3.3.3.3 Community Services

3.3.3.3.1 Education

Thirteen school districts provide public education services and facilities in the INEEL ROI. As shown in Figure 3–12, they operated at between 50 percent (Swan Valley District) and 100 percent (Shelley District) capacity in 1997. In 1997, the average student-to-teacher ratio for the INEEL ROI was 18.8:1 (Nemeth 1997a). In 1990, the average student-to-teacher ratio for Idaho was 12.8:1 (DOC 1990b, 1994).

3.3.3.3.2 Public Safety

In 1997, a total of 475 sworn police officers were serving the four-county ROI. In 1997, the average ROI officer-to-population ratio was 2.2 officers per 1,000 persons (Nemeth 1997b). This compares with the 1990 State average of 1.6 officers per 1,000 persons (DOC 1990b). In 1997, 560 paid and volunteer firefighters provided fire protection services in the INEEL ROI. The average firefighter-to-population ratio in the ROI in 1997 was 2.6 firefighters per 1,000 persons (Nemeth 1997b). This compares with the 1990 State average of 1.2 firefighters per 1,000 persons (DOC 1990b). Figure 3–13 displays the ratio of sworn police officers and firefighters to the population for the INEEL ROI.

3.3.3.3.3 Health Care

In 1996, a total of 329 physicians served the ROI. The average ROI physician-to-population ratio was 1.5 physicians per 1,000 persons as compared with a 1996 State average of 1.7 physicians per 1,000 persons (Randolph 1997). In 1997, there were five hospitals serving the four-county ROI. The hospital bed-to-population ratio averaged 4.6 hospital beds per 1,000 persons (Nemeth 1997c). This compares with the 1990 State average of 3.3 beds per 1,000 persons (DOC 1996:128). Figure 3–13 displays the ratio of hospital beds and physicians to the population for all the counties in the INEEL ROI.

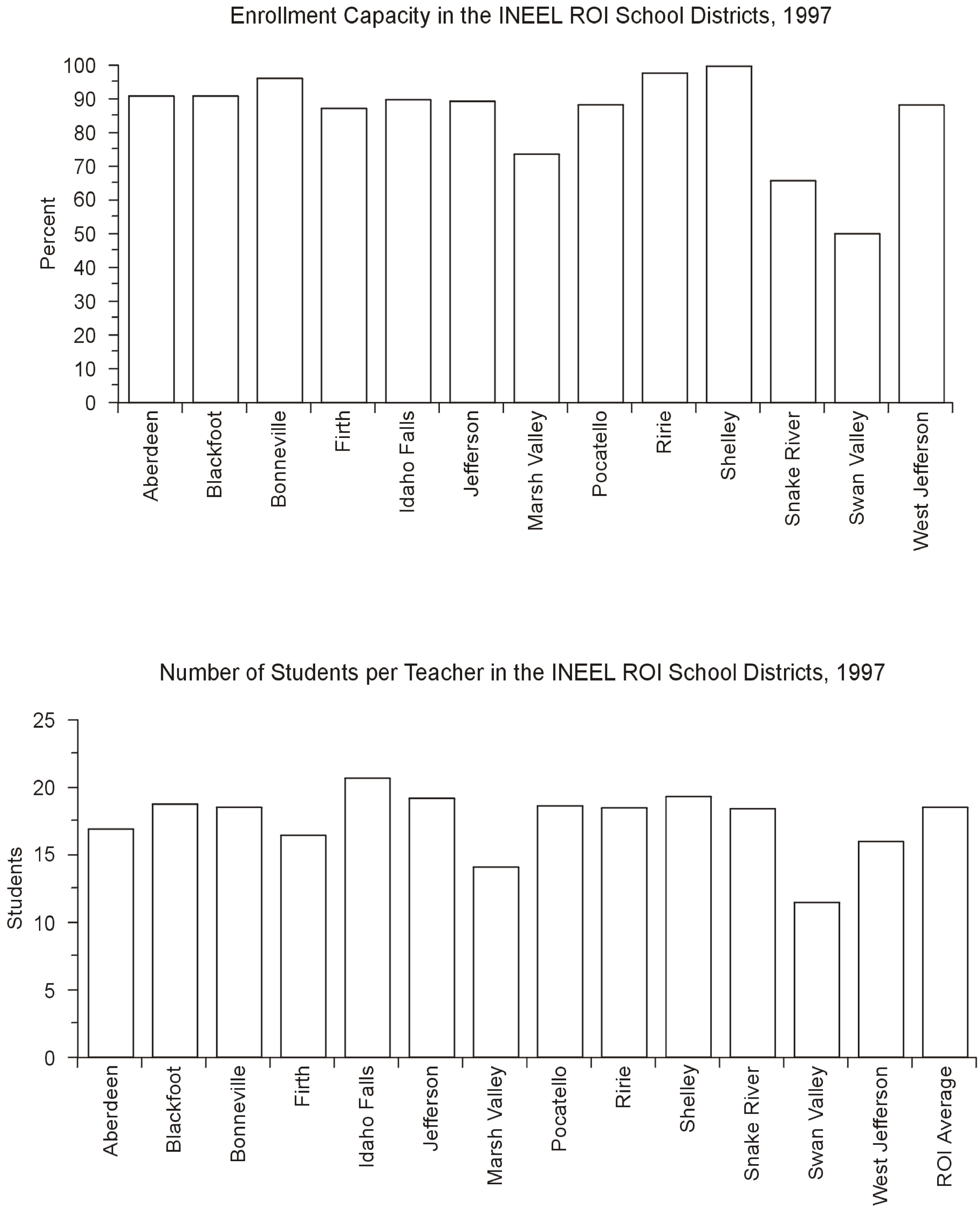
3.3.3.4 Local Transportation

Vehicular access to INEEL is provided by U.S. Routes 20 and 26 to the south and State Routes 22 and 33 to the north. U.S. Routes 20 and 26 and State Routes 22 and 33 all share rights-of-way west of INEEL (see Figure 2–3).

There are two road segments that could be affected by the disposition alternatives: U.S. Route 20 from U.S. Routes 26 and 91 at Idaho Falls to U.S. Route 26 East and U.S. Routes 20 and 26 from U.S. Route 26 East to State Routes 22 and 33.

There are no current road improvement projects affecting access to INEEL; however, there are two planned road improvement projects that could affect future access to INEEL. There are plans to resurface State Route 33 from the intersection of State Routes 28 and 33 to 13 km (8.1 mi) east of this intersection. There are also plans for routine paving of segments along State Route 28 from now until the year 2000 (Bala 1997).

DOE shuttle vans provide transportation between INEEL facilities and Idaho Falls for DOE and contractor personnel. The major railroad in the ROI is the Union Pacific Railroad. The railroad's Blackfoot-to-Arco Branch provides rail service to the southern portion of INEEL. A DOE-owned spur connects the Union Pacific Railroad to INEEL by a junction at Scovill Siding. There are no navigable waterways within the ROI capable of accommodating waterborne transportation of material shipments to INEEL. Fanning Field in Idaho Falls



Source: Nemeth 1997a.

ROI Region of influence

Figure 3–12. School District Characteristics for the INEEL Region of Influence

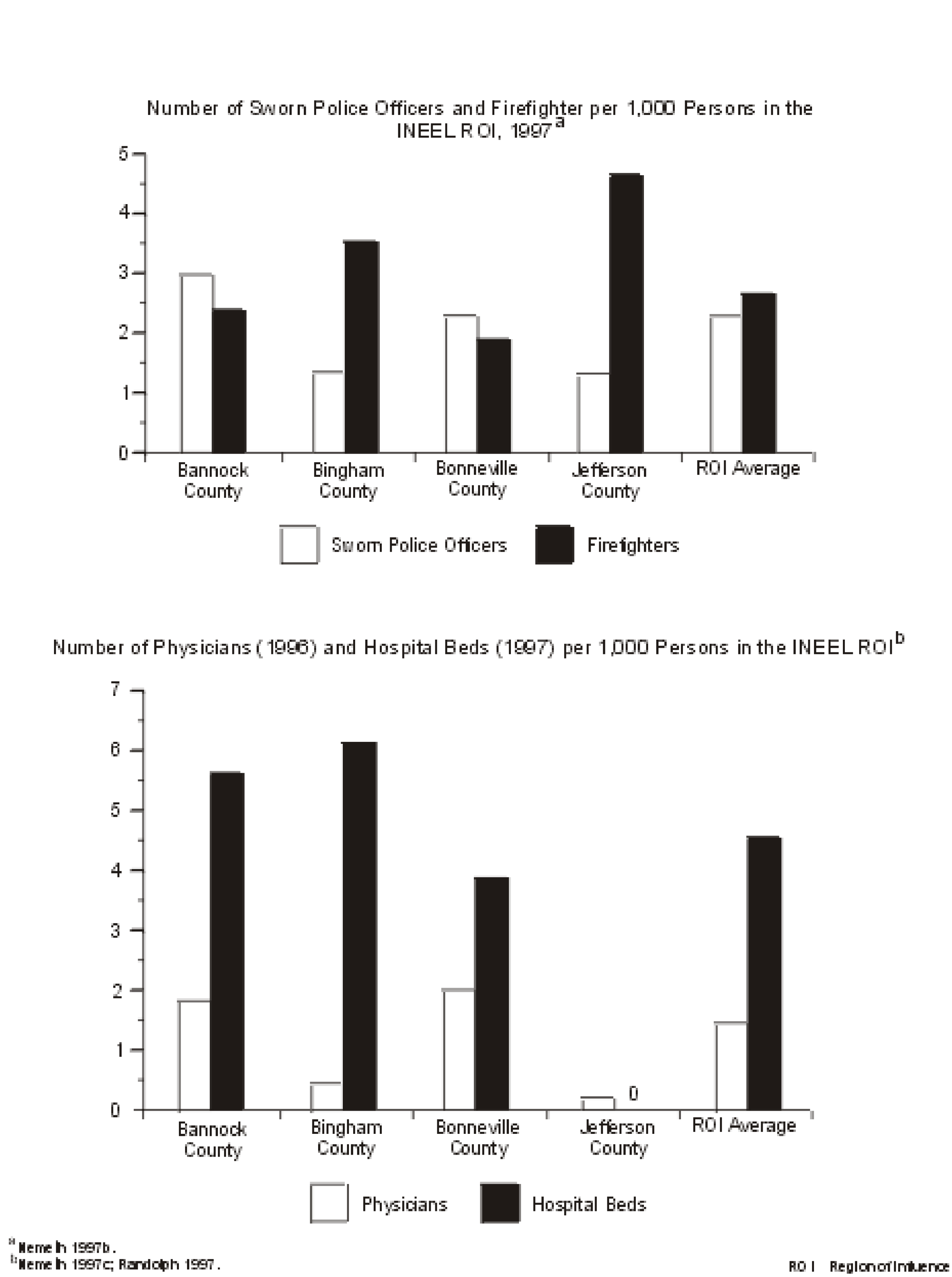


Figure 3–13. Public Safety and Health Care Characteristics for the INEEL Region of Influence

and Pocatello Municipal Airport in Pocatello provide jet air passenger and cargo service for both national and local carriers. Numerous smaller private airports are located throughout the ROI (DOE 1996a).

3.3.4 Existing Human Health Risk

Public and occupational health and safety issues include the determination of potentially adverse effects on human health that result from acute and chronic exposures to ionizing radiation and hazardous chemicals.

3.3.4.1 Radiation Exposure and Risk

3.3.4.1.1 General Site Description

Major sources and levels of background radiation exposure to individuals in the vicinity of INEEL are shown in Table 3–20. Annual background radiation doses to individuals are expected to remain constant over time. The total dose to the population, in terms of person-rem, changes as the population size changes. Background radiation doses are unrelated to INEEL operations.

Table 3–20. Sources of Radiation Exposure to Individuals in the INEEL Vicinity Unrelated to INEEL Operations

Source	Effective Dose Equivalent (mrem/yr)
Natural background radiation[a]	
Cosmic radiation	48
External terrestrial radiation	73
Internal terrestrial/cosmogenic radiation	40
Radon in homes (inhaled)	200[b]
Other background radiation[c]	
Diagnostic x rays and nuclear medicine	53
Weapons test fallout	<1
Air travel	1
Consumer and industrial products	10
Total	426

[a] Mitchell et al. 1997:4-21.
[b] An average for the United States.
[c] NCRP 1987:11, 40, 53.

Releases of radionuclides to the environment from INEEL operations provide another source of radiation exposure to individuals in the vicinity of INEEL. Types and quantities of radionuclides released from INEEL operations in 1996 are listed in *Idaho National Engineering Laboratory Site Environmental Report for Calendar Year 1996* (Mitchell et al. 1997:7-4, 7-5). The doses to the public resulting from these releases are presented in Table 3–21. These doses fall within radiological limits per DOE Order 5400.5 (DOE 1993a:II-1–II-5) and are much lower than those of background radiation.

Using a risk estimator of 500 cancer deaths per 1 million person-rem (5×10^{-4} fatal cancer per person-rem) to the public (see Appendix F.10), the fatal cancer risk to the maximally exposed member of the public due to radiological releases from INEEL operations in 1996 is estimated to be 1.6×10^{-8}. That is, the estimated probability of this person dying of cancer at some point in the future from radiation exposure associated with 1 year of INEEL operations is less than 2 in 100 million. (It takes several to many years from the time of radiation exposure for a cancer to manifest itself.)

Table 3–21. Radiation Doses to the Public From Normal INEEL Operations in 1996 (Total Effective Dose Equivalent)

	Atmospheric Releases		Liquid Releases		Total	
Members of the Public	**Standard**[a]	**Actual**	**Standard**[a]	**Actual**	**Standard**[a]	**Actual**
Maximally exposed individual (mrem)	10	0.031	4	0	100	0.031
Population within 80 km (person-rem)[b]	None	0.24	None	0	100	0.24
Average individual within 80 km (mrem)[c]	None	0.0020	None	0	None	0.0020

[a] The standards for individuals are given in DOE Order 5400.5 (DOE 1993a:II-1–II-5). As discussed in that order, the 10-mrem/yr limit from airborne emissions is required by the Clean Air Act, and the 4-mrem/yr limit is required by the Safe Drinking Water Act; for this SPD EIS, the 4-mrem/yr value is conservatively assumed to be the limit for the sum of doses from all liquid pathways. The total dose of 100 mrem/yr is the limit from all pathways combined. The 100-person-rem value for the population is given in proposed 10 CFR 834, as published in 58 FR 16268 (DOE 1993b:para. 834.7). If the potential total dose exceeds the 100-person-rem value, it is required that the contractor operating the facility notify DOE.

[b] About 121,500 in 1996.

[c] Obtained by dividing the population dose by the number of people living within 80 km (50 mi) of the site.

Source: Mitchell, Peterson, and Hoff 1996:4-48.

According to the same risk estimator, 1.2×10^{-4} excess fatal cancer is projected in the population living within 80 km (50 mi) of INEEL from normal operations in 1996. To place this number in perspective, it may be compared with the number of fatal cancers expected in the same population from all causes. The 1996 mortality rate associated with cancer for the entire U.S. population was 0.2 percent per year (Famighetti 1998:964). Based on this mortality rate, the number of fatal cancers expected during 1995 from all causes in the population living within 80 km (50 mi) of INEEL was 243. This expected number of fatal cancers is much higher than the 1.2×10^{-4} fatal cancer estimated from INEEL operations in 1996.

INEEL workers receive the same doses as the general public from background radiation, but they also receive an additional dose from working in facilities with nuclear materials. Table 3–22 presents the average dose to the individual worker and the cumulative dose to all workers at INEEL from operations in 1996. These doses fall within the radiological regulatory limits of 10 CFR 835 (DOE 1995a:para. 835.202). According to a risk estimator of 400 fatal cancers per 1 million person-rem among workers[4] (Appendix F.10), the number of projected fatal cancers among INEEL workers from normal operations in 1996 is 0.082.

A more detailed presentation of the radiation environment, including background exposures and radiological releases and doses, is presented in the *Idaho National Engineering Laboratory Site Environmental Report for Calendar Year 1996* (Mitchell et al. 1997). The concentrations of radioactivity in various environmental media (including air, water, and soil) in the site region (on and off the site) are also presented in that report.

3.3.4.1.2 Proposed Facility Location

External radiation doses and concentrations of gross alpha, plutonium, and americium in air have been measured in the INTEC area. In 1996, the annual average dose along the boundary of INTEC was about 180 mrem. If radiation from the “hot spots” along this boundary (e.g., the tree farm) is not included, the dose is reduced to about 150 mrem. This is about 20 mrem higher than the average dose measured at the offsite control locations. Concentrations in air of gross alpha, plutonium 239/240, and americium 241 in 1995 were 5×10^{-4} pCi/m^3, 2.1×10-

---

[4] The risk estimator for workers is lower than the estimator for the public because of the absence from the workforce of the more radiosensitive infant and child age groups.

^{5} pCi/m^3, and 6×10^{-6} pCi/m^3, respectively. The gross alpha value was about three times lower than that measured at the offsite control locations, and the plutonium 239/240 and americium 241

Table 3–22. Radiation Doses to Workers From Normal INEEL Operations in 1996 (Total Effective Dose Equivalent)

	Onsite Releases and Direct Radiation	
Occupational Personnel	**Standard**[a]	**Actual**
Average radiation worker (mrem)	None[b]	125[c]
Total workers (person-rem)[d]	None	205[c]

[a] The radiological limit for an individual worker is 5,000 mrem/yr (DOE 1995a:para. 835.202). However, DOE's goal is to maintain radiological exposure as low as is reasonably achievable. It has therefore established an administrative control level of 2,000 mrem/yr (DOE 1994a:2-3); the site must make reasonable attempts to maintain individual worker doses below this level.

[b] No standard is specified for an "average radiation worker"; however, the maximum dose that this worker may receive is limited to that given in footnote "a."

[c] Does not include doses received at the Naval Reactors Facility. The impacts associated with this facility fall under the jurisdiction of the Navy as part of the Nuclear Propulsion Program.

[d] About 1,650 (badged) in 1995.

Source: Abbott, Crockett, and Moor 1997.

values were each about 50 percent higher. In 1996, the concentration of gross alpha was about 1×10^{-3} pCi/m^3 in the INTEC area. No measurements of plutonium or americium in air were reported in this area in 1996 (Mitchell, Peterson, and Hoff 1996:4-10, 4-17, 4-18, 4-28, 4-31; Mitchell et al.1997:4-4, 4-19, 4-21, 4-23).

3.3.4.2 Chemical Environment

The background chemical environment important to human health consists of the atmosphere, which may contain hazardous chemicals that can be inhaled; drinking water, which may contain hazardous chemicals that can be ingested; and other environmental media through which people may come in contact with hazardous chemicals (e.g., surface water during swimming, soil through direct contact, or food). Hazardous chemicals can cause cancer and noncancer health effects. The baseline data for assessing potential health impacts from the chemical environment are addressed in Section 3.3.1.

Effective administrative and design controls that decrease hazardous chemical releases to the environment and help achieve compliance with permit requirements (e.g., air emissions and NPDES permit requirements) contribute to minimizing health impacts on the public. The effectiveness of these controls is verified through the use of monitoring information and inspection of mitigation measures. Health impacts on the public may occur via inhalation of air containing hazardous chemicals released to the atmosphere during normal INEEL operations. Risks to public health from other possible pathways, such as ingestion of contaminated drinking water or direct exposure, are lower than those via the inhalation pathway. At INEEL, the risk to public health from water ingestion and direct exposure pathways is low because surface water is not used for drinking or as a receptor for wastewater discharges.

Baseline air emission concentrations and applicable standards for hazardous chemicals are addressed in Section 3.3.1. These baseline concentrations are estimates of the highest existing offsite concentrations and represent the highest concentrations to which members of the public could be exposed. These concentrations are in compliance with applicable guidelines and regulations. Information on estimating the health impacts of hazardous chemicals is presented in Appendix F.10.

Exposure pathways to INEEL workers during normal operation may include the inhalation of contaminants in the workplace atmosphere and direct contact with hazardous materials. The potential for health impacts varies among facilities and workers, and available information is insufficient for a meaningful estimate of impacts. However, workers are protected from workplace hazards through appropriate training, protective equipment, monitoring, substitution, and engineering and management controls. INEEL workers are also protected by adherence to OSHA and EPA standards that limit workplace atmospheric and drinking water concentrations of potentially hazardous chemicals. Appropriate monitoring that reflects the frequency and amounts of chemicals used in the operational processes ensures that these standards are not exceeded. Additionally, DOE requires that conditions in the workplace be as free as possible from recognized hazards that cause, or are likely to cause, illness or physical harm. Therefore, workplace conditions at INEEL are substantially better than required by standards.

3.3.4.3 Health Effects Studies

Epidemiological studies were conducted on communities surrounding INEEL to determine whether there are excess cancers in the general population. Two of these are described in more detail in Appendix M.4.4 of the *Storage and Disposition PEIS* (DOE 1996a:M-233, M-234). No excess cancer mortality was reported, and although excess cancer incidence was observed, no association thereof with INEEL was established. A study by the State of Idaho completed in June 1996 found excess brain cancer incidence in the six counties surrounding INEEL, but a follow-up survey concluded that “there was nothing that clearly linked all these cases to one another or any one thing.”

No occupational epidemiological studies have been completed at INEEL to date, but several worker health studies were initiated recently at INEEL and another is almost complete. Researchers from the Boston University School of Public Health in cooperation with the National Institute of Occupational Safety and Health (NIOSH), are investigating the effects of workforce restructuring (downsizing) in the nuclear weapons industry. The health of displaced workers will be studied. Under a NIOSH cooperative agreement, the epidemiologic evaluation of childhood leukemia and paternal exposure to ionizing radiation now includes INEEL as well as other DOE sites. Another study began in October 1997, *Medical Surveillance for Former Workers at INEEL*, is being carried out by a group of investigators consisting of the Oil, Chemical, and Atomic Workers International Union, Mt. Sinai School of Medicine, the University of Massachusetts at Lowell, and the Alice Hamilton College. A cohort mortality study of the workforce at INEEL being conducted by NIOSH is not expected to be released until December 1998. DOE has implemented an epidemiologic surveillance program to monitor the health of current INEEL workers. A discussion of this program is given in Appendix M.4.4 of the *Storage and Disposition PEIS* (DOE 1996a:M-233, M-234).

3.3.4.4 Accident History

DOE conducted a study, the *Idaho National Engineering Laboratory Historical Dose Evaluation* (DOE/ID-12119), to estimate the potential offsite radiation doses for the entire operating history of INEEL (DOE 1996a:3-139). Releases resulted from a variety of tests and experiments as well as a few accidents at INEEL. The study concluded that these releases contributed to the total radiation dose during test programs of the 1950s and early 1960s. The frequency and size of releases has declined since that time. There have been no serious unplanned or accidental releases of radioactivity or other hazardous substance at INEEL facilities in the last 10 years of operation.

3.3.4.5 Emergency Preparedness

Each DOE site has established an emergency management program that would be activated in the event of an accident. This program has been developed and maintained to ensure adequate response to most accident conditions and to provide response efforts for accidents not specifically considered. The emergency management program includes emergency planning, preparedness, and response.

Government agencies whose plans are interrelated with the INEEL emergency plan for action include the State of Idaho, Bingham County, Bonneville County, Butte County, Clark County, Jefferson County, the Bureau of Indian Affairs, and the Fort Hall Indian Reservation. INEEL contractors are responsible for responding to emergencies at their facilities. Specifically, the emergency action director is responsible for recognition, classification, notifications, and protective action recommendations. At INEEL, emergency preparedness resources include fire protection from onsite and offsite locations and radiological and hazardous chemical material response. Emergency response facilities include an emergency control center at each facility, at the INEEL warning communication center, and at the INEEL site emergency operations center. Seven INEEL medical facilities are also available to provide routine and emergency service.

DOE has specified actions to be taken at all DOE sites to implement lessons learned from the emergency response to an accidental explosion at Hanford in May 1997. These actions and the timeframe in which they must be implemented are presented in Section 3.2.4.5.

3.3.5 Environmental Justice

Environmental justice concerns the environmental impacts that proposed actions may have on minority and low-income populations, and whether such impacts are disproportionate to those on the population as a whole in the potentially affected area. In the case of INEEL, the potentially affected area includes only parts of central Idaho.

The potentially affected area surrounding INTEC is defined by a circle with an 80-km (50-mi) radius centered at FPF (lat. 43E34'12.5" N, long. 112E55' 55.4" W). The total population residing within that area in 1990 was 119,138. The proportion of the population there that was considered minority was 9.9 percent. The same census data show that the percentage of minorities for the contiguous United States was 24.1, and for the State of Idaho, 7.8 (DOC 1992).

Figure 3–14 illustrates the racial and ethnic composition of the minority population in the potentially affected area centered at FPF. At the time of the 1990 census, Hispanics and Native Americans were the largest minority groups within that area, constituting 6 percent and 2.6 percent of the total population, respectively, during the 1990 census. Asians constituted about 1 percent, and blacks, about 0.3 percent (DOC 1992).

A breakdown of incomes in the potentially affected area is also available from the 1990 census data (DOC 1992). At that time, the poverty threshold was $9,981 for a family of three with one related child under 18 years of age. A total of 14,386 persons (12.2 percent of the total population) residing within the potentially affected area around INTEC reported incomes below that threshold. Data obtained during the 1990 census also show that of the total population of the contiguous United States, 13.1 percent reported incomes below the poverty threshold, and that Idaho reported 13.3 percent.

3.3.6 Geology and Soils

Geologic resources are consolidated or unconsolidated earth materials, including ore and aggregate materials, fossil fuels, and significant landforms. Soil resources are the loose surface materials of the earth in which plants grow, usually consisting of disintegrated rock, organic matter, and soluble salts.

3.3.6.1 General Site Description

The upper 1 to 2 km (0.6 to 1.2 mi) of the crust beneath INEEL is composed of interlayered basalt and sediment. The sediments are composed of fine-grained silts that were deposited by wind; silts, sands, and

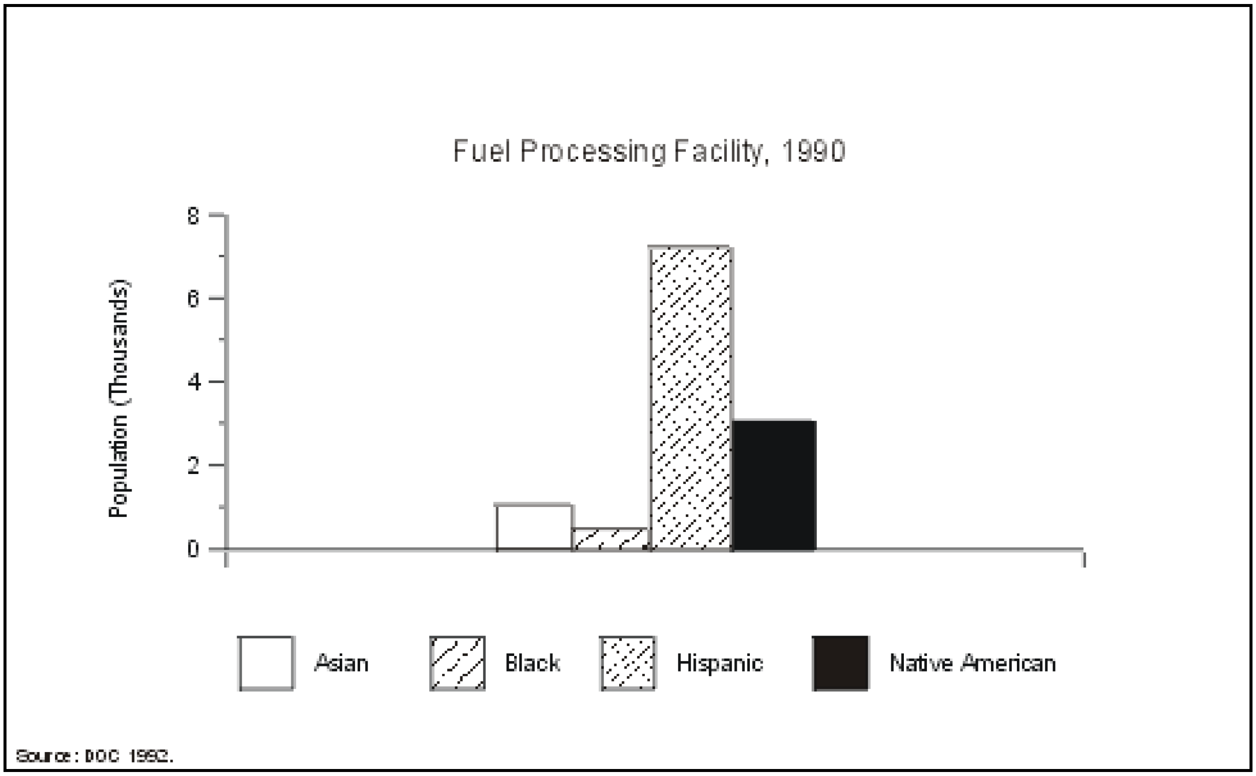


Figure 3–14. Racial and Ethnic Composition of Minorities Around the Fuel Processing Facility at INEEL

gravels deposited by streams; and clays, silts, and sands deposited in lakes. Rhyolitic (granite-like) volcanic rocks of unknown thickness lie beneath the basalt sediment sequence. The rhyolitic volcanic rocks were erupted between 6.5 and 4.3 million years ago (Barghusen and Feit 1995:2.3-17).

Within INEEL, economically viable sand, gravel, and pumice resources have been identified. Several quarries have supplied these materials to various onsite construction projects (DOE 1996a:3-121). Geothermal resources are potentially available in parts of the Eastern Snake River Plain, but neither of two boreholes—INEEL–1 (drilled to a depth of 3,048 m [10,000 ft] to explore for geothermal resources 8 km [5 mi] north of INTEC) and WO–2 (drilled to a depth of 1,524 km [5,000 ft] 4.8 km [3 mi] east of INTEC)—encountered rocks with significant geothermal potential (Abbott, Crockett, and Moor 1997:11).

There is no potential for sinkholes or unstable conditions at INTEC. Lava tubes, which could have adverse effects similar to those of sinkholes, do occur in the INEEL area, but extensive drilling and foundation excavation in the INTEC area over the past few decades has revealed no lava tubes beneath the site. Drilling for foundation engineering investigations at FPF has also revealed no lava tubes (Abbott, Crockett, and Moor 1997:10).

The Arco Segment of the Lost River Fault and the Howe Segment of the Lemhi Fault terminate about 30 km (19 mi) from the INEEL boundary and are considered capable. A capable fault is one that has had movement at or near the ground surface at least once within the past 35,000 years or recurrent movement within the past 500,000 years (DOE 1996a:3-121).

According to the Uniform Building Code, INEEL, located on the Eastern Snake River Plain, is in Seismic Zone 2B, meaning that moderate damage could occur as a result of an earthquake. Historic and recent seismic data cataloged by NOAA, the National Earthquake Information Center, the University of Utah, and the INEEL Seismic Network indicate that earthquakes in the region occur primarily in the Intermountain Seismic Belt and the

Centennial Tectonic Belt. The seismic characteristics of the Eastern Snake River Plain and the adjacent Basin and Range Province are different; the plain has historically experienced few and small earthquakes. No earthquakes have been recorded within about 48 km (30 mi) of the site (DOE 1996a:3-121). An earthquake with a maximum horizontal acceleration of 0.15g is calculated to have an annual probability of occurrence of 1 in 5,000 at a central INEEL location (Barghusen and Feit 1995:2.3-17).

The largest historic earthquake near INEEL took place in 1983 about 107 km (66 mi) to the northwest, near Borah Peak in the Lost River Range. The earthquake had a surface wave magnitude of 7.3 with a resulting peak horizontal ground acceleration of 0.022g to 0.078g at INEEL (Jackson 1985:385). An earthquake of greater than 5.5 magnitude can be expected about every 10 years within a 322-km (200-mi) radius of INEEL (DOE 1996a:3-121).

Volcanic hazards at INEEL can come from sources inside or outside the Snake River Plain. Most of the basaltic volcanic activity occurred at the Craters of the Moon National Monument 20 km (12 mi) southwest of INEEL between 4 million and 2,100 years ago. The probability of volcanic activity affecting facilities at INEEL is very low. In fact, the Volcanism Working Group for the *Storage and Disposition PEIS* (DOE 1996a) estimated that the conditional probability of basaltic volcanism affecting a south-central INEEL location is at most once per 40,000 years. The rhyolite domes along the Axial Volcanic Zone formed between 1.2 million and 300,000 years ago and have a recurrence interval of about 200,000 years. Therefore, the probability of future dome formation affecting INEEL facilities is also very low (DOE 1996a:3-121–3-123).

INEEL soils are derived from volcanic and clastic rocks from nearby highlands. In the southern part of the site, the soils are gravelly to rocky and generally shallow. The northern portion is composed mostly of unconsolidated clay, silt, and sand. No prime farmland lies within the INEEL boundaries. Generally, the soils are acceptable for standard construction techniques (DOE 1996a:3-107, 3-123). More detailed descriptions of the geology and the soil conditions at INEEL are included in the *Storage and Disposition PEIS* (DOE 1996a:3-121–3-123).

3.3.6.2 Proposed Facility Location

The nearest capable fault is in the South Creek Segment of the Lemhi Fault, about 26 km (16 mi) north of INTEC. All soil near INTEC was originally fine loam over a sand or sand-cobble mix deposited in the floodplain of the Big Lost River. However, all soils within the INTEC fences have been disturbed. The soils beneath the INTEC area are not subject to liquefaction because of the high content of gravel mixed with the alluvial sands and silts. In addition, the sediments are not saturated (Abbott, Crockett, and Moor 1997:10).

3.3.7 Water Resources

3.3.7.1 Surface Water

Surface water includes marine or freshwater bodies that occur above the ground surface, including rivers, streams, lakes, ponds, rainwater catchments, embayments, and oceans.

3.3.7.1.1 General Site Description

Three intermittent streams drain the mountains near INEEL: Big Lost River, Little Lost River, and Birch Creek. These intermittent streams carry snowmelt in the spring and are usually dry by midsummer. Several years can pass before any offsite waters enter DOE property. Big Lost River and Birch Creek are the only streams that regularly flow onto INEEL. Little Lost River is usually dry by the time it reaches the site because of upstream use of the flow for irrigation. None of the rivers flow from the site to offsite areas. Big Lost River discharges into the Big Lost River sinks, and there is no surface discharge from these sinks (Barghusen and Feit 1995:2.3-2, 2.3-21; DOE 1996a:3-115).

Big Lost River has been classified by the State of Idaho for domestic and agricultural use, cold water biota development, salmon spawning, primary and secondary recreation, and other special resource uses. Surface waters, however, are not used for drinking water on the site, nor is any wastewater discharged directly to them. Moreover, there are no surface water rights issues at INEEL, because INEEL facilities currently neither discharge directly to, nor make withdrawals from, these water bodies. None of the rivers have been classified as a Wild and Scenic River. Flood diversion facilities constructed in 1958 secured INEEL from the 300-year flood (DOE 1995b:4.8-1–4.8-5; 1996a:3-115).

3.3.7.1.2 Proposed Facility Location

There are no named streams within INTEC—only unnamed drainage ditches to carry storm flows away from buildings and facilities at the site. Outside INTEC, the only surface water is a stretch of Big Lost River. This is an intermittent stream that flows only after rainfall events or in the spring, when it carries snowmelt from the nearby mountains (Abbott, Crockett, and Moor 1997:5). A summary of water quality data for Big Lost River in the vicinity of INEEL is provided in the *Storage and Disposition PEIS* and shows no unusual concentrations of the parameters analyzed (DOE 1996a:3-115–3-117).

Flooding scenarios that involve the failure of McKay Dam and high flows in the Big Lost River have been evaluated. The results indicate that in the event of a failure of this dam, flooding would occur at INTEC and other facilities at INEEL. The low velocity and shallow depth of the water, however, would not pose a threat of structural damage to the facilities. Localized flooding can occur due to rapid snowmelt and frozen ground conditions, but none has been reported at INTEC (Barghusen and Feit 1995:2.3-21, 2.3-23). A study of the 100-year flood has been completed by the U.S. Geological Survey. The study indicates that the only INEEL facility that would be flooded is the northern part of INTEC and its entrance road. The depth of water over Lincoln Boulevard near its intersection with Monroe Boulevard is estimated at 0.12 to 0.70 m (0.4 to 2.3 ft) (Berenbrock and Kjelstrom 1998:11, 12). The 500-year flood has not been studied (Abbott, Crockett, and Moor 1997:7). However, the probable maximum flood has been calculated, as shown on Figure 3–15 (DOE 1997b).

Purgeable organics such as 1,1-dichloroethylene, toluene, and 1,1,1-trichloroethane have been detected in wells near INTEC. Metals, including arsenic, barium, lead, mercury, selenium, and silver, were also found in samples from wells. Inorganic chemicals such as sodium and chloride have been found in these samples. Maximum values for tritium in samples from three wells averaged 23,700 pCi/l; and maximum strontium 90 values averaged 53 pCi/l (Abbott, Crockett, and Moor 1997:11, 12). These values exceed the drinking water standards for tritium and strontium 90 of 20,000 pCi/l and 8 pCi/l, respectively. The results of groundwater modeling and baseline risk assessment will be used to identify the release sites requiring further evaluation. If necessary, removal actions may be taken to prevent further migration of contaminants to the Snake River Plain Aquifer (Mitchell et al. 1997:3-5). Sanitary waste with no potential for radioactive contamination is treated in the INTEC Sewage Treatment Facility (CPP–615). This facility has a Wastewater Land Application Permit from the State of Idaho and does not discharge to surface waters, but allows land application of treated sanitary sewage. The only effluent criteria associated with flows to the sewage ponds are the amounts of total suspended solids and nitrogen released to the ponds. All compliance points for the ponds are in wells downgradient from the ponds, and the maximum allowable concentrations are similar to those in the National Primary and Secondary Drinking Water Standards (Abbott, Crockett, and Moor 1997:9, 10). Drainage from corridors, roof and floor drains, and condensate from process heating, and heating, ventilation, and air

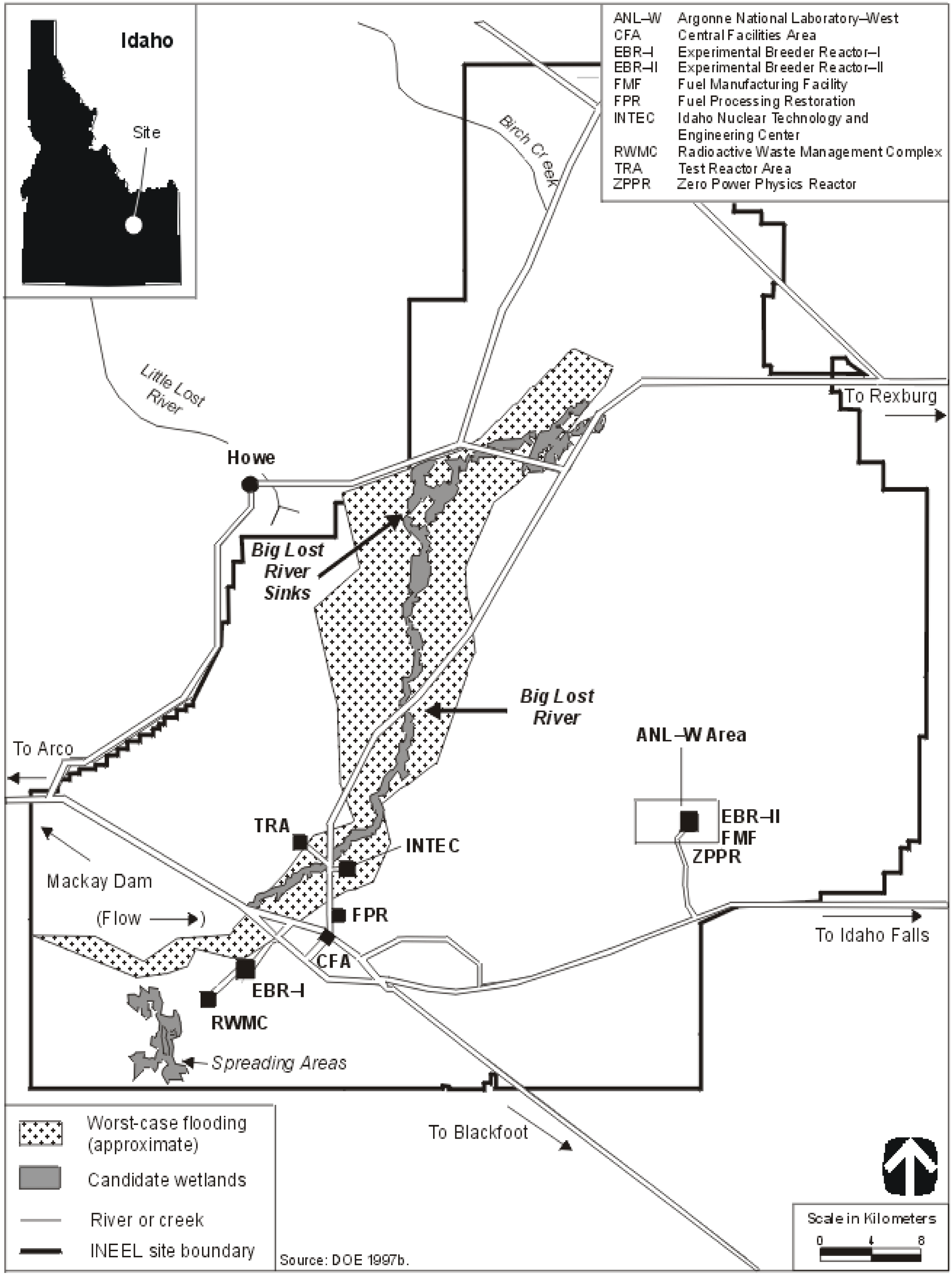


Figure 3–15. Flood Area for the Probable Maximum Flood–Induced Overtopping Failure of the Mackay Dam

conditioning systems with very low potential for radiological contamination are routed to the INTEC service waste system. Service Waste Percolation Pond 1 (SWP–1), southeast of Building CPP–603, has a surface area about of 18,400 m^2 (198,000 ft^2) and is 4.9 m (16 ft) deep. Service Waste Pond 2, immediately west of SWP–1, has a surface area of 46 m^2 (495 ft^2). Both ponds are fenced to keep out wildlife (Abbott, Crockett, and Moor 1997:9).

Consideration is being given to relocating the percolation pond to reduce the potential impacts on a contaminated perched water zone. Consideration is also being given to obtaining an NPDES permit to allow direct discharge into Big Lost River. These actions are independent of the proposed action analyzed in this SPD EIS and would be preceded by appropriate NEPA documentation (Abbott, Crockett, and Moor 1997:10).

3.3.7.2 Groundwater

Aquifers are classified by Federal and State authorities according to use and quality. The Federal classifications include Class I, II, and III groundwater. Class I groundwater is either the sole source of drinking water or is ecologically vital. Class IIA and IIB are current or potential sources of drinking water (or other beneficial use), respectively. Class III is not considered a potential source of drinking water and is of limited beneficial use.

3.3.7.2.1 General Site Description

The Snake River Plain aquifer is classified by EPA as a Class I sole source aquifer. It lies below the INEEL site and covers about 24,860 km^2 (9,600 mi^2) in southeastern Idaho. This aquifer serves as the primary drinking water source in the Snake River Basin and is believed to contain 1.2 quadrillion to 2.5 quadrillion l (317 trillion to 660 trillion gal) of water. Recharge of the groundwater comes from Henry's Fork of the Snake River, Big Lost River, Little Lost River, and Birch Creek. Rainfall and snowmelt also contribute to the aquifer's recharge (DOE 1996a:3-115–3-117).

Groundwater generally flows laterally at a rate of 1.5 to 6.1 m/day (5 to 20 ft/day). It emerges in springs along the Snake River from Milner to Bliss, Idaho. Depth to the groundwater table ranges from about 60 m (200 ft) below ground in the northeast corner of the site to about 300 m (1,000 ft) in the southeast corner (DOE 1995b:4.8-5; 1996a:3-117).

Perched water tables occur below the site. These perched water tables tend to slow the migration of pollutants that might otherwise reach the Snake River Plain aquifer (DOE 1996a:3-117).

INEEL has a large network of monitoring wells—about 120 in the Snake River Plain aquifer and another 100 drilled in the perched zone. The wells are used for monitoring to determine the compliance of specific actions with requirements of RCRA and CERCLA, as well as routine monitoring to evaluate the quality of the water in the aquifer. The aquifer is known to have been contaminated with tritium; however, the concentration dropped 93 percent between 1961 and 1994, possibly due to the elimination of tritium disposal, radioactive decay, and dispersion throughout the aquifer. Other known contaminants include cesium 137, iodine 129, strontium 90, and nonradioactive compounds such as TCE. Components of nonradioactive waste entered the aquifer as a result of past waste disposal practices. Elimination of groundwater injection exemplifies a change in disposal practices that has reduced the amount of these constituents in the groundwater (DOE 1996a:3-117, 3-119).

From 1982 to 1985, INEEL used about 7.9 billion l/yr (2.1 billion gal/yr) from the Snake River Plain aquifer, the only source of water at INEEL. This represents less than 0.3 percent of the groundwater withdrawn from that aquifer. DOE holds a Federal Reserved Water Right for the INEEL site that permits a pumping capacity of approximately 2.3 m^3/s (80 ft^3/s) with a maximum water consumption of 43 billion l/yr (11 billion gal/yr). INEEL's priority on water rights dates back to its establishment in 1950 (DOE 1996a:3-119).

3.3.7.2.2 Proposed Facility Location

Generally, the groundwater near INEEL, including INTEC, flows from the north and northeast to the south and southwest (Barghusen and Feit 1995:2.3-23).

Water for the INTEC is supplied by two deep wells located in the northwest corner of the INTEC. The wells are about 180 m (590 ft) deep and about 36 cm (14 in) in diameter (Abbott, Crockett, and Moor 1997:9). These wells can each supply up to approximately 11,000 1/min (3,000 gal/min) of water for use in the INTEC fire water, potable water, treated water, and demineralized water systems (Werner 1997). Pumping has little effect on the level of the groundwater, because the withdrawals are so small relative to the volume of water in the aquifer and the amount of recharge available. The production wells at INTEC have historically contained measurable quantities of strontium 90. In 1992, the highest concentration was 1 pCi/l, compared with the EPA maximum Primary Drinking Water Standard of 8 pCi/l. Sampling has yielded similar results over time (Barghusen and Feit 1995:2.3-23–2.3-29).

3.3.8 Ecological Resources

Ecological resources are defined as terrestrial (predominantly land) and aquatic (predominantly water) ecosystems characterized by the presence of native and naturalized plants and animals. For the purposes of this SPD EIS, those ecosystems are differentiated in terms of habitat support of threatened, endangered, and other special-status species—that is, "nonsensitive" versus "sensitive" habitat.

3.3.8.1 Nonsensitive Habitat

Nonsensitive habitat comprises those terrestrial and aquatic areas of the site that typically support the region's major plant and animal species.

3.3.8.1.1 General Site Description

INEEL is dominated by fairly undisturbed shrub-steppe vegetation that provides important habitat for nearly 400 plant species and numerous animal species native to the region's cool desert environment. Facilities and operating areas occupy 2 percent of INEEL, and approximately 60 percent of the surrounding area is used by sheep and cattle for grazing (DOE 1996a:3-125). Six broad vegetative categories representing nearly 20 distinct habitats have been identified on the INEEL site. Approximately 90 percent of INEEL is covered by shrub-steppe vegetation, which is dominated by big sagebrush, saltbrush, rabbitbrush, and native grasses, and contains a diversity of forbs (Figure 3–16) (DOE 1997b:44).

The large, undeveloped tracts of land used by INEEL for safety and security buffers also provide important habitat for plants and animals. Because INEEL is at the mouth of several mountain valleys, large numbers of mammals and migratory birds of prey are funneled onto the site. During some winters, thousands of pronghorn antelope and sage grouse can be found in the low and big sagebrush communities in the northern region. The juniper communities in the northwestern and southwestern regions provide important nesting areas for raptors and songbirds (DOE 1996a:3-125; 1997b:42).

Animal species found at INEEL include 2 species of amphibians, more than 225 species of birds, 6 species of fish, 44 species of mammals, and 11 species of reptiles (Reynolds 1999). Commonly observed animals include the short-horned lizard, gopher snake, sage sparrow, Townsend's ground squirrel, and black-tailed

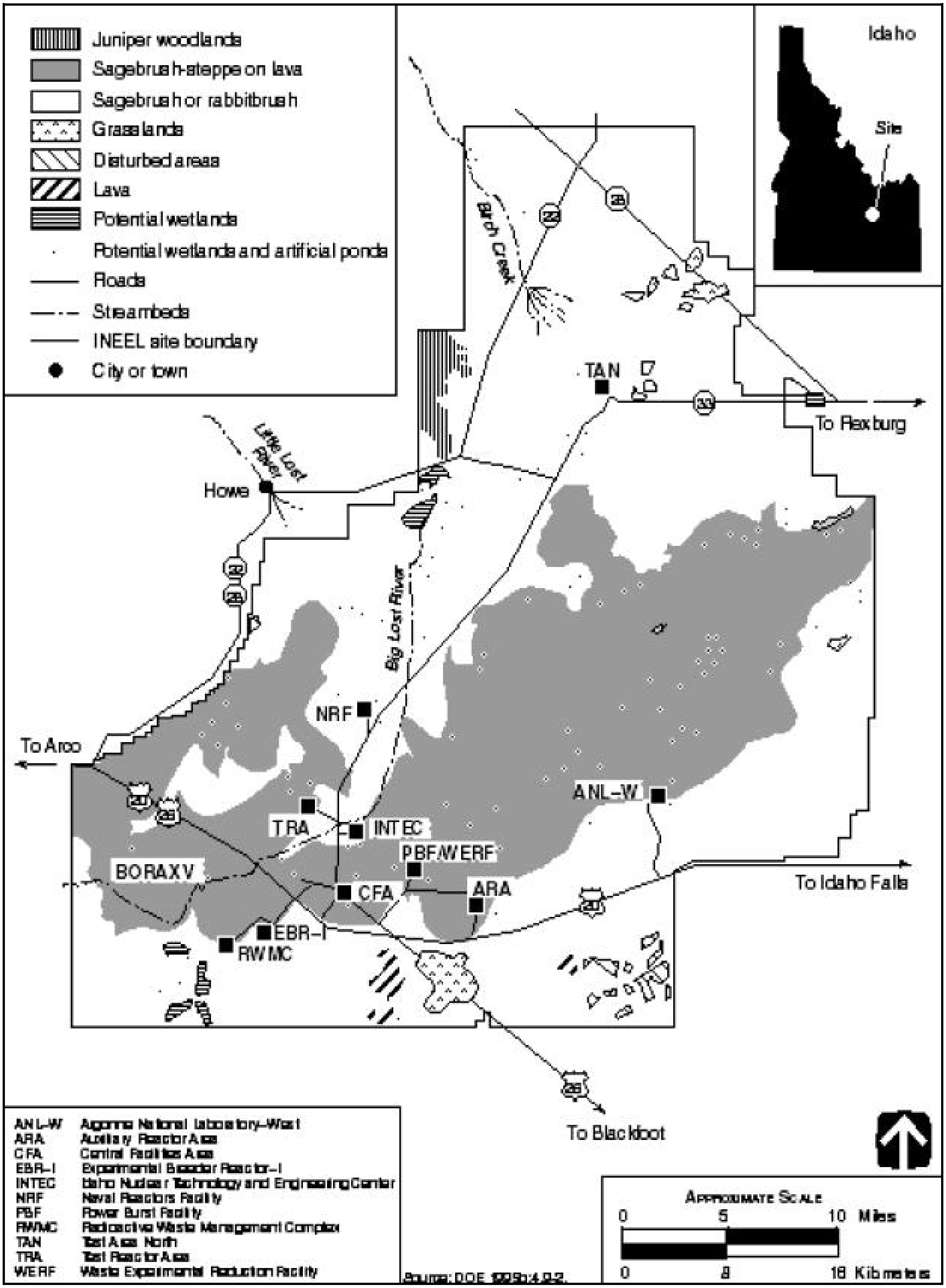


Figure 3–16. Generalized Habitat Types at INEEL

jackrabbit (DOE 1996a:3-125). Important game animals that reside at INEEL include sage grouse, mule deer, and elk. Roughly 30 percent of Idaho's pronghorn antelope population uses INEEL as winter range. Hunting of pronghorn antelope and elk is permitted under controlled conditions to reduce damage to crops on private lands and is restricted to within about 0.8 km (0.5 mi) inside the property boundary of INEEL (DOE 1995b:4.2-1; 1996a:3-125). Predators observed on the INEEL site include bobcats, mountain lions, badgers, and coyotes (DOE 1997b:42).

Aquatic habitat is limited to three intermittent streams (Big Lost River, Little Lost River, and Birch Creek) that drain into four sinks in the north-central portion of INEEL and to a number of liquid-waste disposal ponds. When water from the Big Lost River does flow on the site, several species of fish are observed: brook trout, rainbow trout, mountain whitefish, speckled dace, shorthead sculpin, and kokanee salmon (DOE 1996a:3-125).

3.3.8.1.2 Proposed Facility Location

INTEC is an industrial facility with most land surfaces being disturbed, bare ground (85 percent) or facilities and pavement (13 percent). Natural areas are limited to those areas outside the fenced boundary, mainly sagebrush-steppe on lava, sagebrush, rabbitbrush, and grasslands. The onsite areas are not vegetated except for grasses, shrubs, and trees associated with lawns and landscaping, and weedy annuals and grasses commonly found in disturbed areas. These areas, as well as buildings and wastewater treatment ponds, are used by a number of species. Accordingly, animal species potentially present in the immediate area surrounding FPF are primarily limited to those species adapted to disturbed industrial areas, such as small mammals (e.g., mice, rabbits, and ground squirrels), birds (e.g., sparrows and finches), and reptiles (e.g., lizards). A comprehensive list of species potentially present within INTEC and the surrounding area is presented in the Waste Area Grouping 3 (WAG3) risk assessment work plan developed by Rodriguez et al. (1997) (Werner 1997:WAG3 Report Summary). There are no known aquatic species or habitat within the immediate environs of FPF (Abbott, Crockett, and Moor 1997:15).

3.3.8.2 Sensitive Habitat

Sensitive habitat comprises those terrestrial and aquatic (including designated wetlands) areas of the site that support threatened and endangered, State-protected, and other special-status plant and animal species.[5]

3.3.8.2.1 General Site Description

Nearly all INEEL wetland habitats, with the exception of playa wetlands, are impacted by water management and diversion activities on and off the site. Agricultural demands and flood control diversions, combined with low regional precipitation, prevent permanent water in the Big Lost River and Birch Creek drainages, thus limiting the "classic" wetlands to inordinately wet periods. The Big Lost River and Birch Creek drainages support unique riparian habitats that are important to a diversity of desert animals and breeding birds (DOE 1997b:43, 44). Riparian vegetation, primarily willow and cottonwood, provides nesting habitat for hawks, owls, and songbirds (DOE 1996a:3-125). The only permanent source of surface water on INEEL is manmade ponds where flows are sustained through facility operations. These ponds represent important habitat on INEEL that would not exist otherwise (DOE 1997b:43, 44).

Nineteen threatened, endangered, and other special-status species listed by the Federal Government or the State of Idaho may be found in the vicinity of INEEL, as shown in Table 3.4.6–1 in the *Storage and Disposition PEIS* (DOE 1996a:3-128).

[5] The Federal Government defines threatened and endangered species in the Endangered Species Act, and wetlands in 33 CFR 328.3.

3.3.8.2.2 Proposed Facility Location

There are no known wetlands within the immediate environs of INTEC (Abbott, Crockett, and Moor 1997:15). Manmade percolation ponds that receive permitted facility effluent and hold water intermittently are known to support the boreal chorus frog and aquatic invertebrates when water is present. Several wetland plant species have been identified in percolation ponds south of INTEC (Werner 1997:WAG3 Report Summary). INTEC does not provide critical habitat for any of the 14 threatened, endangered, or other special-status species listed in Table 3–23 that may occur in the area (Werner 1997:WAG3 Report Summary).

Table 3–23. Threatened and Endangered Species, Species of Concern, and Sensitive Species Occurring or Potentially Occurring in Areas Surrounding INTEC

Common Name	Scientific Name	Federal Status	State Status
Birds			
Bald eagle	*Haliaeetus leucocephalus*	Threatened	Endangered
Black tern	*Chlidonias niger*	Species of Concern	Not listed
Burrowing owl	*Athene cunicularia*	Species of Concern	Not listed
Ferruginous hawk	*Buteo regalis*	Species of Concern	Protected
Loggerhead shrike	*Lanius ludovicianus*	Species of Concern	Not listed
Northern goshawk	*Accipiter gentilis*	Species of Concern	Sensitive
Peregrine falcon	*Falco peregrinus*	Endangered	Endangered
Trumpeter swan	*Cygnus buccinator*	Species of Concern	Species of Special Concern
White-faced ibis	*Plegadis chihi*	Species of Concern	Not listed
Mammals			
Long-eared myotis	*Myotis evotis*	Species of Concern	Not listed
Pygmy rabbit	*Brachylagus (Sylvilagus) idahoensis*	Species of Concern	Species of Special Concern
Small-footed myotis	*Myotis subulatus*	Species of Concern	Not listed
Townsend's western big-eared bat	*Plecotus townsendii*	Species of Concern	Species of Special Concern
Plants			
Lemhi milkvetch	*Astragalus aquilonius*	Not listed	Global (Rare) Priority 3
Sepal-tooth dodder	*Cuscuta denticulata*	Not listed	State Priority 1
Spreading gilia	*Ipomopsis polycladon*	Not listed	State Priority 2
Unknown	*Catapyrenium congestum*	Not listed	Sensitive
Winged-seed evening primrose	*Camissonia pterosperma*	Not listed	Sensitive
Reptiles			
Northern sagebrush lizard	*Sceloporus graciosus*	Species of Concern	Not listed

Key: INTEC, Idaho Nuclear Technology and Engineering Center.
Source: Ruesink 1998; Stephens 1998, 1999; Werner 1997:WAG3 Report Summary.

The northern sagebrush lizard and three bat species of special concern are believed to have the greatest potential for occurrence within the environs of INTEC. This is based on a survey conducted in 1996 to evaluate the presence of suitable habitat for threatened and endangered species and species of concern. Bat usage of the area is likely to be limited to aerial hunting activities around the INTEC sewage disposal and percolation ponds. The sewage disposal and percolation ponds are routinely used by wildlife, and these facilities and a portion of the Big

Lost River are within 1 km (0.6 mi) of FPF. The extent of potential usage of facility habitats by the northern sagebrush lizard is unknown (Werner 1997:WAG3 Report Summary).

3.3.9 Cultural and Paleontological Resources

Cultural resources are human imprints on the landscape and are defined and protected by a series of Federal laws, regulations, and guidelines. INEEL has a well-documented record of cultural and paleontological resources. Guidance for the identification, evaluation, recordation, curation, and management of these resources is included in the *Final Draft Idaho National Engineering Laboratory Management Plan for Cultural Resources* (Miller 1995). There have been 1,506 cultural resource sites and isolated finds identified, including 688 prehistoric sites, 38 historic sites, 753 prehistoric isolates, and 27 historic isolates (DOE 1996a:3-129). While many significant cultural resources have been identified, only about 4 percent of the area within the INEEL site has been surveyed (DOE 1996a:3-129). Most surveys have been conducted near major facility areas in conjunction with major modification, demolition, or abandonment of site facilities.

Cultural sites are often occupied continuously or intermittently over substantial time spans. For this reason, a single location (sites) may contain evidence of use during both historic and prehistoric periods. In the discussions that follow, the numbers of prehistoric and historic resources are presented; the sum of these resources may be greater than the total number of sites reported due to this dual-use history at sites. Therefore, where the total number of sites reported is less than the sum of prehistoric and historic sites certain locations were used during both periods.

3.3.9.1 Prehistoric Resources

Prehistoric resources are physical properties that remain from human activities that predate written records.

3.3.9.1.1 General Site Description

Prehistoric resources identified at INEEL are generally reflective of Native American hunting and gathering activities. Resources appear to be concentrated along the Big Lost River and Birch Creek, atop buttes, and within craters or caves. They include residential bases, campsites, caves, hunting blinds, rock alignments, and limited-activity locations such as lithic and ceramic scatters, hearths, and concentrations of fire-affected rock. Most sites have not been formally evaluated for nomination to the National Register, but are considered to be potentially eligible. Given the rather high density of prehistoric sites at INEEL, additional sites are likely to be identified as surveys continue (DOE 1996a:3-129).

3.3.9.1.2 Proposed Facility Location

The INTEC area has been subject to a number of archaeological survey projects over the past two decades. Most of these investigations have been concentrated around the perimeter of the site and along existing roadways or power line corridors. Survey coverage in the area around Building 691 is complete. The inventory of identified resources includes campsites and isolated artifacts reflecting Native American hunting and gathering activities, as well as resources reflective of more recent attempts at homesteading and agriculture (Abbott, Crockett, and Moor 1997:16).

Most of the area near FPF has been surveyed, except for a small area east of the railroad tracks. Six archaeological resources have been identified within the surveyed area. Most of the sites are prehistoric and historic isolates that are not likely to yield additional information and are therefore not likely to be potentially eligible for National Register nomination (Abbott, Crockett, and Moor 1997:16).

3.3.9.2 Historic Resources

Historic resources consist of physical properties that postdate the existence of written records. In the United States, historic resources are generally considered to be those that date no earlier than 1492.

3.3.9.2.1 General Site Description

Thirty-eight historic sites and 27 historic isolates have been identified at INEEL. These resources are representative of European-American activities, including fur trapping and trading, immigration, transportation, mining, agriculture, and homesteading, as well as more recent military and scientific/engineering R&D activities. Examples of historic resources include Goodale's Cutoff (a spur of the Oregon Trail), remnants of homesteads and ranches, irrigation canals, and a variety of structures from the World War II era. Experimental Breeder Reactor I, the first reactor to achieve a self-sustaining chain reaction using plutonium instead of uranium as the principal fuel component, is listed on the National Register and is designated a National Historic Landmark. Many other INEEL structures built between 1949 and 1974 are considered eligible for the National Register because of their exceptional scientific and engineering significance and their major role in the development of nuclear science and engineering since World War II. According to current studies, additional historic sites are likely to exist in unsurveyed portions of INEEL (DOE 1996a:3-129).

3.3.9.2.2 Proposed Facility Location

In the study area near INTEC are two historic sites, a homestead and nearby trash dump, that may be eligible for nomination to the National Register. These sites are potential sources of information on Carey Land Act–sponsored agricultural activities in the region (Abbott, Crockett, and Moor 1997:16).

A historic resource inventory of all buildings within INTEC is being conducted and will likely identify additional historic structures built between 1949 and 1974. Because it was constructed after 1974, FPF is not considered to be historic (Abbott, Crockett, and Moor 1997:16).

3.3.9.3 Native American Resources

Native American resources are sites, areas, and materials important to Native Americans for religious or heritage reasons. In addition, cultural values are placed on natural resources such as plants, which have multiple purposes within various Native American groups. Of primary concern are concepts of sacred space that create the potential for land-use conflicts.

3.3.9.3.1 General Site Description

Native American resources at INEEL are associated with the two groups of nomadic hunters and gatherers that used the region at the time of European-American contact: the Shoshone and Bannock. Both of these groups used the area that now encompasses INEEL as they harvested floral and faunal resources and obsidian from Big Southern Butte or Howe Point. Because INEEL is considered part of the Shoshone-Bannock Tribes' ancestral homeland, it contains many localities that are important for traditional, cultural, educational, and religious reasons. This includes not only prehistoric archaeological sites, which are important in a religious or cultural heritage context, but also features of the natural landscape and air, plant, water, or animal resources that have special significance (DOE 1996a:3-129).

3.3.9.3.2 Proposed Facility Location

INTEC and the surrounding area may contain Native American resources. The existence and significance of any resources near INTEC would be established in direct consultation with the Shoshone and Bannock Tribes. INEEL recently initiated general consultation with the Shoshone and Bannock Tribes, and a working agreement was established (Abbott, Crockett, and Moor 1997:16, B-1, B-2). Consultations (see Chapter 5 and Appendix O) were initiated with appropriate Native American groups to determine any concerns associated with the actions evaluated in this SPD EIS.

3.3.9.4 Paleontological Resources

Paleontological resources are the physical remains, impressions, or traces of plants or animals from a former geological age.

3.3.9.4.1 General Site Description

Paleontological remains consist of fossils and their associated geologic information. The region encompassing INEEL has abundant and varied paleontological resources, including plant, vertebrate, and invertebrate remains from soils and lake and river sediments, and organic materials found in caves and archaeological sites (DOE 1995b:4.4-5).

3.3.9.4.2 Proposed Facility Location

Vertebrate fossils recovered from the Big Lost River floodplain consist of isolated bones or teeth from large mammals of the Pleistocene or Ice Age. These fossils were discovered during excavations and well-drilling operations. A single mammoth tooth was salvaged during the excavation of a percolation pond immediately south of INTEC. Other fossils have been recorded in the vicinities of the Test Reactor Area and Naval Reactors Facility. Occasional skeletal elements of fossil mammoth, horse, and camel have been retrieved from the Big Lost River diversion dam and Radioactive Waste Management Complex on the southwestern side of INEEL, and from river and alluvial fan gravels and Lake Terreton sediments near Test Area North (Abbott, Crockett, and Moor 1997:16).

3.3.10 Land Use and Visual Resources

3.3.10.1 Land Use

Land may be characterized by its potential for the location of human activities (land use). Natural resource attributes and other environmental characteristics could make a site more suitable for some land uses than for others. Changes in land use may have both beneficial and adverse effects on other resources (biological, cultural, geological, aquatic, and atmospheric).

INEEL is situated on approximately 2,300 km^2 (890 mi^2) of land in southeastern Idaho (DOE 1997b). INEEL is owned by the Federal Government and administered, managed, and controlled by DOE (DOE 1996a:3-107). It is primarily within Butte County, but portions of the site are also in Bingham, Jefferson, Bonneville, and Clark Counties. The site is roughly equidistant from Salt Lake City, Utah, and Boise, Idaho.

3.3.10.1.1 General Site Description

Lands surrounding INEEL are owned by the Federal Government, the State of Idaho, and private parties. Regional land uses include grazing, wildlife management, rangeland, mineral and energy production, recreation, and crop production. Approximately 60 percent of the surrounding area is used by sheep and cattle for grazing. Small communities and towns near the INEEL boundaries include Mud Lake to the east; Arco, Butte City, and Howe to the west; and Atomic City to the south (DOE 1995b:4.2-5). Two National Natural Landmarks border INEEL: Big Southern Butte (2.4 km [1.5 mi] south) and Hell's Half Acre (2.6 km [1.6 mi] southeast) (DOE 1996a:3-107). A portion of Hell's Half Acre National Natural Landmark is designated as a Wilderness Study Area. The Black Canyon Wilderness Study Area is also adjacent to INEEL (DOE 1996a:3-107).

Land-use categories at INEEL include facility operations, grazing, general open space, and infrastructure such as roads. Generalized land uses at INEEL and vicinity are shown in Figure 3–17. Facility operations include industrial and support operations associated with energy research and waste management activities. Land is also used for recreation and environmental research associated with the designation of INEEL as a National Environmental Research Park. Much of INEEL is open space that has not been designated for specific use. Some of this space serves as a buffer zone between INEEL facilities and other land uses. About 2 percent of the total INEEL site area (46 km^2 [18 mi^2]) is used for facilities and operation (DOE 1995b:4.2-1). Approximately 9,000 ha (22,240 acres) or 4 percent of the total acreage at INEEL is available for radioactive waste management facilities (DOE 1997a:vol. I, 4-20). Public access to most facilities is restricted. Approximately 6 percent of the INEEL site, or 140 km^2 (54 mi^2), is public roads and utilities that cross the site. Recreational uses include public tours of general facility areas and Experimental Breeder Reactor I (a National Historic Landmark), and controlled hunting, which is generally restricted to 0.8 km (0.5 mi) within the INEEL boundary. Between 1,210 km^2 (467 mi^2) and 1,420 km^2 (548 mi^2) are used for cattle and sheep grazing. A 3.6-km^2 (1.4-mi^2) portion of this land, at the junction of Idaho State Highways 28 and 33, is used by the U.S. Sheep Experiment Station as a winter feedlot for about 6,500 sheep (DOE 1995b:4.2-1).

INTEC is about 4.8 km (3 mi) north of the Central Facilities Area. The plant is situated on approximately 85 ha (210 acres) within the perimeter fence. An additional 22 ha (54 acres) of the plant area lie outside the fence (DOE 1997b). The INTEC complex houses reprocessing facilities for Government-owned defense and research spent fuels. Facilities at INTEC include spent fuel storage and reprocessing areas, a waste solidification facility and related waste storage bins, remote analytical laboratories, and a coal-fired steam-generating plant.

DOE land-use plans and policies applicable to INEEL include the *INEL Institutional Plan for FY 1994–1999* and the *INEL Technical Site Information Report* (DOE 1995b:vol. 2, part A, 4.2-1). The *Institutional Plan* provides a general overview of INEEL facilities, strategic program descriptions, and major construction projects, and identifies specific technical programs and capital equipment needs. The *Information Report* (DOE 1995b:vol. 2, part A) presents a 20-year master plan for development activities at the site. Land-use planning for INEEL administrative and laboratory facilities located in the city of Idaho Falls is subject to Idaho Falls planning and zoning restrictions (DOE 1996a:3-107).

All county plans and policies encourage development adjacent to previously developed areas to minimize the need for infrastructure improvements and to avoid urban sprawl. Because 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 site. Recreational and agricultural uses, however, are expected to increase in the surrounding area in response to greater demand for recreational areas and the conversion of rangeland to cropland (DOE 1995b:4.2-5).

The Fort Bridger Treaty of July 3, 1868, secured the Fort Hall Reservation as the permanent homeland of the Shoshone-Bannock Peoples. According to the treaty, tribal members reserved rights to hunting, fishing, and gathering on surrounding unoccupied lands of the United States. While INEEL is considered occupied land, it was recognized that certain areas on the INEEL site have significant cultural and religious significance to

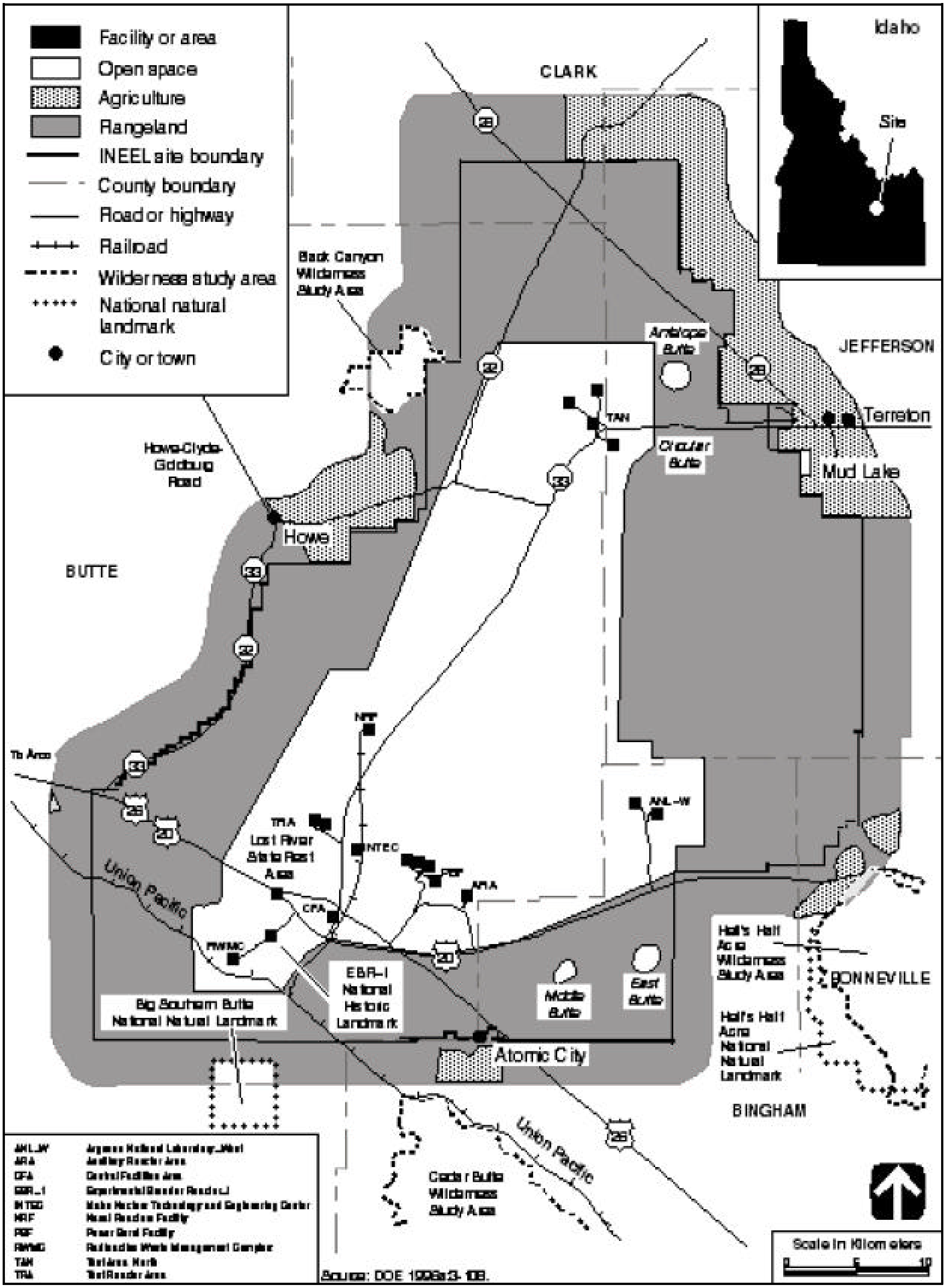


Figure 3–17. Generalized Land Use at INEEL and Vicinity

the tribes. A *1994 Memorandum of Agreement with the Shoshone-Bannock Tribes* (DOE 1994b:1) provides tribal members access to the Middle Butte to perform sacred or religious ceremonies or other educational or cultural activities.

3.3.10.1.2 Proposed Facility Location

FPF is not currently being used and is being maintained on standby. This building, the largest at INTEC, is in the middle of an area of several warehouse and administrative facilities. The land, currently disturbed, is designated for waste-processing operations. FPF is 12 km (7.5 mi) from the nearest site boundary.

3.3.10.2 Visual Resources

Visual resources are natural and human-created features that give a particular landscape its character and aesthetic quality. Landscape character is determined by the visual elements of form, line, color, and texture. All four elements are present in every landscape; however, they exert varying degrees of influence. The stronger the influence exerted by these elements in a landscape, the more interesting the landscape. The more visual variety that exists with harmony, the more aesthetically pleasing the landscape.

3.3.10.2.1 General Site Description

The INEEL site is bordered on the north and west by the Bitterroot, Lemhi, and Lost River mountain ranges. Volcanic buttes near the southern boundary of INEEL can be seen from most locations on the site. INEEL generally consists of open desert land predominantly covered by large sagebrush and grasslands. Pasture and farmland border much of the site.

Ten facility areas are on the INEEL site. Although INEEL has a master plan, no specific visual resource standards have been established. INEEL facilities have the appearance of low-density commercial/industrial complexes widely dispersed throughout the site. Structure heights range from about 3 to 30 m (10 to 100 ft); a few stacks and towers reach 76 m (250 ft). Although many INEEL facilities are visible from highways, most facilities are more than 0.8 km (0.5 mi) from public roads (DOE 1995b:4.5-1). The operational areas are well defined at night by the security lights.

The Craters of the Moon National Monument is about 20 km (12 mi) southwest of INEEL's western boundary. It includes a designated Wilderness Area, which must maintain Class I air quality standards. Lands adjacent to the site, under BLM jurisdiction, are designated as VRM Class II areas (DOE 1995b:4.5-2). This designation obliges preservation and retention of the existing character of the landscape. Lands within the INEEL site are designated as VRM Classes III and IV, the most lenient classes in terms of modification (DOE 1995b:4.5-2). The Black Canyon Wilderness Study Area, adjacent to INEEL, is under consideration by BLM for Wilderness Area designation, approval of which would result in an upgrade of its VRM class from Class II to Class I (DOE 1995b:4.5-2; DOI 1986a, 1986b). The Hell's Half Acre Wilderness Study Area is about 2.6 km (1.6 mi) southeast of INEEL's eastern boundary. This area, famous for its lava flows and hiking trails, is managed by BLM.

3.3.10.2.2 Proposed Facility Location

While FPF is the largest building on the site, the tallest structure is the stack connected to INTEC; it is 76 m (250 ft) tall. INTEC is visible in the middle ground from State Highways 20 and 26, with Saddle Mountain in the background. The character of INTEC is consistent with a VRM Class IV designation (DOI 1986a, 1986b). Natural features of visual interest within a 40-km (25-mi) radius include Big Lost River at 0.8 km (0.5 mi), Big Southern Butte National Natural Landmark at 20 km (12 mi), Saddle Mountain at 40 km (25 mi), Middle Butte at 18 km (11 mi), Hell's Half Acre Wilderness Study area at 35 km (22 mi) and East Butte at 23 km (14 mi) (Abbott, Crockett, and Moor 1997:4).

3.3.11 Infrastructure

Site infrastructure includes those utilities and other resources required to support construction and continued operation of mission-related facilities identified under the various proposed alternatives.

3.3.11.1 General Site Description

INEEL has extensive production, service, and research facilities. An extensive infrastructure supports these facilities, as shown in Table 3–24.

Table 3–24. INEEL Sitewide Infrastructure Characteristics

Resource	Current Usage	Site Capacity
Transportation		
Roads (km)	445[a]	445[a]
Railroads (km)	48	48
Electricity		
Energy consumption (MWh/yr)	232,500	394,200
Peak load (MW)	42	124
Fuel		
Natural gas (m^3/yr)	NA	NA
Oil (l/yr)[b]	5,820,000	16,000,000[c]
Coal (t/yr)	11,340	11,340[c]
Water (l/yr)	6,000,000,000[d]	43,000,000,000[e]

[a] Includes paved and unpaved roads.
[b] Includes fuel oil and propane.
[c] As supplies get low, more can be supplied by truck or rail.
[d] See Werner 1997:2.
[e] See DOE 1995b:vol. II, part A, 4.13-1.
Key: NA, not applicable.
Source: DOE 1996a:3-110.

3.3.11.1.1 Transportation

The road network at INEEL provides for onsite transportation; the railroads for deliveries of large volumes of coal and oversized structural components. Commercial shipments are by truck and plane, but some bulk materials are transported by train, and waste by truck and train (DOE 1995b:vol. I, 4.11-1).

About 140 km (87 mi) of paved surface has been developed out of the 445 km (277 mi) of roads on the site, including about 29 km (18 mi) of service roads that are closed to the public. Most of the roads are adequate for the current level of normal transportation activity and could handle increased traffic volume (DOE 1995b:vol. I, 4.11-1).

Idaho Falls receives railroad freight service from Butte, Montana, to the north, and from Pocatello, Idaho, and Salt Lake City, Utah, to the south. The Union Pacific Railroad's Blackfoot-to-Arco Branch crosses the southern portion of INEEL and provides rail service to the site. This branch connects with a DOE spur line at the Scoville

Siding, then links with developed areas within INEEL. Rail shipments to and from INEEL usually are limited to bulk commodities, spent nuclear fuel, and radioactive waste (DOE 1995b:vol. I, 4.11-3).

3.3.11.1.2 Electricity

Commercial electric power is supplied to INEEL from the Antelope substation through two feeders to the federally owned Scoville substation, which supplies electric power directly to the site electric power distribution system. Electric power supplied by Idaho Power Company is generated by hydroelectric generators along the Snake River in southern Idaho and by the Bridger and Valmy coal-fired thermal electric generation plants in southwestern Wyoming and northern Nevada (DOE 1995b:vol. II, part A, 4.13-2). Characteristics of this power pool are summarized in Table 3.4.2–2 of the *Storage and Disposition PEIS* (DOE 1996a:3-111).

The average electrical availability at INEEL is about 394,200 MWh/yr; the average usage, about 232,500 MWh/yr. The peak load capacity for INEEL is 124 MW; the current peak load usage, about 42 MW (DOE 1996a:3-110).

3.3.11.1.3 Fuel

Fuels consumed at INEEL include several liquid petroleum fuels, coal, and propane gas. All fuels are transported to the site for storage and use. Fuel storage is provided for each facility, and the inventories are restocked as necessary (DOE 1995b:vol. II, part A, 4.13-2). The current site usage is about 5.8 million l/yr (1.5 million gal/yr). The current site usage of coal is about 11,340 t/yr (12,500 tons/yr) (DOE 1996a:3-110). If additional coal or fuel oil were needed during the year, it could be shipped onto the site.

3.3.11.1.4 Water

The Snake River Plain Aquifer is the source of all water at INEEL (DOE 1996a:3-119). The water is provided by a system of about 30 wells, together with pumps and storage tanks. That system is administered by DOE, which holds the Federal Reserved Water Right for the site of 43 billion 1/yr (11 billion gal/yr) (DOE 1995b:vol. II, part A, 4.13-1). The current site usage is 6 billion 1/yr (1.6 billion gal/yr) (Werner 1997:2).

3.3.11.1.5 Site Safety Services

DOE operates three fire stations at INEEL. These stations are at the north end of Test Area North, at ANL–W, and in the Central Facilities Area. Each station has a minimum of one engine company capable of supporting any fire emergency in its assigned area. The fire department also provides the site with ambulance, emergency medical technician, and hazardous material response services (DOE 1995b:vol. II, part A, 4.13-3).

3.3.11.2 Proposed Facility Location

A separate utility tunnel running off the main INTEC utility tunnel was completed and water, steam condensate, air, and other lines have been completed up to, and in some cases into, FPF when this facility was built. A summary of the infrastructure characteristics of INTEC is presented as Table 3–25.

3.3.11.2.1 Electricity

Electric power for INTEC is routed into the main electrical room from a 14-kV feeder in Unit Substation 2, north of the building. The current capacity available for INTEC is 262,800 MWh/yr (Abbott, Crockett, and Moor 1997:20).

Table 3–25. INEEL Infrastructure Characteristics for INTEC

Resource	Current Usage	Capacity
Electricity		
Energy consumption (MWh/yr)	60,000	262,800
Peak load (MW)	9.2[a]	31.4[b,c]
Fuel		
Natural gas (m^3/yr)	NA	NA
Oil (l/yr)	757,000	1,112,720[d,e]
Coal (t/yr)	13,000	NA[e]
Water (l/yr)	45,420,000	227,100,000

[a] Demand.
[b] Equivalent to 30 MW continuous use per year.
[c] Based on a 95 percent power factor.
[d] Available capacity is INTEC tank storage capacity in liters.
[e] As supplies get low, more can be supplied by truck or rail.
Key: INTEC, Idaho Nuclear Technology and Engineering Center; NA, not applicable.
Source: Abbott, Crockett, and Moor 1997:20; Werner 1997:1.

3.3.11.2.2 Fuel

Fuel oil and propane are supplied from INTEC. The current capacity of fuel oil and propane is approximately 1.1 million l/yr (291,000 gal/yr); the usage, approximately 757,000 l/yr (200,000 gal/yr) (Abbott, Crockett, and Moor 1997:20).

3.3.11.2.3 Water

Water service is available through connection to the INTEC water supply system, which obtains its water from two deep wells located north of the INTEC main process area. The water withdrawn from the Snake River Plain Aquifer is a small fraction of the available supply (Abbott, Crockett, and Moor 1997:9). The current annual capacity of water available for FPF is about 230 million l/yr (61 million gal/yr); and the current usage for the facility is about 45 million l/yr (12 million gal/yr) (Werner 1997:1).

3.4 PANTEX PLANT

Pantex is in Carson County along U.S. Highway 60 and lies about 27 km (17 mi) northeast of downtown Amarillo, Texas (Figure 2–4). Pantex lies in the Texas Panhandle on the Llano Estacado (staked plains) portion of the Great Plains. The topography at Pantex is relatively flat, characterized by rolling grassy plains and natural playa basins. The term “playa” is used to describe the more than 17,000 ephemeral lakes in the Texas Panhandle, usually less than 1 km (0.6 mi) in diameter, that receive water runoff from the surrounding area. The region is a semiarid farming and ranching area. Pantex is surrounded by agricultural land, but several significant industrial facilities are also nearby (DOE 1996a:3-146).

Pantex was first used by the U.S. Army for loading conventional ammunition shells and bombs from 1942 to 1945. In 1951, the Atomic Energy Commission arranged to begin rehabilitating portions of the original plant and constructing new facilities for nuclear weapons operations. The current missions are shown in Table 3–26. Weapons assembly, disassembly, and stockpile surveillance activities involve handling (but not processing) of encapsulated uranium, plutonium, and tritium, as well as a variety of nonradioactive hazardous or toxic chemicals (DOE 1996a:3-146).

Table 3–26. Current Missions at Pantex

Mission	Description	Sponsor
Plutonium storage	Provide storage of pits from dismantled nuclear weapons	Assistant Secretary for Defense Programs
High explosive(s) components	Manufacture for use in nuclear weapons	Assistant Secretary for Defense Programs
Weapons assembly	Assemble new nuclear weapons for the stockpile	Assistant Secretary for Defense Programs
Weapons maintenance	Retrofit, maintain, and repair stockpile weapons	Assistant Secretary for Defense Programs
Quality assurance	Stockpile quality assurance testing and evaluation	Assistant Secretary for Defense Programs
Weapons disassembly	Disassemble stockpile weapons as required	Assistant Secretary for Defense Programs
Test and training programs	Assemble nuclear weapon-like devices for training	Assistant Secretary for Defense Programs
Weapons dismantlement	Dismantle nuclear weapons no longer required	Assistant Secretary for Defense Programs
Development support	Provide support to design agencies as requested	Assistant Secretary for Defense Programs
Waste management	Waste treatment, storage, and disposal	Assistant Secretary for Defense Programs
Environmental management	Environmental restoration activities	Assistant Secretary for Environmental Management

Source: DOE 1996a:3-146.

DOE Activities. All DOE activities at Pantex, except for environmental restoration programs, fall under the DOE Office of the Assistant Secretary for Defense Programs. Historically, DOE’s mission for Pantex primarily included assembly and delivery to the U.S. Department of Defense (DoD) of a variety of nuclear weapons. Today, the primary roles of Pantex are the disassembly of U.S. nuclear weapons being returned to DOE by DoD, maintenance and repair of nuclear weapons, and storage of plutonium pits. These operations are in compliance with the negotiated downsizing of the U.S. and the former Soviet nuclear forces (DOE 1996a:3-147).

Other activities that have been, and will continue to be, conducted under DOE's national security mission include certain maintenance and monitoring activities of the remaining nuclear weapons stockpile, modification and assembly of existing nuclear weapons systems, and production of high-explosive components for nuclear weapons. DOE also conducts quality evaluation of weapons, quality assurance testing of weapons components, and R&D supporting nuclear weapons activities at the plant. DOE's national security responsibilities are mandated by statutes, Presidential directives, and congressional authorization and appropriations (DOE 1996a:3-147).

The change in mission emphasis from assembly to disassembly of nuclear weapons has caused an increase in some waste streams. Waste management operations at Pantex in the near term would add facilities to enhance capabilities to adequately handle existing waste streams. Improved facilities for hazardous waste staging, treatment, and storage would be coupled with increased use of commercial offsite facilities to treat mixed waste streams. Upon completion of the current backlog of dismantlements due to stockpile reduction, waste generation is likely to decrease (DOE 1996a:3-147).

Non-DOE Activities. Texas Tech University pursues agricultural activities on both DOE-owned and DOE-leased property (DOE 1996a:3-147).

3.4.1 Air Quality and Noise

3.4.1.1 Air Quality

Air pollution refers to any substance in the air that could harm human or animal populations, vegetation, or structures, or that unreasonably interferes with the comfortable enjoyment of life and property. Air pollutants are transported, dispersed, or concentrated by meteorological and topographical conditions. Air quality is affected by air pollutant emission characteristics, meteorology, and topography.

3.4.1.1.1 General Site Description

The climate at Pantex and the surrounding region is characterized as semiarid with hot summers and rather cold winters. The average annual temperature in the Amarillo region is 13.8 EC (56.9 EF); temperatures range from an average daily minimum of -5.7 EC (21.8 EF) in January to an average daily maximum of 32.8 EC (91.1 EF) in July. The average annual precipitation is 49.8 cm (19.6 in). Prevailing winds at Pantex are from the south. The average annual windspeed is 6 m/s (13.5 mph) (NOAA 1994a). Additional information related to meteorology and climatology at Pantex is presented in Appendix F of the *Storage and Disposition PEIS* (DOE 1996a:F-11, F-12) and in the site environmental information document (M&H 1996a:6-1–6-19).

Pantex is within the Amarillo-Lubbock Intrastate AQCR #211. None of the areas within Pantex and this AQCR are designated as nonattainment areas with respect to the NAAQS for criteria air pollutants (EPA 1997e). Applicable NAAQS and Texas State ambient air quality standards are presented in Table 3–27.

There are no PSD Class I areas within 100 km (62 mi) of Pantex. None of the facilities at Pantex have been required to obtain a PSD permit (DOE 1996f:4-118–4-120).

The primary emission sources of criteria pollutants at Pantex are the steam plant boilers, the explosives-burning operation, and emissions from onsite vehicles. Emission sources of hazardous or toxic air pollutants include the high-explosives synthesis facility, the explosives-burning operation, paint spray booths, miscellaneous laboratories, and other small operations (DOE 1996f:4-134). The boilers and high-explosives synthesis facility operate under air permits from the Texas Natural Resource Conservation Commission (TNRCC). The paint

Table 3–27. Comparison of Ambient Air Concentrations From Pantex Sources With Most Stringent Applicable Standards or Guidelines, 1993

Pollutant	Averaging Period	Most Stringent Standard or Guideline (Fg/m^3)[a]	Concentration (Fg/m^3)
Criteria pollutants			
Carbon monoxide	8 hours	10,000[b]	161
	1 hour	40,000[b]	924
Nitrogen dioxide	Annual	100[b]	0.90
Ozone	8 hours	157[c]	(d)
PM_{10}	Annual	50[b]	8.73
	24 hours	150[b]	88.5
$PM_{2.5}$	3-year annual	15[c]	(e)
	24 hours (98th percentile over 3 years)	65[c]	(e)
Sulfur dioxide	Annual	80[b]	<0.01
	24 hours	365[b]	<0.01
	3 hours	1,300[b]	<0.01
	30 minutes	1,048[f]	<0.01
Other regulated pollutants			
Hydrogen sulfide	30 minutes	112[f]	(g)
Total suspended particulates	3 hours	200[f]	(h)
	1 hour	400[f]	(h)
Hazardous and other toxic compounds			
Benzene	1 hour	75[i]	19.4[j]
	Annual	3[i]	0.0547
[Text deleted.]			

[a] The more stringent of the Federal and State standards is presented if both exist for the averaging period. The National Ambient Air Quality Standards (NAAQS) (EPA 1997a), other than those for ozone, particulate matter, lead, and those based on annual averages, are not to be exceeded more than once per year. The 1-hr ozone standard is attained when the expected number of days per year with maximum hourly average concentrations above the standard is #1. The 1-hr ozone standard applies only to nonattainment areas. The 8-hr ozone standard is attained when the 3-year average of the annual fourth-highest daily maximum 8-hr average concentration is less than or equal to 157 Fg/m^3. The 24-hr particulate matter standard is attained when the expected number of days with a 24-hr average concentration above the standard is #1. The annual arithmetic mean particulate matter standard is attained when the expected annual arithmetic mean concentration is less than or equal to the standard.

[b] Federal and State standard.

[c] Federal standard.

[d] Not directly emitted or monitored by the site.

[e] No data is available with which to assess $PM_{2.5}$ concentrations.

[f] State standard.

[g] No sources identified at the site.

[h] No site boundary concentrations from Pantex facilities presented in the *Final EIS for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components*.

[i] TNRCC effects-screening levels are "tools" used by the Toxicology and Risk Assessment Staff to evaluate impacts of air pollutant emissions. They are not ambient air standards. If ambient levels of air contaminants exceed the screening levels, it does not necessarily indicate a problem, but would trigger a more indepth review. The levels are set where no adverse effect is expected.

[j] Concentration reported as a 30-min average.

Note: The NAAQS also includes standards for lead. No sources of lead emissions have been identified for any of the alternatives presented in Chapter 4. Emissions of other air pollutants not listed here have been identified at Pantex, but are not associated with any of the alternatives evaluated. These other air pollutants are quantified in the *Final EIS for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components* (DOE 1996f). EPA recently revised the ambient air

quality standards for particulate matter and ozone. The new standards, finalized on July 18, 1997, changed the ozone primary and secondary standards from a 1-hr concentration of 235 μg/m^3 (0.12 ppm) to an 8-hr concentration of 157 μg/m^3 (0.08 ppm). During a transition period while States are developing State implementation plan revisions for attaining and maintaining these standards, the 1-hr ozone standard will continue to apply in nonattainment areas (EPA 1997b:38855). For particulate matter, the current PM_{10} annual standard is retained, and two $PM_{2.5}$ standards are added. These standards are set at a 15-μg/m^3 3-year annual arithmetic mean based on community-oriented monitors and a 65 μg/m^3 3-year average of the 98th percentile of 24-hr concentrations at population-oriented monitors. The revised 24-hr PM_{10} standard is based on the 99th percentile of 24-hr concentrations. The existing PM_{10} standards will continue to apply in the interim period (EPA 1997c:38652).
Source: DOE 1996f:4-127–4-133; EPA 1997a; TNRCC 1997a, 1997b.

spray booths, miscellaneous laboratories, and other small operations are allowed under TNRCC standard exemptions. The explosive-burning operation is allowed under the TNRCC hazardous waste permit (DOE 1997c:21, 22).

With the exception of thermal treatment of high explosives at the burning ground, most stationary sources of nonradioactive atmospheric releases are fume hoods and building exhaust systems, some of which have HEPA filters for control of particulate emissions. Table 3–27 presents the ambient air concentrations attributable to sources at Pantex, which are based on emissions for the year 1993. These emissions were modeled using meteorological data from 1988 (DOE 1996f:4-123) and represent maximum output conditions. Actual annual emissions for some pollutants are somewhat less than these levels, and the estimated concentrations bound the actual Pantex contribution to ambient levels. Only those pollutants that would be emitted for any of the surplus plutonium disposition alternatives are presented. Additional information on ambient air quality at Pantex and detailed information on emissions of other pollutants at Pantex are discussed in the *Final EIS for the Continued Operation of Pantex* (DOE 1996f:4-117–4-135, B-3–B-61) and the 1996 *Environmental Report for Pantex Plant* (DOE 1997c:21, 22, 78–84). Concentrations of nonradiological air pollutants shown in Table 3–27 are in compliance with applicable regulations or are below applicable health effects-screening levels, the concentration of hazardous air pollutants determined by TNRCC to have minimal effect on human health and the environment.

Measurements of PM_{10} and various volatile organic compounds are made at Pantex. During 1993, only one 24-hr PM_{10} measurement exceeded the NAAQS level, while in 1994 the PM_{10} NAAQS level was exceeded 1 day in January and 1 day in June. Windblown dust is indicated as a major contributor to some of these exceedances. The concentrations of carbon monoxide, sulfur dioxide, and nitrogen dioxide from Pantex—combined with those from background (non-Pantex) sources—are expected to be in compliance with the ambient air quality standards. Measured concentrations of 1-2-dibromoethane exceeded the effects-screening levels once in 1995. However, monitoring in the last quarter of 1995 and 1996 showed that all organic compounds measured were below their respective effects-screening levels (DOE 1996f:4-121–4-123; M&H 1997:8, 12, 35–37). 1-2-dibromoethane is not emitted at Pantex. The air quality monitoring program is described in the annual site environmental monitoring reports (DOE 1997c).

Annual PM_{10} measured concentrations during 1995 were less than 24 μg/m^3 at all monitoring locations, and except one measurement of 170 μg/m^3 during a grass fire, 24-hr PM_{10} measured concentrations were below 129 μg/m^3 (TNRCC 1997c:13–15).

3.4.1.1.2 Proposed Facility Location

The meteorological conditions described for Pantex are considered to be representative of the Zone 4 West area. Primary sources of pollutants in Zone 4 West include a standby diesel electric generator, drum sampling, and bulk handling of chemicals (DOE 1996f:B-10–B-29).

3.4.1.2 Noise

Noise is unwanted sound that interferes or interacts negatively with the human or natural environment. Noise may disrupt normal activities or diminish the quality of the environment.

3.4.1.2.1 General Site Description

Major noise emission sources within Pantex include various industrial facilities, equipment, and machines (e.g., cooling systems, transformers, engines, pumps, boilers, steam vents, construction and materials-handling equipment, vehicles), as well as small arms firing, alarms, and explosives detonation. Most Pantex industrial

facilities are far enough from the site boundary that noise levels from these sources at the boundary are barely distinguishable from background noise. However, some noise from explosives detonation can be heard at residences north of the site, and small arms weapons firing can be heard at residences to the west (DOE 1996a:3-153, 1996f:4-161–4-170).

The acoustic environment along the Pantex boundary and at nearby residences away from traffic noise is typical of a rural location. The day-night average sound levels are in the range, 35 to 50 dBA, that is typical of rural areas (EPA 1974:B-4). Noise survey results in areas adjacent to Pantex indicate that ambient sound levels are generally low, with natural sounds and distant traffic being the primary sources. Traffic, aircraft, trains, and agricultural activities result in higher short-term levels (M&H 1996a:11-1–11-19). Traffic is the primary source of noise at the site boundary and at residences near roads. Traffic noise is expected to dominate sound levels along major roads in the area, such as U.S. Route 60. The residents most likely to be affected by noise from plant traffic along Pantex access routes are those living along Farm-to-Market (FM) 2373 and FM 683 (DOE 1996a:3-153).

Measurements of equivalent sound levels for traffic noise and other sources along the roads bounding Pantex are 53 to 62 dBA for FM 2373 at about 400 m (1300 ft) from the road; 51 to 58 dBA for FM 293 at about 70 m (230 ft); 44 to 65 dBA for FM 683 at about 40 m (130 ft); and 51 dBA for U.S. Route 60 at about 225 m (740 ft). These levels are based on a limited number of 30-min samples taken during peak and offpeak traffic periods; mostly at locations within the site boundary (M&H 1996a:11-11–11-15). The levels represent the range of daytime traffic noise levels at residences near the site.

Other sources of noise include aircraft, wind, insect activity, and agricultural activity. Except for the prohibition of nuisance noise, neither the State of Texas nor local governments have established any regulations that specify acceptable community noise levels applicable to Pantex (DOE 1996a:F-32).

The EPA guidelines for environmental noise protection recommend an average day-night sound level of 55 dBA as sufficient to protect the public from the effects of broadband environmental noise in typically quiet outdoor and residential areas (EPA 1974:29). Land-use compatibility guidelines adopted by the Federal Aviation Administration and the Federal Interagency Committee on Urban Noise indicate that yearly day-night average sound levels less than 65 dBA are compatible with residential land uses and levels up to 75 dBA are compatible with residential uses if suitable noise reduction features are incorporated into structures (DOT 1995). It is expected that for most residences near Pantex, the day-night average sound level is less than 65 dBA and is compatible with the residential land use.

3.4.1.2.2 Proposed Facility Location

No distinguishing noise characteristics of Zone 4 West have been identified. Zone 4 West is far enough—1.8 km (1.1 mi)—from the site boundary that noise levels from the facilities are barely distinguishable from background levels. |

3.4.2 Waste Management

Waste management includes minimization, characterization, treatment, storage, transportation, and disposal of waste generated from ongoing DOE activities. The waste is managed using appropriate treatment, storage, and disposal technologies and in compliance with all applicable Federal and State statutes and DOE orders.

3.4.2.1 Waste Inventories and Activities

Pantex manages the following types of waste: LLW, mixed LLW, hazardous, and nonhazardous. TRU waste and mixed TRU waste are not normally generated and no HLW is currently generated at Pantex. Waste generation rates and the inventory of stored waste from activities at Pantex are provided in Table 3–28. Table 3–29 summarizes Pantex waste management capabilities. More detailed descriptions of the waste management system capabilities at Pantex are included in the *Storage and Disposition PEIS* (DOE 1996a:3-180–3-183, E-49–E-62) and the *Final EIS for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapons Components* (DOE 1996f:4-229).

Table 3–28. Waste Generation Rates and Inventories at Pantex

Waste Type	Generation Rate (m^3/yr)	Inventory (m^3)
TRU[a]		
Contact handled	0	0[b]
Remotely handled	0	0
LLW	139	208
Mixed LLW	24[c]	135
Hazardous	486[c,d]	153[e,f]
Nonhazardous		
Liquid	473,125[g]	NA[f]
Solid	8,007[c]	311[e,f,h]

[a] Includes mixed TRU waste.
[b] DOE 1997d:1-2.
[c] DOE 1997c:19.
[d] Includes TSCA-regulated wastes.
[e] DOE 1996f:4-233.
[f] Generally, hazardous and nonhazardous wastes are not held in long-term storage.
[g] King 1997a.
[h] Largely composed of asbestos waste.

Key: LLW, low-level waste; NA, not applicable; TRU, transuranic; TSCA, Toxic Substances Control Act.

Source: DOE 1996e:15, 16, except as notes.

EPA placed Pantex on the National Priorities List on May 31, 1994. Currently, environmental restoration activities are conducted in compliance with CERCLA and a RCRA permit issued in April 1991, and modified in February 1996. Environmental restoration activities are expected to be completed in 2000 (DOE 1996a:3-180). More information on regulatory requirements for waste disposal is provided in Chapter 5.

3.4.2.2 Transuranic and Mixed Transuranic Waste

Pantex does not generate or manage TRU waste as a result of normal operations, although there are procedures in place to manage TRU waste if it is generated. The small quantity of TRU waste (<1 m^3) that was stored in Building 12-24 was moved to LANL pending disposal at WIPP (DOE 1997d:1-2).

3.4.2.3 Low-Level Waste

Compactible solid LLW is processed at the LLW Compactor and stored along with the noncompactible materials for shipment to the Nevada Test Site (NTS), where most LLW is disposed of, or to a commercial vendor. Some liquid LLW has been solidified, but more development is required in this area. Much liquid

Table 3–29. Waste Management Capabilities at Pantex

			Applicable Waste Type					
Facility Name/Description	**Capacity**	**Status**	**TRU**	**Mixed TRU**	**LLW**	**Mixed LLW**	**Haz**	**Non-Haz**
Treatment Facility (m^3/yr)								
11-09 South - Scintillation Vial Crusher/Segregator	Variable[a]	Online[b]			X			
11-09 South - Sort/Segregation and Decontamination Activities	Variable[a]	Online[b]			X	X		
11-09 South - Fluorescent Bulb Crusher	Variable[a]	Online[b]					X	
12-17 - Evaporator for Tritiated Water	Campaign	Online			X			
12-19 East - Rotary Evaporator Vacuum Distillation Units (2)	Campaign	Online						X
12-19 East - Fractional Distillation Unit	Campaign	Online						X
12-19 East - HE Precipitation Process	Campaign	Online						X
12-42 - Compactor/Drum Crusher	Variable[a]	Online[b]			X			
16-18 - HWTPF	750	Planned for 1999			X	X	X	
16-18 - HWTPF Waste Compacting	90	Planned for 1999			X	X	X	X
16-18 - HWTPF Drum Crushing	208	Planned for 1999			X	X	X	X
16-18 - HWTPF Wastewater Evaporation System	45	Planned for 1999			X			
16-18 - HWTPF Misc Drum Operations (including neutralization and filtration)	Various	Planned for 1999			X	X	X	
16-18 - HWTPF Drum Rinsing System	45	Planned for 1999					X	
16-18 - HWTPF Fluorescent Bulb Crusher	12	Planned for 1999					X	
16-18A - Solvent Recovery Unit	348	Planned for 1999					X	
16-18A - Scintillation Vial Crushing	90	Planned for 1999			X			X
Burning Ground Thermal Processing Units	Variable[c]	Online				X	X	
Wastewater Treatment Facility	946,250	Online						X