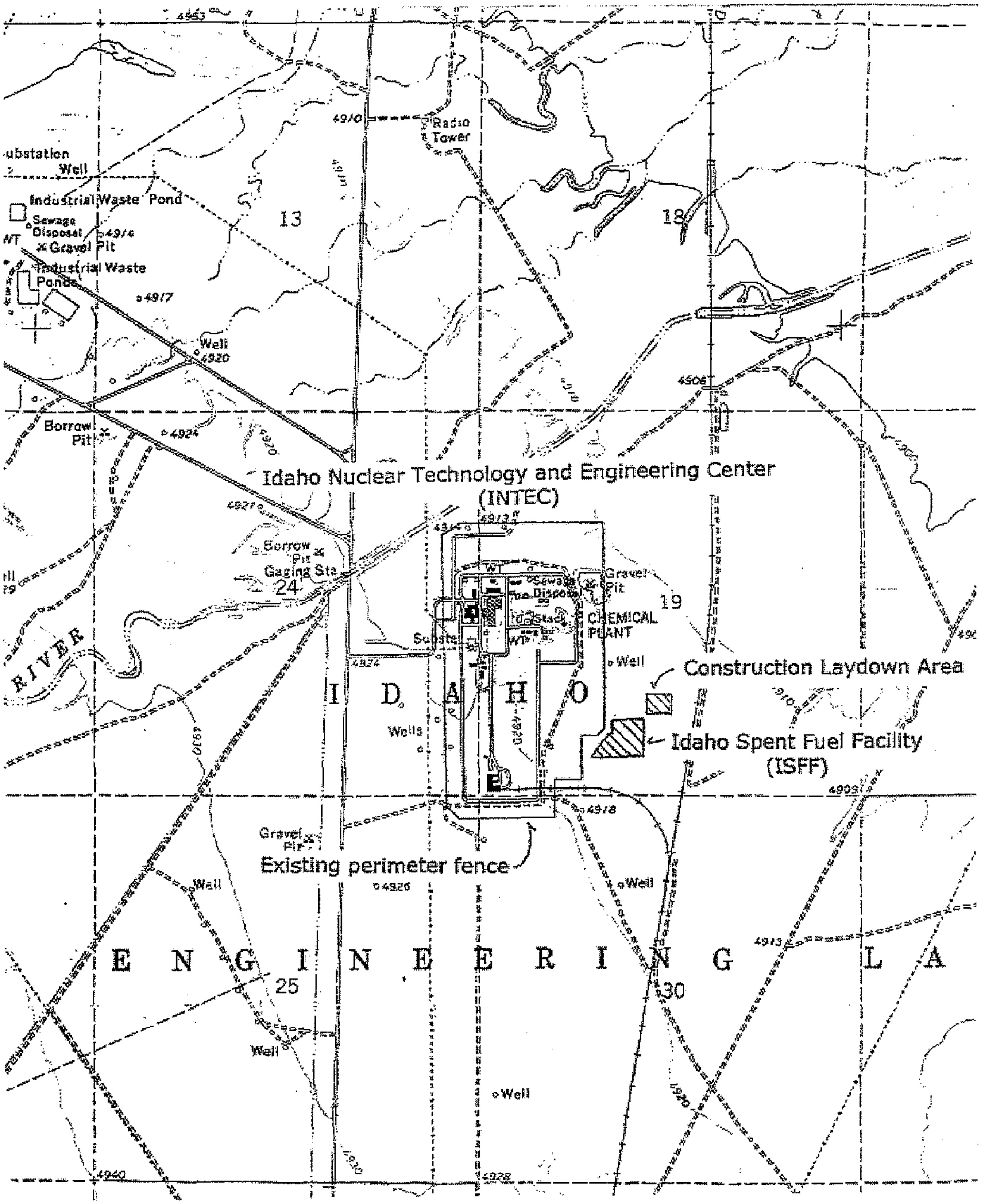
Map 1: General location of the Idaho Nuclear Technology and Engineering Center and proposed Idaho Spent Fuel Facility on the Idaho National Engineering and Environmental Laboratory.



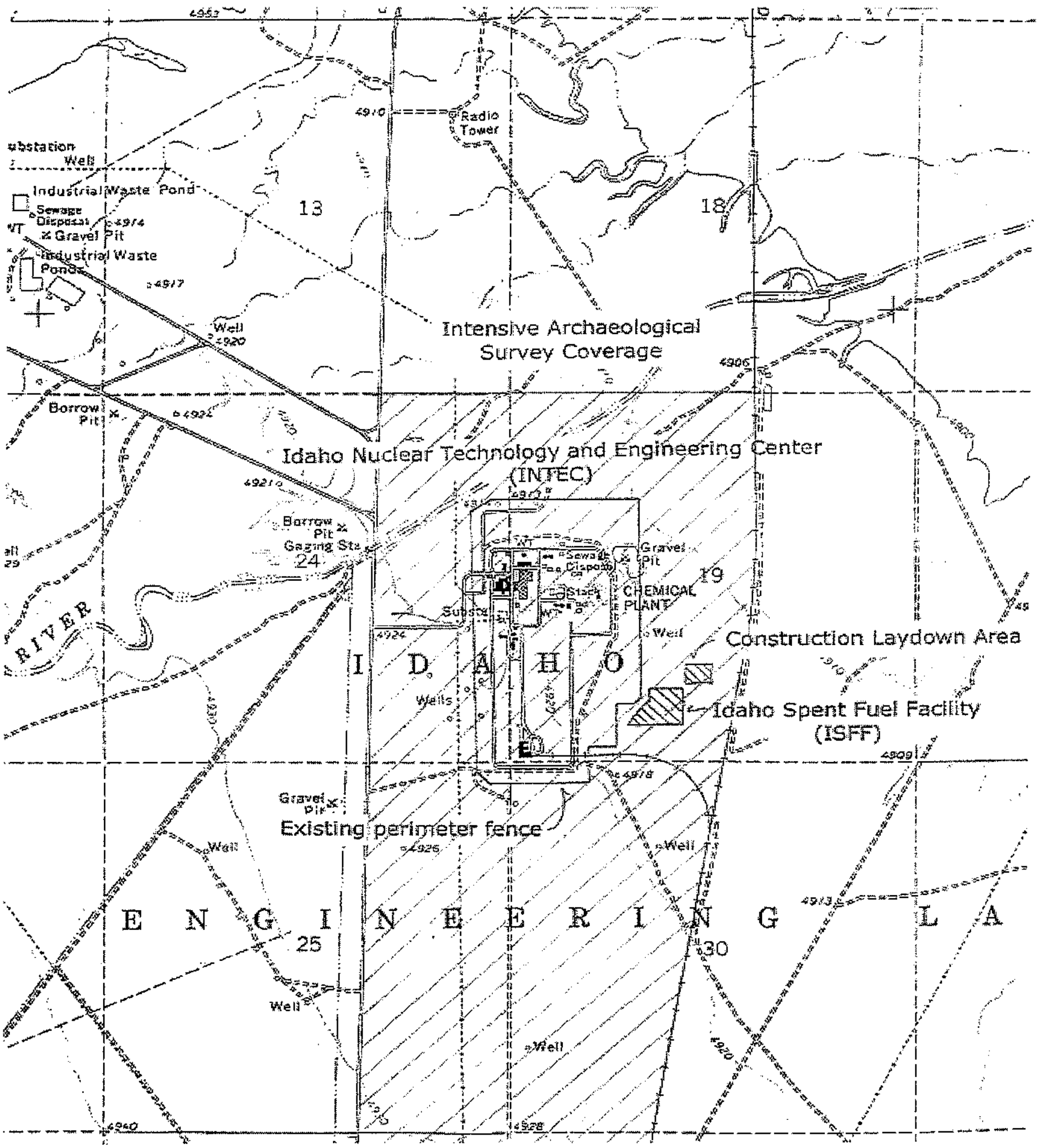
Map 2: Plot plan of the proposed Idaho Spent Fuel Facility and associated construction laydown area east of the Idaho Nuclear Technology and Engineering Center.



Map 3: Partial 7.5' topographic map (Circular Butte 3SW) showing the two areas of potential effect for the Idaho Spent Fuel Facility project.



Map 4: Partial 7.5' topographic map (Circular Butte 3SW) showing previous archaeological survey coverage in the vicinity of the Idaho Nuclear Technology and Engineering Center and proposed Idaho Spent Fuel Facility.



Map 5: Partial 7.5' topographic map (Circular Butte 3SW) showing the areas of potential effect for the Idaho Spent Fuel Facility project in relation to known cultural resources in the vicinity. For Official Use only.

For Official Use only.