4.4.9.3 Housing and Community Services

Table 4–44 lists the total number of occupied housing units and vacancy rates in the NTS region of influence. In 1990, the region of influence contained 325,261 housing units, of which 293,689 were occupied. The median values of owner-occupied units were $93,300 in Clark County and $70,800 in Nye County. The vacancy rate in Clark County was 9.5 percent, and the vacancy rate in Nye County was 17.5 percent (DOC 1998).

Community services include public education and health care (i.e., hospitals, hospital beds, and doctors). In 1998, student enrollment in the region of influence totaled 209,042, with a student-to-teacher ratio of 20:1 (Department of Education 2000). Community health services and facilities are concentrated in Clark County (Gaquin and DeBrandt 2000).

Table 4–44 Housing and Community Services in the NTS Region of Influence

	Clark County	*Nye County*	*Region of Influence*
Housing (1990) [a]			
Total units	317,188	8,073	325,261
Occupied housing units	287,025	6,664	293,689
Vacant units	30,163	1,409	31,572
Vacancy rate (percent)	9.5	17.5	9.7
Median value ($)	93,300	70,800	–
Public Education (1998) [b]			
Total enrollment	203,777	5,265	209,042
Student-to-teacher ratio	20:1	15.6:1	20:1
Community Health Care (1998) [c]			
Hospitals	8	1	9
Hospital beds per 1,000 persons	1.9	1.6	1.9
Physicians per 1,000 persons	1.7	0.5	1.7

[a] DOC 1998.
[b] Department of Education 2000.
[c] Gaquin and DeBrandt 2000.

4.4.9.4 Local Transportation

The main access to NTS is Mercury Highway, which originates at U.S. Highway 95, 105 kilometers (65 miles) northwest of Las Vegas, Nevada, and accesses the main gate in Mercury (see Figure 4–21). U.S. Highway 95 is the most frequented direct access to NTS and is used by over 95 percent of the employees working on site. It is the closest and most direct route to the site for hauling materials and waste, whether hauled directly by trucks or by rail. Another entrance located 8 kilometers (5 miles) to the west of Mercury is a turnoff to Jackass Flats Road; however, this entrance is presently barricaded. NTS has a restricted access into Area 25 from U.S. Highway 95 at Lathrop Wells Road, which is located about 32 kilometers (20 miles) west of Mercury. A seldom-used fourth entrance is located in the northeast corner of the site and can be reached from State Route 375. This route requires crossing the Nellis Air Force Range Complex. Other existing roadways, although unpaved, could provide entrance or exit routes in case of an emergency. Access to NTS is restricted, and guard stations are located at all entrances, as well as throughout the site. Background traffic on key roads in the vicinity of the site has grown rapidly in the last 10 years. For example, average annual growth ranging from 2 to 5 percent has been experienced on U.S. Highway 95, while less than 2 percent growth is common elsewhere on rural highways. While background traffic has increased in Nevada, traffic volumes at the Mercury interchange have decreased by approximately 2 percent per year during the last 10 years because of reductions in the NTS workforce.

Commuter buses provide daily passenger service to NTS from Las Vegas and Pahrump by way of U.S. Highway 95. The number of buses entering the site varies daily depending on the onsite activities in progress. Currently, there are 54 buses serving Las Vegas and 5 buses serving Pahrump. The commuter bus service provides dedicated routes to the forward areas, and paved parking areas for the buses are located at the support facilities within Areas 6, 23 (Mercury), and 25. Limited bus parking is also available at other NTS support facilities. Parking for government and private commuter vehicles is available at most buildings at the site.

The closest rail line to NTS is the Union Pacific line, which passes through Las Vegas approximately 80 kilometers (50 miles) east of Mercury. This line connects Los Angeles with Salt Lake City. There is no direct railway link to the site. Commercial air service to and from the area is available through McCarran International Airport, which is located in Las Vegas, 120 kilometers (75 miles) southeast of NTS. Aside from three small airports in the region, air transport service is also possible through two U.S. Air Force bases in the area: Nellis Air Force Base in North Las Vegas and the Indian Springs Auxiliary Airfield. Two serviceable airstrips are also located on NTS (Desert Rock Airport in Area 22 and Yucca Lake airstrip in Area 6) in addition to 10 helipads.

4.4.10 Environmental Justice

Under Executive Order 12898, DOE is responsible for identifying and addressing disproportionately high and adverse impacts on minority or low-income populations. As discussed in Appendix E, minority persons are those who identify themselves as Hispanic or Latino, Asian, Black or African American, American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, or multiracial. Persons whose incomes are below the Federal poverty threshold are designated low-income.

DAF is located at latitude 36° 53'37.824" north, longitude 116° 2'54.794" west. No Indian reservations lie within or partially within the region of potential radiological impacts centered on the DAF.

Three counties in Nevada are partially included in the potentially affected area (**Figure 4–30**): Clark, Lincoln, and Nye. In addition, Inyo County, California, is partially contained in the region of potential radiological impacts. **Table 4–45** provides the racial and Hispanic composition for these counties using data obtained from the decennial census conducted in 2000. In the year 2000, approximately 4 of 10 county residents identified themselves as a member of a minority group. Hispanics or Latinos and Blacks or African Americans comprised approximately three-quarters of the resident minority population.

Figure 4–31 compares the growth in minority populations in the potentially affected counties between 1990 and 2000. As discussed in Section E.5.1 of Appendix E, data concerning race and Hispanic origin from the 2000 Census cannot be directly compared with that from the 1990 Census because the racial categories used in the two enumerations were different. Bearing this change in mind, the minority populations in potentially affected counties increased from approximately 24 percent to 39 percent in the decade from 1990 to 2000. During that decade, Nevada's population increase was the largest among all of the states in the U.S. The Hispanic or Latino population more than tripled, and the Asian population of potentially affected counties nearly tripled during the past decade. Over 70 percent of the increase in minority populations occurred in the Las Vegas metropolitan area of Clark County. For comparison, minorities composed approximately one-quarter of the total population of the United States in 1990 and nearly one-third of the total population in 2000.

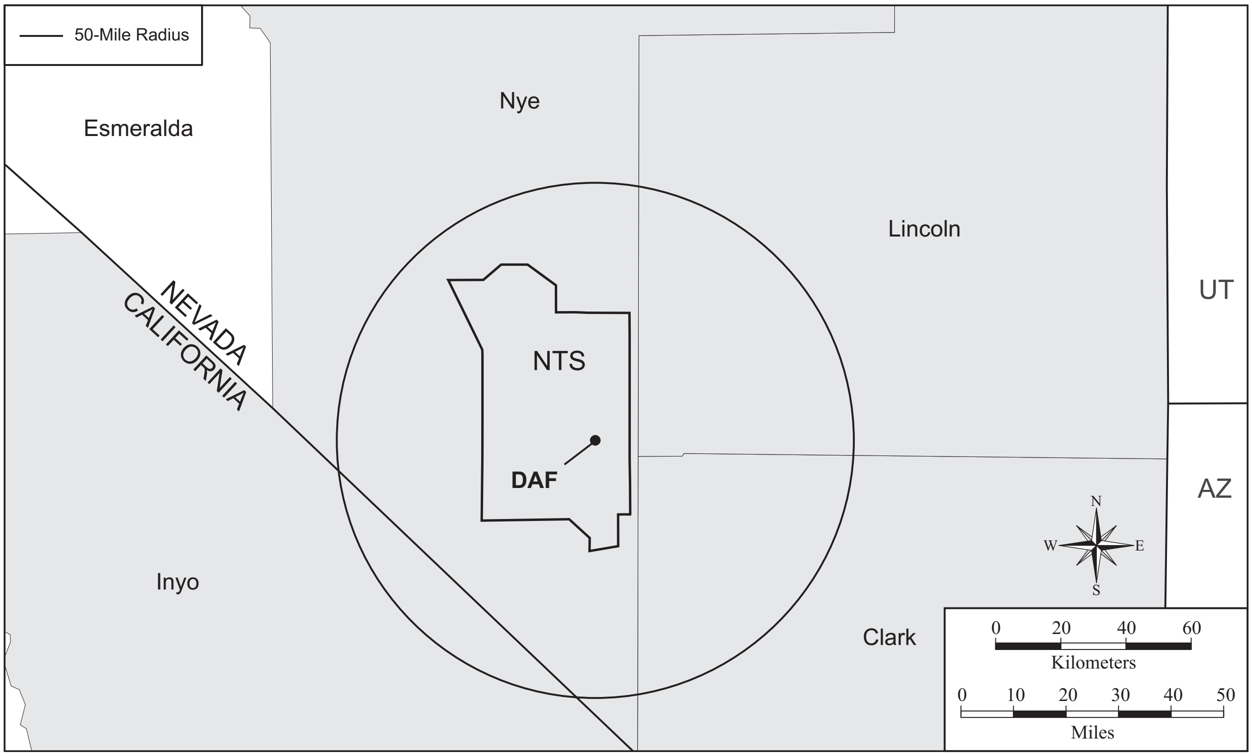

Figure 4–30 Potentially Affected Counties Surrounding DAF at NTS

Table 4–45 Populations in Potentially Affected Counties Surrounding DAF in 2000

Population Group	*Population*	*Percentage of Total*
Minority	554,986	38.8
Hispanic	307,334	21.5
Black/African American	121,865	8.5
American Indian/Alaska Native	10,092	0.7
Asian	71,639	5.0
Native Hawaiian/Pacific Islander	5,980	0.4
Two or More Races	38,076	2.7
Some Other Race	2,133	0.1
White	873,241	61.1
Total	1,430,360	100.0

Source: DOC 2001.

The percentage of low-income population at risk in potentially affected counties surrounding DAF in 1990 was approximately 14 percent. In 1990, nearly 13 percent of the total population of the continental United States reported incomes less than the poverty threshold. In terms of percentages, minority populations in potentially impacted counties are relatively large in comparison with the national percentage, largely due to the population explosion in the Las Vegas metropolitan area during the last decade. The percentage low-income population at risk in 1990 is commensurate with the corresponding national percentage. Complete census data with block group resolution for minority and low-income populations obtained from the decennial census of 2000 are scheduled for publication in 2002.

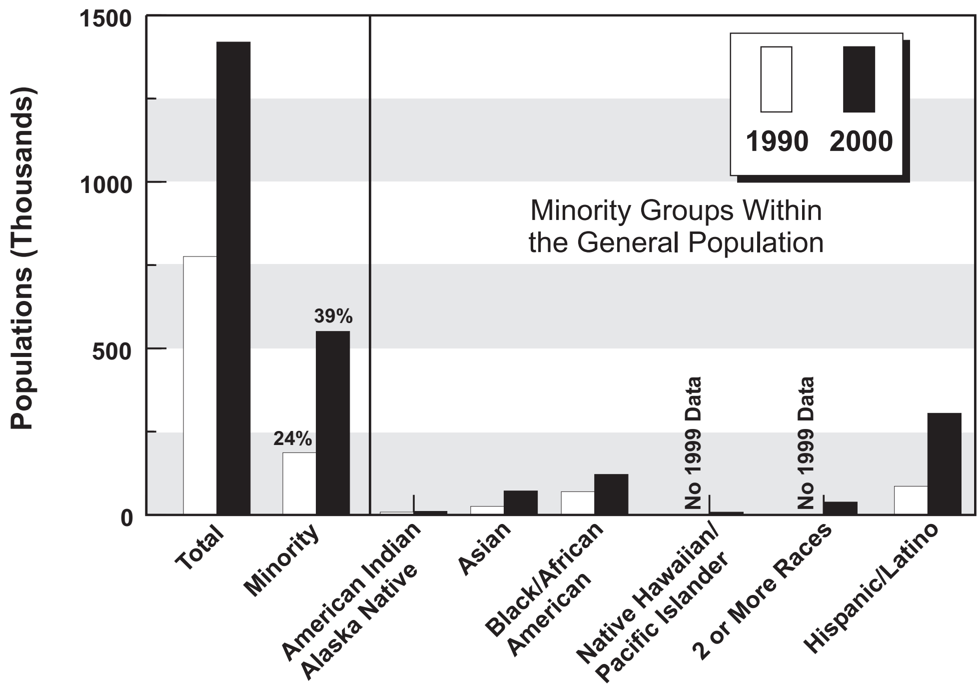

Figure 4–31 Comparison of Populations in Potentially Affected Counties Surrounding DAF in 1990 and 2000

4.4.11 Existing Human Health Risk

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

4.4.11.1 Radiation Exposure and Risk

Major sources and levels of background radiation exposure to individuals in the vicinity of NTS are shown in **Table 4–46**. 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 NTS operations.

Releases of radionuclides to the environment from NTS operations provide another source of radiation exposure to individuals in the vicinity of NTS. Types and quantities of radionuclides released from NTS operations in 1999 are listed in the *Nevada Test Site Annual Site Environmental Report for Calendar Year 1999* (DOE 2000j). The releases are summarized in Section 4.4.3.2 of this EIS. The doses to the public resulting from these releases are presented in **Table 4–47**. These doses fall within the radiological limits given in DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, and are much lower than those of background radiation.

Table 4–46 Sources of Radiation Exposure to Individuals in the NTS Vicinity Unrelated to NTS Operations

Source	*Effective Dose Equivalent (millirem per year)*
Natural Background Radiation	
Total external (cosmic and terrestrial) [a]	74
Internal terrestrial and global cosmogenic [b]	40
Radon in homes (inhaled)	200 [b, c]
Other Background Radiation [b]	
Diagnostic x rays and nuclear medicine	53
Weapons test fallout	less than 1
Air travel	1
Consumer and industrial products	10
Total	379

[a] Derived from information on cosmic and terrestrial radiation given in EPA 1981.
[b] NCRP 1987.
[c] This is an average for the United States.

Table 4–47 Radiation Doses to the Public From Normal NTS Operations in 1998 (total effective dose equivalent)

	Atmospheric Releases		*Liquid Releases*		*Total*	
Members of the Public	*Standard* [a]	*Actual*	*Standard* [a]	*Actual*	*Standard* [a]	*Actual*
Maximally exposed offsite individual (millirem)	10	0.63 [b]	4	0	100	0.63
Population within 80 kilometers (50 miles) (person-rem) [b]	None	0.38	None	0	100	0.38
Average individual within 80 kilometers (50 miles) (millirem) [c]	None	0.01	None	0	None	0.01

[a] The standards for individuals are given in DOE Order 5400.5. As discussed in that Order, the 10-millirem per year limit from airborne emissions is required by the Clean Air Act (40 CFR 61) and the 4-millirem per year limit is required by the Safe Drinking Water Act (40 CFR 141). The total dose of 100 millirem per year is the limit from all pathways combined. The 100-person-rem value for the population is given in the proposed 10 CFR 834, *Radiation Protection of the Public and Environment; Proposed Rule,* published in 58 FR 16268. If the potential total dose exceeds the 100 person-rem value, the contractor operating the facility would be required to notify DOE.
[b] Includes the air, milk, and wildlife dose pathways.
[c] Based on a population of 36,517 in 1999.
[d] Obtained by dividing the population dose by the number of people living within 80 kilometers (50 miles) of the site.
Source: DOE 2000j.

Using a risk estimator of 1 latent cancer death per 2,000 person-rem to the public (see Appendix B), the fatal cancer risk to the maximally exposed member of the public due to radiological releases from NTS operations in 1999 is estimated to be 3.2×10^{-7}. That is, the estimated probability of this person dying of cancer at some point in the future from radiation exposure associated with one year of NTS operations is about 3 in 10 million (it takes several to many years from the time of radiation exposure for a cancer to manifest itself).

According to the same risk estimator, 1.9×10^{-4} excess fatal cancers are projected in the population living within 80 kilometers (50 miles) of NTS from normal operations in 1999. 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 mortality rate associated with cancer for the entire U.S. population is 0.2 percent per year. Based on this mortality rate, the number of fatal cancers expected during 1999 from all causes in the population living within 80 kilometers (50 miles) of NTS was 73. This expected number of fatal cancers is much higher than the 1.9×10^{-4} fatal cancers estimated from NTS operations in 1998.

NTS workers receive the same dose as the general public from background radiation, but they also receive an additional dose from working in facilities with nuclear materials. The average dose to the individual worker and the cumulative dose to all workers at NTS from operations in 1998 are presented in **Table 4–48**. These doses fall within the radiological regulatory limits of 10 CFR 835. According to a risk estimator of 1 latent fatal cancer per 2,500 person-rem among workers (see Appendix B), the number of projected fatal cancers among NTS workers from normal operations in 1998 is 4.0×10^{-4}. The risk estimator for workers is lower than the estimator for the public because of the absence from the work force of the more radiosensitive infant and child age groups.

Table 4–48 Radiation Doses to Workers From Normal NTS Operations in 1998 (total effective dose equivalent)

Occupational Personnel	*Onsite Releases and Direct Radiation*	
	Standard [a]	*Actual*
Average radiation worker (millirem)	None [b]	77
Total workers [c] (person-rem)	None	1

[a] The radiological limit for an individual worker is 5,000 millirem per year (10 CFR 835). However, DOE's goal is to maintain radiological exposure as low as is reasonably achievable. Therefore, DOE has recommended an administrative control level of 500 millirem per year (DOE 1999e); 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] There were 13 workers with measurable doses in 1998.

Sources: DOE 1998c.

External radiation doses have been measured in the vicinity of the NTS DAF site that may contain radiological sources for comparison with offsite natural background radiation levels. Measurements taken in 1999 showed an average onsite dose in the vicinity of the DAF site of 91 millirem, compared to an offsite dose of 101 millirem (DOE 2000j).

External concentrations of plutonium in air are measured in the vicinity of DAF. The concentrations of plutonium-239/240 in the vicinity of DAF in 1999 was 2.1×10^{-17} curies per cubic meter. This value is about three times higher than that measured at offsite control locations. Finally, concentrations in air of gross alpha and beta radiation in the vicinity of DAF in 1999 were 2.2×10^{-15} curies per cubic meter and 2.2×10^{-14} curies per cubic meter, respectively. These alpha and beta radiation concentrations are about the same as those measured at offsite locations (DOE 2000j).

4.4.11.2 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 with which people may come in contact (e.g., soil through direct contact or via the food pathway).

Adverse health impacts to the public are minimized through administrative and design controls to decrease hazardous chemical releases to the environment and to achieve compliance with permit requirements. The effectiveness of these controls is verified through the use of monitoring information and inspection of mitigation measures. Health impacts to the public may occur during normal operations at NTS via inhalation of air containing hazardous chemicals released to the atmosphere by NTS operations. Risks to public health from ingestion of contaminated drinking water or direct exposure are also potential pathways.

Baseline air emission concentrations for air pollutants and their applicable standards are presented in Section 4.4.3.1. These 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 compared with applicable guidelines and regulations.

Chemical exposure pathways to NTS workers during normal operation may include inhaling the workplace atmosphere, drinking NTS potable water, and other possible contacts with hazardous materials associated with work assignments. Workers are protected from hazards specific to the workplace through appropriate training, protective equipment, monitoring, and management controls. NTS workers are also protected by adherence to OSHA and EPA occupational standards that limit atmospheric and drinking water concentrations of potentially hazardous chemicals. Appropriate monitoring, which reflects the frequency and amounts of chemicals utilized in the operation processes, ensures that these standards are not exceeded. Additionally, DOE requirements ensure that conditions in the workplace are as free as possible from recognized hazards that cause or are likely to cause illness or physical harm. Therefore, worker health conditions at NTS are expected to be substantially better than required by standards.

4.4.11.3 Health Effects Studies

Several epidemiological studies have been conducted to investigate possible adverse health effects of low-level radioactive fallout on residents of Nevada and Utah. These studies have been summarized in the *Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management (SSM PEIS)* (DOE 1996f). A mortality study of Utah children under 15 years old investigated the relationship between childhood leukemia and radioactive fallout and found a significant excess of leukemia among children who died during the high fallout period (between 1951 and 1958) compared to those who died during the low fallout periods (between 1944 and 1950 and between 1959 and 1975). A follow-up study found that bone doses of southern Utah residents were too low to account for the excess leukemia deaths.

A nonstatistically significant excess of thyroid neoplasm was reported among children living near the nuclear testing sites (Utah/Nevada) compared to a group living in Arizona.

An excess number of leukemia cases were observed among men who participated in military maneuvers in August 1957. No excess in “total cancers” was observed, but four cases of polycythemia vera were reported where 0.2 were expected. For a more detailed description of the studies and the findings, refer to Appendix Section E.4.9 of the *SSM PEIS* (DOE 1996f).

Occupational health studies on NTS workers are being conducted; however, no completed studies on the health of current or past NTS workers are available (DOE and HHS 2000). In one study, accessible information is being reviewed to determine whether former NTS workers might develop health problems due to their employment at the site. The review is focused on construction workers in underground and excavation work and re-entry workers who were employed there from 1951-1992. About 15,000 workers were identified for the cohort study. Exposure information and health data are being collected, and former workers are being contacted. A determination of which workers might possibly be at significant risk for health problems will be made. Those workers will be offered an opportunity to participate in a free medical screening program.

4.4.11.4 Accident History

Nuclear testing began at NTS in 1951. There were some 100 atmospheric nuclear explosions before the Limited Test Ban Treaty was implemented in 1973. Since then, all nuclear tests have been conducted underground.

Since 1970, there have been 126 nuclear tests that released approximately 54,000 curies of radioactivity to the atmosphere. Of this amount, 11,500 curies were accidentally released due to containment failure (massive releases or seeps) and late-time seeps. (Seeps are small releases after a test when gases diffuse through pore spaces in the overlying rock.) The remaining 42,500 curies were operational releases. From the perspective of human health risk, if the same person were standing at the boundary of NTS in the area of maximum concentration of radioactivity for every test since 1970, that person's total exposure would be equivalent to 32 extra minutes of normal background exposure, or the equivalent of one-thousandth of a single chest x-ray (OTA 1989).

4.4.11.5 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 is maintained to ensure adequate response for most accident conditions and to provide response efforts for accidents not specifically considered. The emergency management program incorporates activities associated with emergency planning, preparedness, and response. The NTS Emergency Preparedness Plan is designed to minimize or mitigate the impact of any emergency upon the health and safety of employees and the public. The plan integrates all emergency planning into a single entity to minimize overlap and duplication and to ensure proper responses to emergencies not covered by a plan or directive. The manager of the Nevada Operations Office has the responsibility to manage, counter, and recover from an emergency occurring at NTS.

The NTS Emergency Preparedness Plan provides for identification and notification of personnel regarding any emergency that may develop during operational and nonoperational hours. The Nevada Operations Office receives warnings, weather advisories, and any other communications that could provide advance warning of a possible emergency. The plan is based upon current Nevada Operations Office vulnerability assessments, resources, and capabilities regarding emergency preparedness.

DOE has also 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.

4.4.12 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.

4.4.12.1 Waste Inventories and Activities

NTS manages the following types of waste: transuranic, mixed transuranics, low-level radioactive, mixed low-level radioactive, hazardous, and nonhazardous. Because there is no transuranic or mixed transuranic waste associated with TA-18 operations, these waste types are not discussed in this EIS. Waste generation rates and the inventory of stored waste from activities at NTS are provided in **Table 4–49**. The NTS waste management capabilities are summarized in **Table 4–50**.

Table 4–49 Waste Generation Rates and Inventories at NTS

Waste Type	*Generation Rate (cubic meters per year)*	*Inventory (cubic meters)*
Low-level radioactive	178	Not available
Mixed low-level radioactive	0	Not available
Hazardous	34.6	Not applicable [a]
Nonhazardous (liquid and solid)	7,170	Not applicable [a]

[a] Generally, hazardous and nonhazardous wastes are not held in long-term storage.
Source: DOE 1996f.

Table 4–50 Waste Management Facilities at NTS

Facility	*Capacity*	*Status*	*Applicable Waste Type*			
			Low-Level Radioactive Waste	*Mixed Low-Level Radioactive Waste*	*Hazardous*	*Non-hazardous*
Treatment Facility						
Explosive Ordnance Disposal Unit (kilograms per year)	1,873	Online			X [a]	
Storage Facility						
Transuranic Waste Storage Pad (cubic meters)	1,150	Online		X		
Hazardous Waste Storage Unit (liters)	61,625	Online			X	
Disposal Facility						
Areas 3 and 5 Radioactive Waste Management Site (cubic meters)	500,000	Online	X			
Area 5 Pit 3 Mixed Waste Disposal Unit (cubic meters)	118,908	Online		X		
Area 6 Hydrocarbon Disposal Site (cubic meters)	42,000	Online				X
Area 9 U-10c Solid Waste Disposal Site (cubic meters)	990,000	Online				X
Area 23 Solid Waste Disposal Site (cubic meters)	450,000	Online				X

[a] Treatment of waste explosives, including damaged or expired conventional explosives, by detonation.
Sources: DOE 1996e, DOE 1996g.

Other than reporting requirements, there is no formal CERCLA program at NTS. The Federal Facilities Agreement and Consent Order with the state may preclude NTS from being placed on the National Priority List. More of a RCRA approach in remediating environmental problems will be taken under the Federal Facilities Agreement and Consent Order (DOE 1999g). More information on regulatory requirements for waste disposal is provided in Chapter 6.

4.4.12.2 Low-Level Radioactive Waste

NTS has a formal storage facility for NTS-generated low-level radioactive waste. This facility is located in the Area 5 Radioactive Waste Management Site. NTS-generated waste is stored at this facility while characterization and certification activities are being completed prior to disposal.

NTS currently operates the Area 3 and 5 Radioactive Waste Management Sites for the disposal of low-level radioactive waste generated at NTS and at offsite DOE and DOD facilities. Low-level radioactive waste is accepted for disposal from generators that have received approval from DOE Headquarters and DOE Nevada Operations Office (DOE 1999g).

The Area 5 Radioactive Waste Management Site uses pits and trenches for shallow land burial of standard-packaged low-level waste. Included in this category of low-level waste is classified waste. Classified waste is low-level radioactive waste that is "classified" because of the physical shape or specific composition of the material contained in the waste. Classification creates a need for the use of separate disposal units which are controlled with additional security measures. Area 3 uses subsidence craters generated during underground nuclear weapons testing for disposal of bulk low-level radioactive waste. Waste disposed of at Area 3 tends to have a lower activity concentration than waste disposed of at Area 5 because bulk waste tends to be generated during environmental restoration projects (DOE 1999g).

4.4.12.3 Mixed Low-Level Radioactive Waste

On January 5, 1994, the State of Nevada and NNSA Nevada Operations Office entered into a Mutual Consent Agreement that allowed mixed low-level radioactive wastes generated at NTS to be moved into storage at the Area 5 Transuranic Waste Storage Pad. This was amended in June 1994 to include mixed low-level radioactive waste generated in Nevada via environmental restoration work. Waste at this facility will continue to be held in storage until a final determination of the proper treatment and disposal technology is established by the EPA. A Federal Facilities Agreement and Consent Order was signed, effective March 27, 1996, requiring compliance with a site treatment plan, which was also finalized in March 1996. Compliance with the Federal Facilities Agreement and Consent Order exempts NTS from potential enforcement action resulting from the mixed waste storage prohibition under RCRA (DOE 1999g).

A single disposal unit, Pit 3 in Radioactive Waste Management Site Area 5, has interim status as a mixed waste disposal unit for NTS-generated wastes that meet the RCRA land disposal restrictions. Mixed low-level radioactive waste is stored on the Transuranic Waste Storage Pad until characterization is complete. If the waste meets or has been treated to meet the land disposal restrictions requirements, it may be disposed of in Pit 3 (DOE 1999g).

4.4.12.4 Hazardous Waste

Hazardous wastes result from ongoing operations that utilize solvents, lubricants, fuel, lead, metals, motor oil, and acids. Hazardous wastes are accumulated at satellite areas, stored at the Area 5 RCRA-permitted Hazardous Waste Storage Unit for up to one year and shipped offsite by truck using Department of Transportation-approved transporters to a commercial RCRA-permitted facility. The Area 11 Explosive Ordnance Disposal Unit is a thermal treatment unit where explosive wastes are detonated or treated.

4.4.12.5 Nonhazardous Waste

Solid waste landfills located in Areas 6, 9, and 23 are in use for the disposal of solid nonhazardous wastes. The Area 6 Hydrocarbon Disposal Site accepts hydrocarbon-burdened soil and debris. The Area 9 U-10c Solid Waste Disposal Site is a construction and demolition landfill. The Area 23 Solid Waste Disposal Site receives all types of nonhazardous solid waste with non pathogenic hospital waste, dead animals, and asbestos-containing materials buried in separate cells that are identified by concrete markers. Liquid nonhazardous wastes are disposed of in septic tanks, sumps, or ponds (DOE 1996g).

4.4.12.6 Waste Minimization

The NNSA Nevada Operations Office has an active waste minimization and pollution prevention program to reduce the total amount of waste generated and disposed of at NTS. This is accomplished by eliminating waste through source reduction or material substitution; by recycling potential waste materials that cannot be minimized or eliminated; and by treating all waste that is generated to reduce its volume, toxicity, or mobility prior to storage or disposal. The Nevada Operations Office published its first Waste Minimization Plan in 1991, which defined specific goals, methodologies, responsibilities, and achievements of various programs and organizations. The achievements and progress are updated at least annually. Implementing pollution prevention projects reduced the total amount of waste generated at NTS in 1999 by approximately 1,223 cubic meters (1,600 cubic yards). Examples of pollution prevention projects completed in 1999 at NTS include: reduction of sanitary waste by approximately 716 metric tons (789 tons) by selling ferrous, nonferrous, and light steel scrap metals for recycling; and reduction of sanitary waste by less than 1 metric ton (1.1 tons) by collecting and redistributing unneeded copier machine supplies within the Nevada Operations Office and the Nevada Environmental Protection Agency, and returning the remaining supplies to the vendor for credit (DOE 2000i).

4.4.12.7 Waste Management PEIS Records of Decision

The *Waste Management PEIS* Records of Decision affecting NTS are shown in **Table 4–51**. Decisions on the various waste types were announced in a series of Records of Decision that have been published as a result of analyses documented in the *Waste Management PEIS* (DOE 1997a). The hazardous waste Record of Decision was published on August 5, 1998 (63 FR 41810), and the low-level radioactive and mixed low-level radioactive waste Record of Decision was published on February 18, 2000 (65 FR 10061). The hazardous waste Record of Decision states that most DOE sites will continue using offsite facilities to treat and dispose of major portions of nonwastewater hazardous waste, except the Oak Ridge Reservation and the Savannah River Site, which will continue treating some of their own nonwastewater hazardous waste on site in existing facilities where this is economically feasible. The low-level radioactive waste and mixed low-level radioactive waste Record of Decision states that, for the management of low-level radioactive waste, minimal treatment will be performed at all sites, and disposal will continue on site to the extent practicable at INEEL, LANL, the Oak Ridge Reservation, and the Savannah River Site. In addition, Hanford and on site NTS will be available to all DOE sites for low-level radioactive waste disposal. Mixed low-level radioactive waste will be treated at Hanford, INEEL, the Oak Ridge Reservation, and the Savannah River Site, and will be disposed of at Hanford and NTS. More detailed information concerning DOE's decisions for the future configuration of waste management facilities at NTS is presented in the hazardous waste and low-level radioactive waste and mixed low-level radioactive waste Records of Decision.

4.5 ANL-W

ANL-W is located within the boundaries of INEEL. Because of this, the general site description presented in this section is that of INEEL. INEEL is located on approximately 230,700 hectares (570,000 acres) in southeastern Idaho and is 55 kilometers (34 miles) west of Idaho Falls; 61 kilometers (38 miles) northwest of Blackfoot; and 35 kilometers (22 miles) east of Arco (see **Figure 4–32**). INEEL is owned by the Federal Government and administered, managed, and controlled by DOE. 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 (DOE 2000k).

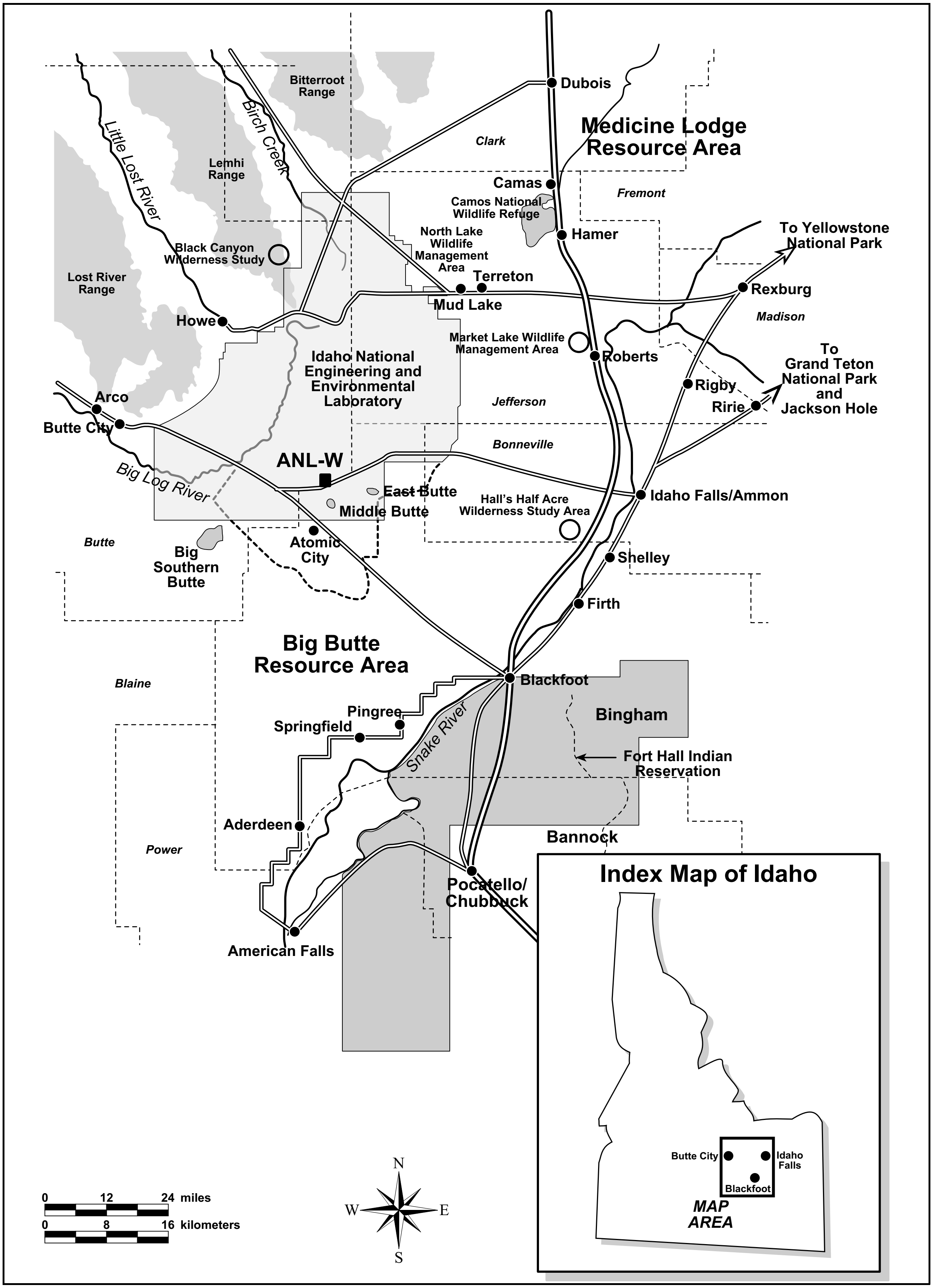

Figure 4–32 Idaho National Engineering and Environmental Laboratory Vicinity

Table 4–51 Waste Management PEIS Records of Decision Affecting NTS

Waste Type	*Preferred Action*
Low-level radioactive	DOE has decided to continue to treat and dispose of NTS low-level radioactive waste on site. In addition, NTS is available to all DOE sites for low-level radioactive waste disposal. [a]
Mixed low-level radioactive	DOE has decided to regionalize treatment of mixed low-level radioactive waste at the Hanford Site, INEEL, the Oak Ridge Reservation, and the Savannah River Site. NTS will continue to dispose of its own mixed low-level radioactive waste on site and will receive and dispose of mixed low-level radioactive waste generated and shipped by other sites, consistent with permit conditions and other applicable requirements. [a]
Hazardous	DOE has decided to continue to use commercial facilities for treatment of NTS nonwastewater hazardous waste. [b]

[a] From the Record of Decision for low-level radioactive and mixed low-level radioactive waste (65 FR 10061).
[b] From the Record of Decision for hazardous waste (63 FR 41810).
Source: 65 FR 10061, 63 FR 41810.

There are 450 buildings and 2,000 support structures at INEEL, with more than 279,000 square meters (3,000,000 square feet) of floor space in varying conditions of utility. INEEL has approximately 25,100 square meters (270,000 square feet) of covered warehouse space and an additional 18,600 square meters (200,000 square feet) of fenced yard space. The total area of the various machine shops is 3,035 square meters (32,665 square feet) (DOE 2000k).

Fifty-two research and test reactors have been used at INEEL over the years to test reactor systems, fuel and target design, and overall safety. In addition to nuclear research reactors, other INEEL facilities are operated to support reactor operations. These facilities include high- and low-level radioactive waste processing and storage sites; hot cells; analytical laboratories; machine shops; and laundry, railroad, and administrative facilities. Other activities include management of one of DOE's largest storage sites for low-level radioactive waste and transuranic waste (DOE 2000k).

ANL-W is located in the southeastern portion of INEEL, about 61 kilometers (38 miles) west of the city of Idaho Falls. The site is designated as a testing center for advanced technologies associated with nuclear power systems. The area has 52 major buildings, including reactor buildings, laboratories, warehouses, technical and administrative support buildings, and craft shops that comprise 55,700 square meters (600,000 square feet) of floor space (DOE 1997c). Five nuclear test reactors have operated on the site, although the only one currently active is a small reactor used for radiography examination of experiments, waste containers, and spent nuclear fuel. Principal facilities located at ANL-W include the Fuel Manufacturing Facility, Transient Reactor Test Facility, Fuel Conditioning Facility, Hot Fuel Examination Facility, Zero Power Physics Reactor, and Experimental Breeder Reactor II. The following descriptions of the affected environment at INEEL and ANL-W are based all or in part on information provided in the *Idaho High-Level Waste and Facility Disposition EIS* (DOE 1999j), the *EIS for the Treatment and Management of Sodium-Bonded Spent Nuclear Fuel* (DOE 2000e), and the *NI PEIS* (DOE 2000k) which are incorporated by reference.

4.5.1 Land Resources

4.5.1.1 Land Use

The Federal Government, the State of Idaho, and various private parties own lands surrounding INEEL. Regional land uses include grazing, wildlife management, mineral and energy production, recreation, and crop production. Small communities and towns near the INEEL boundaries include Mud Lake and Terraton to the east; Arco, Butte City, and Howe to the west; and Atomic City to the south. Two National Natural Landmarks border INEEL: Big Southern Butte (2.4 kilometers [1.5 miles] south) and Hell's Half Acre (2.6 kilometers [1.6 miles] southeast). A portion of Hell's Half Acre National Natural Landmark is designated as a Wilderness Study Area. The Black Canyon Wilderness Study Area is adjacent to INEEL, and the Craters of the Moon Wilderness Area is located about 20 kilometers (12 miles) southwest of INEEL's western boundary. On November 9, 2000, President Clinton signed a Presidential Proclamation that added 267,500 hectares (661,000 acres) to the 21,850-hectare (54,000-acre) monument.

Land use categories at INEEL include facility operations, grazing, general open space, and infrastructure such as roads. Approximately 60 percent of the site is used for cattle and sheep grazing. Generalized land uses at INEEL and the surrounding vicinity are shown in **Figure 4–33**. 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. Recently, 29,950 hectares (74,000 acres) of open space in the north-central portion of the site were designated as the INEEL Sagebrush Steppe Ecosystem Reserve. This area represents one of the last sagebrush steppe ecosystems in the United States and provides a home for a number of rare and sensitive species of plants and animals. Approximately 2 percent of the total INEEL site area (4,600 hectares [11,400 acres]) is used for facilities and operations. Facilities are sited within a central core area of about 93,100 hectares (230,000 acres) (Figure 4–33). Public access to most facilities is restricted. DOE land use plans and policies applicable to INEEL are discussed in the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (DOE 1995c).

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, its 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.

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

The total land area at ANL-W is 328 hectares (810 acres); however, site facilities are principally situated within about 20 hectares (50 acres), or 6 percent of the site. ANL-W is located 7 kilometers (4.3 miles) northwest of the nearest site boundary. Land within the fenced portion of the site has been heavily disturbed, with buildings, parking lots, and roadways occupying most areas and is no natural habitat present. The Fuel Manufacturing Facility is located within the main fenced portion of the site, while the Transient Reactor Test Facility is located about 1.2 kilometers (0.75 miles) to the northeast (Figure 3–13). Land within the site will continue to be used for nuclear and nonnuclear scientific and engineering experiments for DOE, private industry, and academia (DOE 1997c).

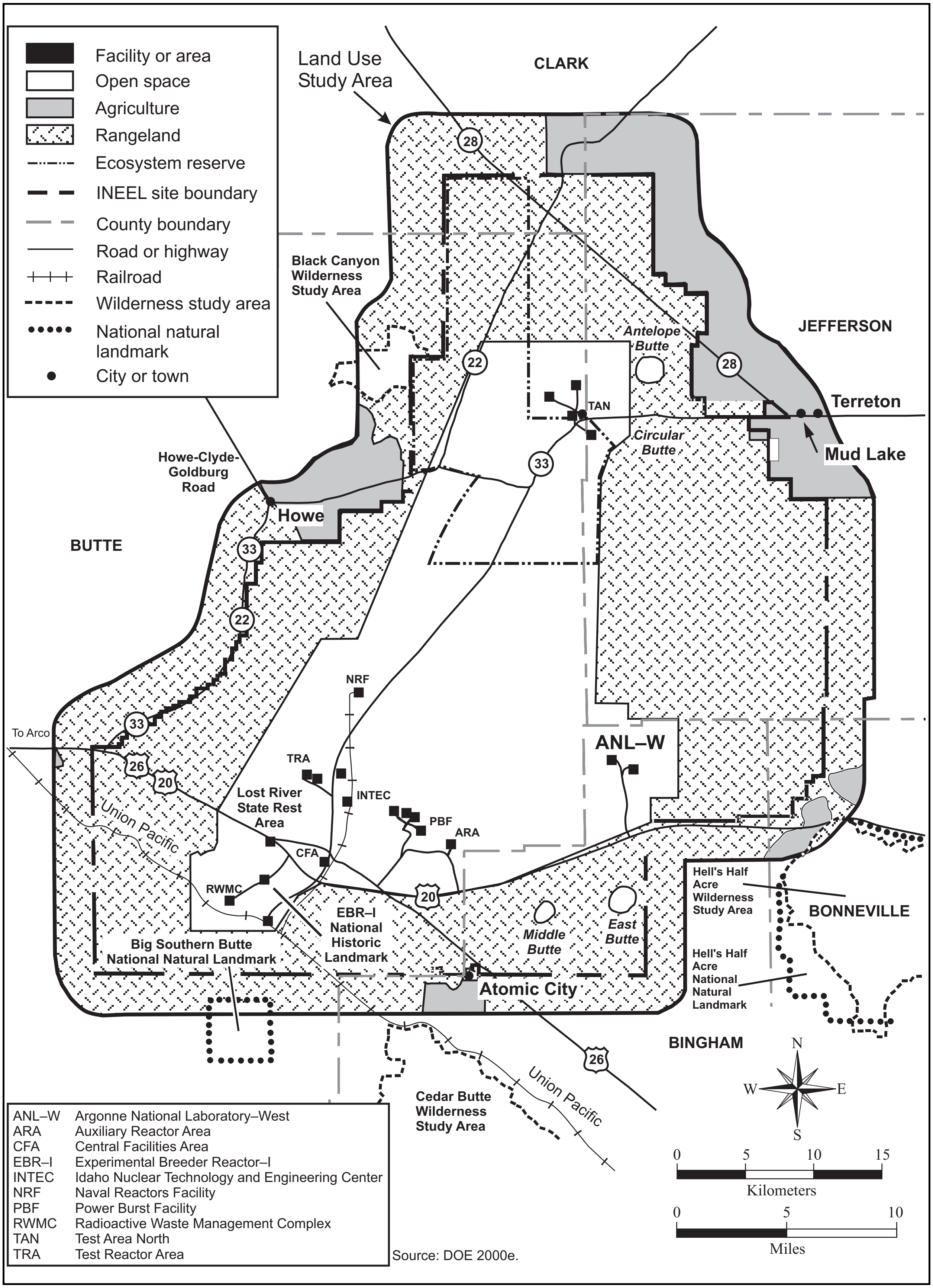

Figure 4–33 Land Use at INEEL and Vicinity

4.5.1.2 Visual Resources

The Bitterroot, Lemhi, and Lost River mountain ranges border INEEL on the north and west. 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 big sagebrush and grasslands. Pasture and farmland border much of the site. Ten facility areas are on the INEEL site. Although INEEL has a comprehensive facility and land use plan (DOE 1997c), 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 generally range from 3 to 30 meters (10 to 100 feet); a few stacks and towers reach 76 meters (250 feet). Although many INEEL facilities are visible from highways, most facilities are more than 0.8 kilometers (0.5 miles) from public roads. The operational areas are well defined at night by the security lights.

Lands adjacent to INEEL are under Bureau of Land Management jurisdiction and have a Visual Resource Contrast Class II rating. Lands within the INEEL site have a Visual Resource Contrast rating of Class II and III. Management activities within these classes may be seen, but should not dominate the review. The Black Canyon Wilderness Study Area adjacent to INEEL is under consideration by Bureau of Land Management for Wilderness Area designation, approval of which would result in an upgrade of its Visual Resource Contrast rating from Class II to Class I. The Hell's Half Acre Wilderness Study Area is 2.6 kilometers (1.6 miles) southeast of INEEL's eastern boundary. This area, famous for its lava flow and hiking trails, is managed by the Bureau of Land Management. The Craters of the Moon Wilderness Area is about 20 kilometers (12 miles) southwest of INEEL's western boundary.

Developed areas within ANL-W are consistent with a Class IV Visual Resource Contrast rating in which management activities dominate the view and are the focus of viewer attention. The tallest structure at ANL-W is the Fuel Conditioning Facility stack, which is 61 meters (200 feet) in height. The site is visible from Highway 20. Facilities that stand out from the highway include the Transient Reactor Test Facility, Hot Fuel Examination Facility, the Experimental Breeder Reactor-II containment shell, and the Zero Power Physics Reactor. Natural features of visual interest within a 40-kilometer (25-mile) radius of ANL-W include the East Butte at 9 kilometers (5.6 miles), Middle Butte at 11 kilometers (6.8 miles), Hell's Half Acre National Natural Landmark and Hell's Half Acre Wilderness Study Area at 15 kilometers (9.3 miles), Big Lost River at 19 kilometers (11.8 miles), and Big Southern Butte National Natural Landmark at 30 kilometers (18.6 miles).

4.5.2 Site Infrastructure

Site infrastructure characteristics are identified in **Table 4–52**.

4.5.2.1 Ground Transportation

The road network at INEEL provides for onsite transportation; railroads are used for deliveries of large volumes of coal and oversized structural components. Commercial shipments are transported by truck; some bulk materials are transported by train; and waste is transported by truck and train. About 140 kilometers (87 miles) of paved surface have been developed out of the 445 kilometers (277 miles) of roads on the site, including 29 kilometers (18 miles) of service roads that are closed to the public (Table 4–52). Most of the roads are adequate for the current level of normal transportation activity and could handle increased traffic volume.

Table 4–52 INEEL Sitewide Infrastructure Characteristics

Resource	Site Usage	Site Capacity
Transportation		
Roads (kilometers)	445 [a]	Not applicable
Railroads (kilometers)	48	Not applicable
Electricity		
Energy consumption (megawatt-hours per year)	221,772	394,200
Peak load (megawatts)	39	124
Fuel		
Natural gas (cubic meters per year)	0	Not applicable
Liquid fuels (liters per year)	5,820,000	16,000,000 [b]
Coal (metric tons per year)	11,340	11,340 [b]
Water (liters per year)	4,829,000,000 [c]	43,000,000,000 [d]

[a] Includes paved and unpaved roads.
[b] Low supplies can be replenished by truck or rail and, therefore, are essentially not limited.
[c] 1998 usage (DOE 2000k).
[d] Water right allocation.
Source: DOE 2000e.

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 Scoville Siding, then links with developed areas within INEEL. There are 48 kilometers (30 miles) of railroad track at INEEL. Rail shipments to and from INEEL usually are limited to bulk commodities, spent nuclear fuel, and radioactive waste. Local and linking regional transportation systems including roadways are detailed in Section 4.5.9.4.

4.5.2.2 Electricity

Commercial electric power is supplied to INEEL through two feeders from the Antelope substation to the Federally owned Scoville substation, which supplies electric power directly to the site's 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.

Site electrical availability is about 394,200 megawatt-hours per year. In 1997, INEEL used 221,772 megawatt-hours of electricity. The 1997 peak load usage was about 39 megawatts; the peak load capacity for INEEL is 124 megawatts (Table 4–52). Current electrical usage at ANL-W is 28,700 megawatt-hours per year.

4.5.2.3 Fuel

Fuel consumed at INEEL includes several types of liquid petroleum fuel, coal, and propane gas. All fuel is transported to the site for use and storage. Fuel storage is provided for each facility, and the inventories are restocked as necessary. The current site usage of fuel oil is about 5.8 million liters (1.5 million gallons) per year. The current site usage of coal is about 11,340 metric tons (12,500 tons) per year (Table 4–52). If additional coal or fuel oil were needed during the year, it could be shipped to the site.

4.5.2.4 Water

The Snake River Plain aquifer is the source of all water used at INEEL (see Section 4.5.6.2). 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 of 43 billion liters (11.4 billion gallons) per year for the site. INEEL site-wide groundwater production in 1998 was about 4.83 billion liters (1.28 billion gallons) (see Table 4–52). In 1998, ANL-W withdrew some 187.6 million liters (49.6 million gallons) from its two production wells (EBR II #1 and EBR II #2).

4.5.3 Air Quality

The climate at INEEL and the surrounding region is characterized as that of a semiarid steppe. The average annual temperature at INEEL is 5.6 °C (42 °F); average monthly temperatures range from a minimum of -8.8 °C (16.1°F) in January to a maximum of 20 °C (68 °F) in July. The average annual precipitation is 22 centimeters (8.7 inches). Prevailing winds at INEEL are southwest or northeast. The annual average wind speed is 3.4 meters per second (7.5 miles per hour).

4.5.3.1 Nonradiological Releases

INEEL is within the Eastern Idaho Intrastate Air Quality Control Region (#61). None of the areas within INEEL and its surrounding counties are designated as nonattainment areas with respect to the NAAQS for criteria air pollutants (40 CFR 81.313). The nearest nonattainment area for particulate matter is in Pocatello, about 80 kilometers (50 miles) to the south. Applicable NAAQS and Idaho State ambient air quality standards are presented in **Table 4–53**.

Table 4–53 Modeled Ambient Air Concentrations from INEEL Sources (μg/m^3)

Pollutant	*Averaging Period*	*Most Stringent Standard* [a]	*INEEL Concentration without ANL-W* [b]	*ANL-W Concentration* [c]
Carbon monoxide	8 hours	10,000 [d]	76	13
	1 hour	40,000 [d]	350	57
Lead	Quarterly	1.5	0.0024	(f)
Nitrogen dioxide	Annual	100 [d]	3.2	1.1
Ozone	1 hour	235 [e]	(f)	(f)
PM_{10}	Annual	50 [d]	1.2	0.018
	24 hours	150 [d]	19	0.28
Sulfur dioxide	Annual	80 [d]	0.61	0.88
	24 hours	365 [d]	16	11
	3 hours	1,300 [d]	67	62

[a] The more stringent of the Federal and state standards is presented if both exist for the averaging period. National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50), other than those for ozone, particulate matter, and lead, and those based on annual averages, are not to be exceeded more than once per year. The annual arithmetic PM_{10} mean standard is attained when the expected annual arithmetic mean concentration is less than or equal to the standard.
[b] Maximum concentrations occur at receptors along public roads.
[c] ANL-W concentrations based on 1997 actual emissions and 1996 meteorology data modeled using ISCST3.
[d] Federal and state standard.
[e] Federal 8-hour standard is currently under litigation.
[f] Not directly emitted or monitored by the site.
Note: NAAQS also include standards for lead. No sources of lead emissions have been identified for any alternative evaluated. Emissions of hazardous air pollutants not listed here have been identified at INEEL, but are not associated with any of the alternatives evaluated. EPA revised the ambient air quality standards for particulate matter and ozone in 1997 (62 FR 38856, 62 FR 38652); however, these standards are currently under litigation, but could become enforceable during the life of this project.
Sources: 40 CFR 50, DOE 1999j, DOE 2000e, ID DEQ 2000.

The primary sources of air pollutants at INEEL include combustion of coal for steam and combustion of fuel oil for heating. Other emission sources include waste burning, coal piles, industrial processes, stationary diesel engines, vehicles, and fugitive dust from waste burial and construction activities. Emissions for 1997 are presented in **Table 4–54**.

Table 4–54 Air Pollutant Emissions at INEEL in 1997 [a]

Pollutant	Sources Other Than ANL-W	ANL-W
Carbon monoxide	1.1 [b]	1.6
Nitrogen dioxide	4.4	6.6
PM_{10}	0.44	0.31
Sulfur dioxide	15	2.2
Volatile organic compounds	0.055	0.13
Lead	0.66	None

[a] Values in metric tons per year.
[b] Emissions associated with fuel combustion.
Source: DOE 1999j, INEEL 1998.

Routine offsite monitoring for nonradiological air pollutants is generally only performed for particulates. Monitoring for PM_{10} is performed by the Environmental Science and Research Foundation at the site boundary and at communities beyond the boundary. In 1998, 55 samples were collected at Rexburg (about 60 kilometers [19.3 miles] east of the site) by the Foundation. The mean PM_{10} concentration at Rexburg for 1998 was 27 micrograms per cubic meter. Forty-eight samples were collected at the Mountain View Middle School in Blackfoot, with a mean concentration of 23 micrograms per cubic meter. Forty-four samples were collected at Atomic City in 1998, with a mean concentration of 21 micrograms per cubic meter.

Some monitoring data have also been collected by the National Park Service at the Craters of the Moon Wilderness Area. The monitoring program has shown no exceedances of the 1-hour ozone standard, low levels of sulfur dioxide (except for one exceedance of the 24-hour standard in 1985), and total suspended particulates within applicable standards. Note that the total suspended particulate standards have been replaced with PM_{10} standards.

The existing ambient air concentrations attributable to sources at INEEL are presented in Table 4–53. These concentrations are based on dispersion modeling at the INEEL site boundary centered at the Idaho Nuclear Technology and Engineering Center facility, and were performed for the *Idaho High-Level Waste and Facilities Disposition Environmental Impact Statement* using 1997 actual emissions and excluding ANL-W and meteorological data from 1991-1992; dispersion modeling at the INEEL site boundary centered on ANL-W using 1997 actual emissions for ANL-W; and meteorological data from 1996. The estimated concentrations are conservative and bound the actual INEEL contribution to ambient levels, as some of the modeled sources are currently in standby. Concentrations shown in Table 4–53 represent a small percentage of the ambient air quality standards. Concentrations of any hazardous and toxic compounds would be well below regulatory levels.

Because INEEL sources are limited and background concentrations of criteria pollutants are well below ambient standards, INEEL emissions should not result in air pollutant concentrations that violate the ambient air quality standards.

The nearest Prevention of Significant Deterioration Class I area to INEEL is Craters of the Moon Wilderness Area, Idaho, 53 kilometers (33 miles) west-southwest from the center of the site. A Class I area is one in which very little increase in pollution is allowed due to the pristine nature of the area. There are no other Class I areas within 100 kilometers (62 miles) of INEEL. INEEL and its vicinity are classified as a Class II area in which more moderate increases in pollution are allowed.

EPA has established Prevention of Significant Deterioration increments for certain pollutants such as: sulfur dioxide, nitrogen dioxide, and particulate matter. The increments specify a maximum allowable increase above a certain baseline concentration for a given averaging period, and apply only to sources constructed or modified after a specified baseline date. These sources are known as increment-consuming sources. The baseline date is the date of submittal of the first application for a Prevention of Significant Deterioration permit in a given area.

Prevention of Significant Deterioration permits have been obtained for the coal-fired steam-generating facility next to the Idaho Nuclear Technology and Engineering Center and the Fuel Processing Facility, which is not expected to be operated. In addition to these facilities, INEEL has other increment consuming sources on site. Current amounts of Prevention of Significant Deterioration increment consumption in Class I and Class II areas by INEEL's increment-consuming sources based on dispersion modeling analyses are specified in **Tables 4–55** and **4–56**, respectively.

Table 4–55 Prevention of Significant Deterioration Increment Consumption at Craters of the Moon Wilderness (Class I) Area by Existing (1996) and Projected Sources Subject to Prevention of Significant Deterioration Regulation (μg/m^3)

Pollutant	*Averaging Period*	*Allowable Prevention of Significant Deterioration Increment* [a]	*Amount of Prevention of Significant Deterioration Increment Consumed*
Nitrogen dioxide	Annual	2.5	0.40
Respirable particulates [b]	Annual 24 hours	4 8	0.025 0.57
Sulfur dioxide	Annual 24 hours 3 hours	2 5 25	0.12 1.9 8.1

[a] All increments specified are State of Idaho standards (ID DEQ 2000).
[b] Data on particulate size are not available for most sources. For purposes of comparison to the respirable particulate increments, it is conservatively assumed that all particulates emitted are of respirable size (i.e., 10 microns or less in diameter).
Note: Estimated increment consumption includes existing INEEL sources subject to Prevention of Significant Deterioration regulation and including Idaho Nuclear Technology and Engineering Center CPP-606 boilers.
Source: DOE 1999j.

Table 4–56 Prevention of Significant Deterioration Increment Consumption at Class II Areas by Existing (1996) and Projected Sources Subject to Prevention of Significant Deterioration Regulation at INEEL (μg/m^3)

Pollutant	*Averaging Period*	*Allowable Prevention of Significant Deterioration Increment* [a]	*Amount of Prevention of Significant Deterioration Increment Consumed*
Nitrogen dioxide	Annual	25	8.8
Respirable particulates [b]	Annual 24 hours	17 30	0.53 10
Sulfur dioxide	Annual 24 hours 3 hours	20 91 512	3.6 27 120

[a] All increments specified are State of Idaho standards (ID DEQ 2000).
[b] Data on particulate size are not available for most sources. For purposes of comparison to the respirable particulate increments, it is conservatively assumed that all particulates emitted are of respirable size (i.e., 10 microns or less in diameter).
Note: Estimated increment consumption includes existing INEEL sources, subject to Prevention of Significant Deterioration regulations and include Idaho Nuclear Technology and Engineering Center CPP-606 boilers.
Source: DOE 1999j.

4.5.3.2 Radiological Releases

Primary releases of radiological air pollutants at INEEL and localized releases at ANL-W are presented in **Table 4–57**. During 1998, an estimated 5,995 curies of radioactivity were released to the atmosphere from all INEEL sources. Ninety-nine percent of the total airborne radioactive effluent was released from two INEEL facilities, the ANL-W and the Test Reactor Area. ANL-W released 4,719 curies and the Test Reactor Area released 1,201 curies. Isotopes of noble gases comprised more than 99 percent of each of their releases.

Year-to-year fluctuations in airborne radioactive effluent releases depend on which processes are active at INEEL facilities. The total for 1998 is higher than the annual totals for 1993 to 1997, primarily because of the 4,687 curies of krypton-85 released from ANL-W. Krypton-85, a noble gas, was released from ANL-W as part of a spent fuel treatment project, (the Electrometallurgical Treatment Research and Demonstration Project) in the Fuel Conditioning Facility. Although the 1998 releases were higher than in previous years, they were still considerably less than the annual totals in the 1980s.

Table 4–57 Radiological Airborne Releases to the Environment at INEEL in 1998

Emission Type	***Radionuclide*** [a]	***ANL-W (curies)***	***Other Facilities at INEEL*** [b] ***(curies)***	***Total (curies)***
Noble gases	Argon-41	2.3	1,172	1,175
	Krypton-85	4,687	0.30	4,687
	Krypton-85m	—	1.5	1.5
	Xenon-133	—	7.8	7.8
	Xenon-135	—	18.5	18.5
Airborne particulates	Sodium-24	—	0.013	0.013
	Chromium-51	—	0.0037	0.0037
	Rubidium-88	—	1.1	1.1
	Strontium-90 [c]	—	3.1×10^{-4}	3.1×10^{-4}
	Technetium-99m	—	0.0014	0.0014
	Antimony-125	—	1.3×10^{-4}	1.3×10^{-4}
	Cesium-137	—	0.0013	0.0013
	Cesium-138	—	0.050	0.050
	Uranium-234	—	0.0050	0.0050
	Plutonium-238	—	5.0×10^{-6}	5.0×10^{-6}
	Plutonium-239	—	5.3×10^{-7}	5.3×10^{-7}
Tritium, carbon-14, and iodine isotopes	Tritium (Hydrogen-3)	30	74	104
	Carbon-14	—	0.80	0.80
	Iodine-129	—	0.018	0.018
	Iodine-131	—	6.7×10^{-4}	6.7×10^{-4}
	Iodine-133	—	0.0015	0.0015
	Iodine-135	—	8.2×10^{-4}	8.2×10^{-4}
Others		4.8×10^{-5}	0.0026	0.0027
Total releases		4,719	1,276	5,995

[a] The table includes all radionuclides with total releases greater than 10^{-7} curies, except for plutonium-239. Values are not corrected for decay after release.
[b] Facilities include Idaho Nuclear Technology and Engineering Center, the Test Reactor Area, and the Naval Reactor Facility.
[c] Parent-daughter equilibrium assumed.
Note: Dashed lines indicate virtually no releases.
Source: DOE 2000f.

4.5.4 Noise

Major noise emission sources within INEEL include various industrial facilities, equipment, and machines (e.g., cooling systems, transformers, engines, pumps, boilers, steam vents, paging systems, construction and materials-handling equipment, and vehicles). Most INEEL industrial facilities are far enough from the site boundary that noise levels at the boundary from these sources are not measurable or are barely distinguishable from background levels.

Existing INEEL-related noises of public significance result from the transportation of people and materials to and from the site and in-town facilities via buses, trucks, private vehicles, and freight trains. Noise measurements along U.S. Route 20, about 15 meters (50 feet) from the roadway, indicate that traffic sound levels range from 64 to 86 dBA, and that the primary source is buses (71 to 80 dBA). While few people reside within 15 meters (50 feet) of the roadway, the results indicate that INEEL traffic noise might be objectionable to members of the public residing near principal highways or busy bus routes. Noise levels along these routes may have decreased somewhat due to reductions in employment and bus service at INEEL in the last few years. The acoustic environment along the INEEL site boundary in rural areas and at nearby areas away from traffic noise is typical of a rural location; the average day-night sound level is in the range of 35 to 50 dBA. Except for the prohibition of nuisance noise, neither the State of Idaho nor local governments have established any regulations that specify acceptable community noise levels applicable to INEEL. The EPA guidelines for environmental noise protection recommend an average day-night sound level limit of 55 dBA to protect the public from the effects of broadband environmental noise in typically quiet outdoor and residential areas (EPA 1974). Land use compatibility guidelines adopted by the Federal Aviation Administration and the Federal Interagency Committee on Urban Noise indicate that annual day-night average sound levels less than 65 dBA are compatible with residential land uses (14 CFR Part 150). These guidelines further indicate that levels up to 75 dBA are compatible with residential uses if suitable noise reduction features are incorporated into structures. It is expected that, for most residences near INEEL, day-night average sound levels are compatible with residential land use, although noise levels may be higher than 65 dBA for some residences along major roadways.

No distinguishing noise characteristics at ANL-W have been identified. ANL-W is 7 kilometers (4.3 miles) from the nearest site boundary, so the contribution from the area to noise levels at the site boundary is unmeasurable.

4.5.5 Geology and Soils

INEEL is on the northwestern edge of the eastern Snake River Plain, which is bounded on the north and south by north-to-northwest-trending mountains and valleys of the Basin and Range Physiographic Province. The upper 1 to 2 kilometers (0.6 to 1.2 miles) of the crust beneath INEEL is composed of a sequence of Quaternary age (recent to 2 million years old) basalt lava flows and poorly consolidated sedimentary interbeds collectively called the Snake River Group. The sediments are composed of fine-grained silts that were deposited by wind; silts, sands, and 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 4.3 and 6.5 million years ago during the upper Tertiary Period. Lava tubes, which could have similar adverse effects as karst, occur in the INEEL area. Additional details about INEEL site geology are presented in the *NI PEIS*.

Within INEEL, economically viable sand, gravel, pumice, silt, clay, and aggregate resources exist. Several quarries supply these materials to various onsite construction and maintenance projects. Geothermal resources are potentially available in parts of the Eastern Snake River Plain, but neither of two boreholes drilled near the Idaho Nuclear Technology and Engineering Center encountered rocks with significant geothermal potential.

The Arco Segment of the Lost River Fault is thought to terminate about 7 kilometers (4.3 miles) from the INEEL boundary. The Howe Segment of the Lemhi Fault terminates near the northwest boundary of the site (**Figure 4–34**). Both segments 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 (10 CFR Part 100, Appendix A).

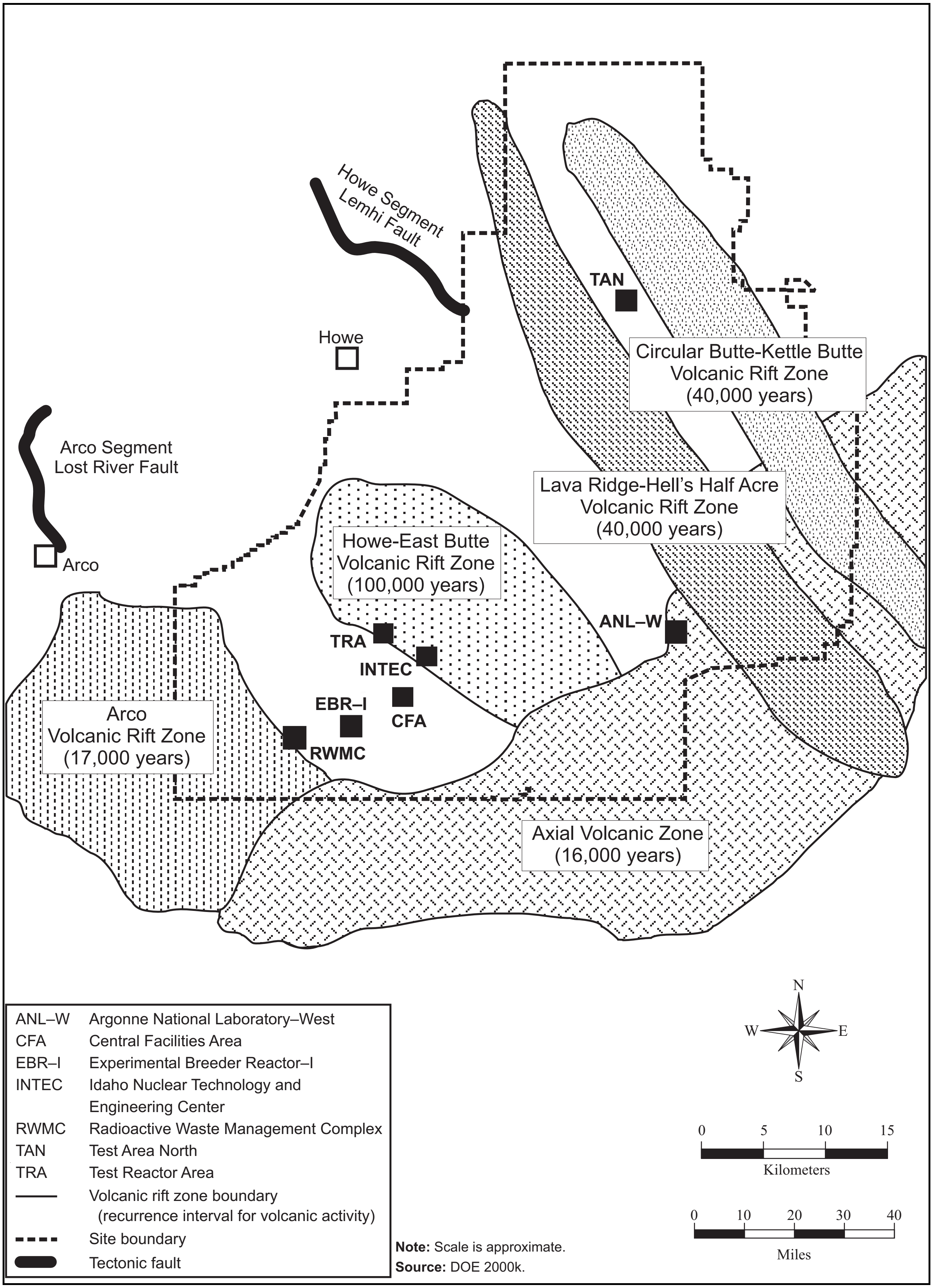

Figure 4–34 Major Geologic Features of INEEL

The seismic characteristics of the Eastern Snake River Plain and the adjacent Basin and Range Province are different; the Snake River Plain has historically experienced a few small earthquakes. Monitoring by the INEEL seismic network has detected relatively few microearthquakes (magnitude less than 1.5) occurring on or near the site. Thus, INEEL has a relatively low seismicity indicative of the Eastern Snake River Plain. Since 1973, 22 earthquakes have been recorded within 100 kilometers (62 miles) of south-central INEEL ranging in magnitude from 2.8 to a magnitude 3.9. These represent minor earthquakes with none centered closer than 77 kilometers (48 miles) from the site (USGS 2001i).

The largest historic earthquake near INEEL took place in October 1983 about 90 kilometers (56 miles) to the northwest of the western site boundary, near Borah Peak in the Lost River Range. It occurred on the middle portion of the Lost River Fault. The earthquake had a surface-wave magnitude of 7.3 (moment magnitude of 6.9), producing peak horizontal accelerations of 0.022g to 0.078g at INEEL (USGS 2001h, USGS 2001i). The reported Modified Mercalli Intensity ranged from V to IX at the event's epicenter (USGS 2001i). The Test Reactor Area (Advanced Test Reactor) experienced a Modified Mercalli Intensity of VI during this event with no damage to the Advanced Test Reactor found upon inspection. For reference, a comparison of Modified Mercalli Intensity (the observed effects of earthquakes) with measures of earthquake magnitude and ground acceleration is provided in Section F.5.2 (see Appendix F).

As discussed in more detail in Section 4.2.5, the U.S. Geological Survey has developed new earthquake hazard maps that are based on spectral response acceleration. These maps have been adapted for use in the new International Building Code (ICC 2000) and depict a maximum considered earthquake ground motion of 0.2- and 1.0-second spectral response acceleration, respectively, based on a 2 percent probability of exceedance in 50 years (i.e., 1 in 2,500). The south-central portion of INEEL encompassing ANL-W is calculated to lie within the 0.35 to 0.36g mapping contours for a 0.2 second spectral response acceleration and the 0.12g to 0.13g contours for a 1.0-second spectral response acceleration. For comparison, the calculated peak ground acceleration, for the given probability of exceedance is approximately 0.14g (USGS 2001e).

Basaltic volcanic activity occurred from about 2,100 to 4 million years ago in the INEEL site area. Although no eruptions have occurred on the Eastern Snake River Plain during recorded history, lava flows of the Hell's Half Acre lava field erupted near the southern INEEL boundary as recently as 5,400 years ago. The most recent eruptions within the site area occurred about 2,100 years ago 30 kilometers (19 miles) southwest of the site at the Craters of the Moon Wilderness Area. Five volcanic zones have been identified in the vicinity of INEEL. The estimated recurrence interval for volcanism in these zones ranges from 16,000 to 100,000 years. These zones are depicted in Figure 4–34.

Four basic soilscapes exist at INEEL: river-transported sediments deposited on alluvial plains, fine-grained sediments deposited into lake or playa basins, colluvial sediments originating from bordering mountains, and wind-blown sediments over lava flows. The alluvial deposits follow the courses of the modern Big Lost River and Birch Creek. The playa soils are found in the north-central part of the site. The colluvial sediments are located along the western edge of INEEL. Wind-blown sediments (silt and sand) covering lava plains occupy the rest of the landscape of the site. The thickness of surficial sediments ranges from less than 0.3 meters (1 foot) at basalt outcrops east of the Idaho Nuclear Technology and Engineering Center to 95 meters (312 feet) near the Big Lost River sinks. No prime farmland lies within INEEL boundaries.

The nearest capable fault to ANL-W is the Howe Segment of the Lemhi Fault, which is located 31 kilometers (19 miles) northwest of the site. ANL-W is located within the Axial Volcanic Zone, which has an estimated recurrence interval for volcanism of 16,000 years. The site is situated within a topographically closed basin. Low ridges of basalt found east of the area rise as high as 30 meters (100 feet) above the level of the plain. Sediments cover most of the underlying basalt on the plain, except where pressure ridges form basalt