Table 4-*20*. Trends in tritium, strontium-90, and iodine-129 in selected wells at the INEEL.

Year	Concentration[a] (pCi/L)		
	Tritium[b] (USGS-77)	Strontium-90[b] (USGS-47)	Iodine-129[c] (USGS-46)
1981	80,000 ± 800	79 ± 5	41 ± 2
1986	70,000 ± 900	56 ± 4	2.3 ± 0.3
1991	42,000 ± 900	55 ± 4	0.35 ± 0.02
1995	25,000 ± 100	47 ± 2	–
2001	***11,500 ± 613[d]***	***45 ± 7.57[d]***	***ND[d]***

a. The concentrations shown are for selected wells on the INEEL, not necessarily the maximum concentrations measured at the INEEL or at INTEC.

b. Source: Bartholomay et al. (1997).

c. Source: 1981 and 1986 data - Mann et al. (1988); 1991 data – Mann and Beasley (1994).

d. ***Source: DOE (2002b). ND = not detected***

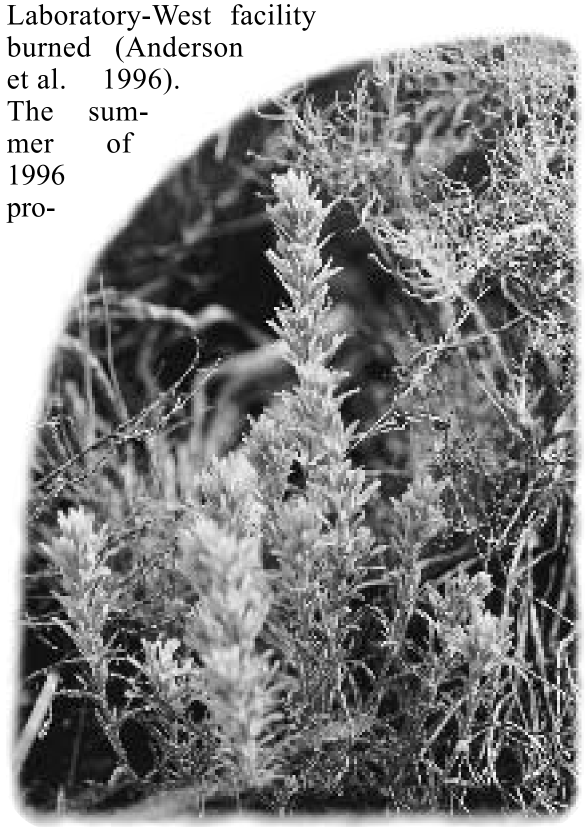
4.9.1 PLANT COMMUNITIES AND ASSOCIATIONS

INEEL lies within a cool desert ecosystem dominated by shrub-steppe vegetation. The area is relatively undisturbed, providing important habitat for species native to the region. Vegetation and habitat on INEEL can be grouped into six types: shrub-steppe, juniper woodlands, native grasslands, modified ephemeral playas, lava, and wetland-like areas. Figure 4-***16*** shows these areas.

More than 90 percent of INEEL falls within the shrub-steppe vegetation type. The shrub-steppe vegetation type is dominated by sagebrush (*Artemisia spp.*), saltbush (*Atriplex spp.*), and rabbitbrush (*Chrysothamnus spp.*). Grasses found on INEEL include cheatgrass (*Bromus tectorum*), Indian ricegrass (*Oryzopsis hymenoides*), wheatgrass (*Agropyron spp.*), and squirreltail (*Sitanion hysterix*). Herbaceous plants or forbs such as phlox (*Phlox spp.*), wild onion (*Allium spp.*), and milkvetch (*Astragalus spp.*), weeds such as Russian thistle (*Salsola kali*), halogeton (*Halogeton glomeratus*), and various mustards occur on disturbed areas throughout the INEEL area.

Areas cleared of natural vegetation cover about 2 percent of INEEL. Vegetation in disturbed areas such as INTEC is frequently dominated by introduced annual species, including Russian thistle and cheatgrass. Introduced annuals in disturbed areas provide lower quality food and cover for wildlife than native species. Therefore, species diversity is generally lower in disturbed and developed areas and higher in undisturbed natural areas (DOE 1995).

Large wildfires in 1994, 1995, 1996, ***1999, and 2000*** played an important role in the vegetation cover at INEEL. Figure 4-***17*** shows the location of the wildfires. In July 1994, the Butte City fire burned 17,107 acres along the western boundary of INEEL (Anderson et al. 1996). In August 1995, 6,831 acres along a corridor running north and south of the Argonne National Laboratory-West facility burned (Anderson et al. 1996). The summer of 1996 pro-



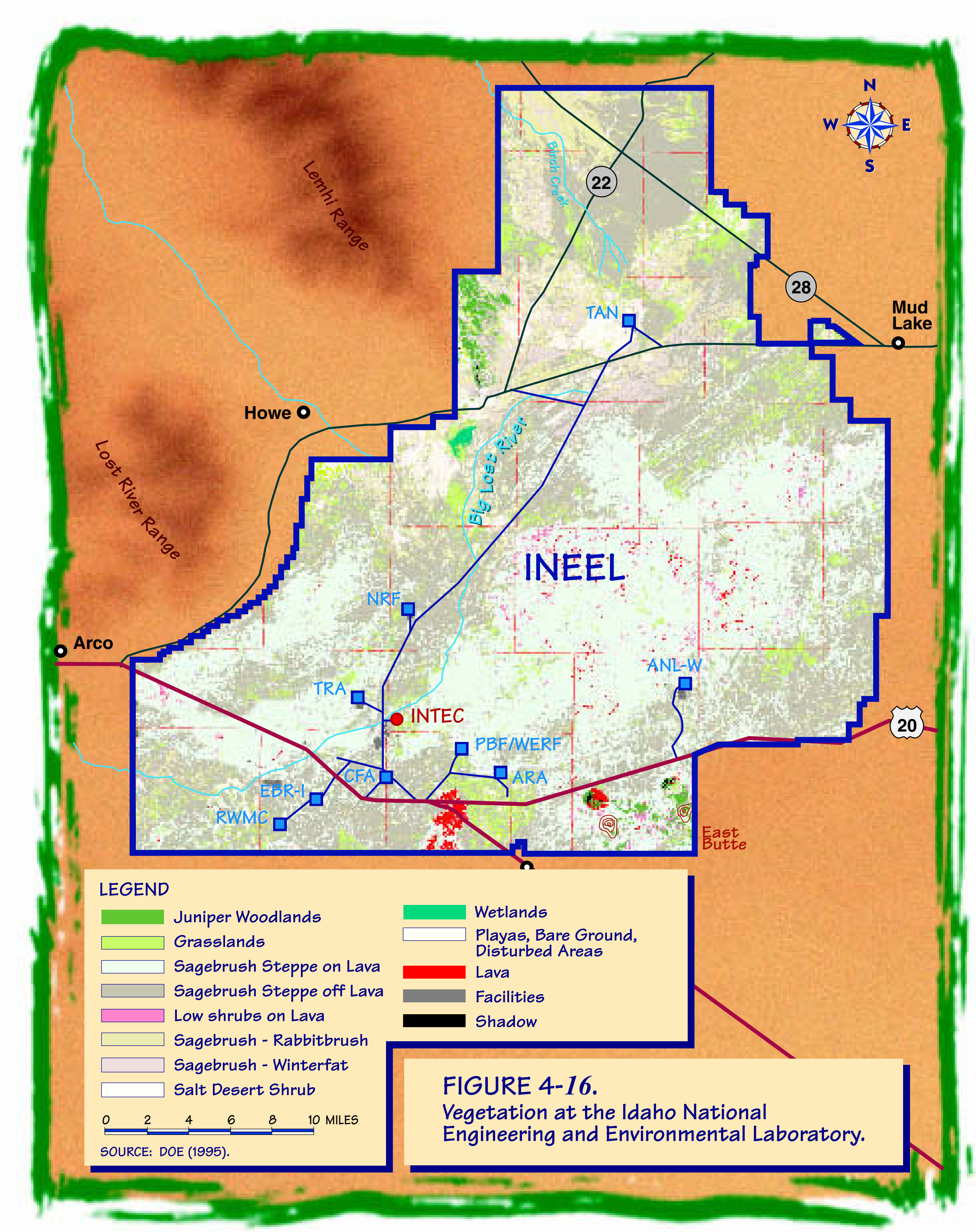


FIGURE 4-16.
Vegetation at the Idaho National Engineering and Environmental Laboratory.

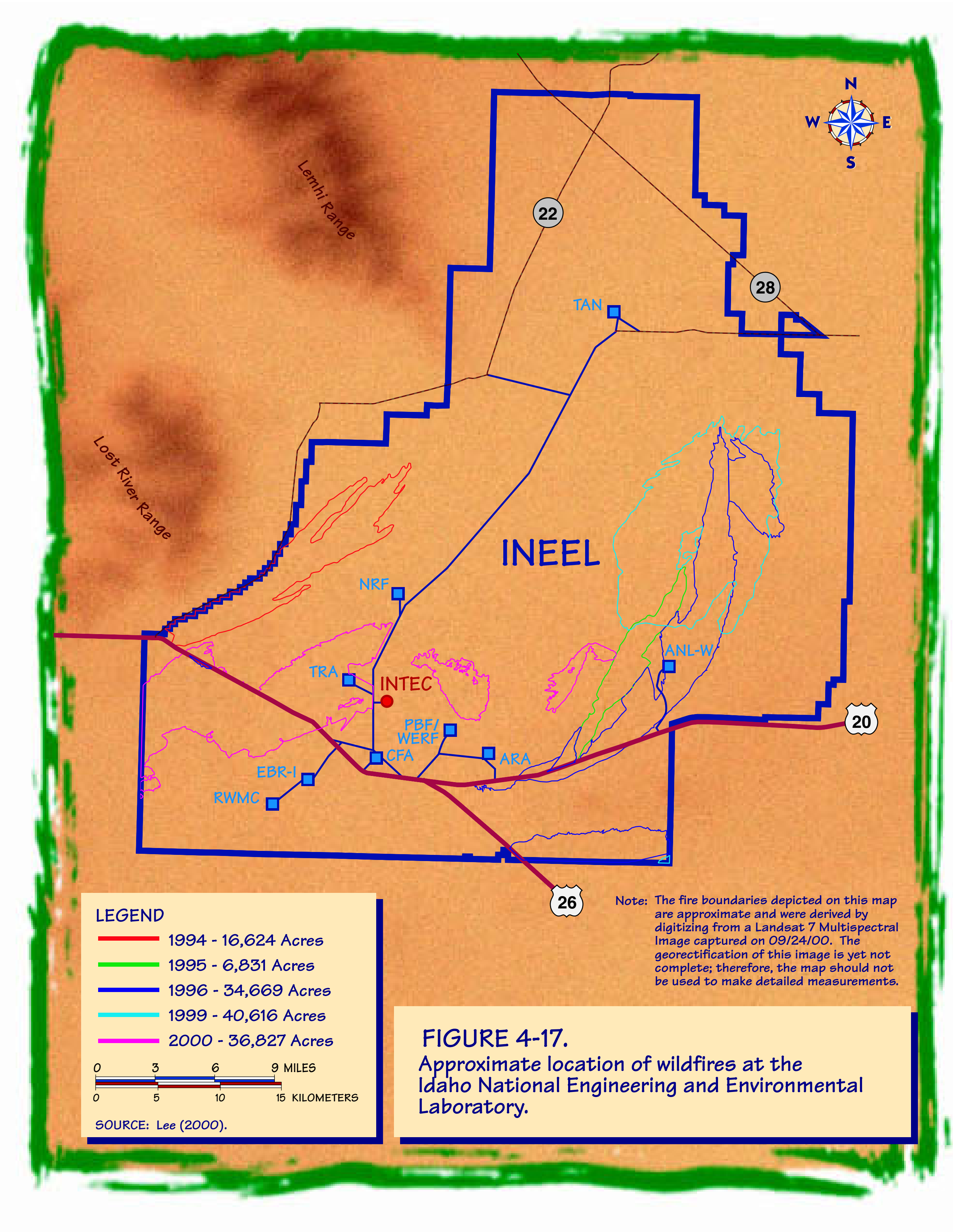
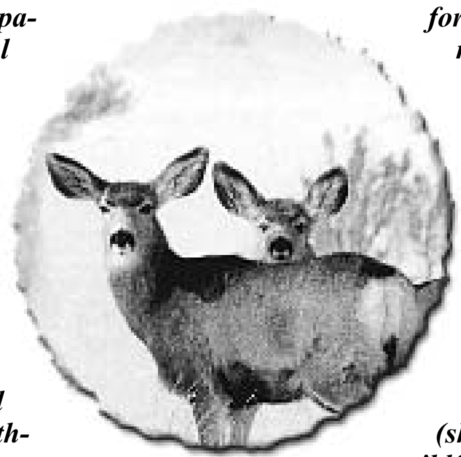


FIGURE 4-17.
Approximate location of wildfires at the Idaho National Engineering and Environmental Laboratory.

duced six fires that burned a total of 36,450 acres on and adjacent to INEEL. These fires burned virtually all of the aboveground biomass, resulting in severe wind erosion and, therefore, blowing dust (Patrick and Anderson 1997). ***Wildfires in 1999 burned approximately 40,000 more acres of the INEEL and in the summer and early fall of 2000, three separate fires burned an additional 36,000 acres. The first of these fires in late July 2000 burned approximately 30,000 acres northwest of the Radioactive Waste Management Complex. A second fire in early August burned approximately 2,000 acres west of Argonne National Laboratory-West. A third fire in mid-September burned approximately 4,000 acres northwest of INTEC.***



As a result of the 1995 Argonne burn, blowing dust created problems for normal facility operations, and health and safety concerns for Argonne National Laboratory-West employees. In an effort to control the blowing dust, erosion control activities were initiated. Spring wheat was planted on about 160 acres immediately upwind of the Argonne National Laboratory-West facility to provide a cover crop. A monitoring program was implemented by the Environmental Science and Research Foundation to determine the effects of introducing a non-native plant species. Data collected showed that the wheat planting reduced the number of native species by more than one-half. The impacts from this planting are believed to be due to the physical damage caused by the mechanical drilling of seeds and the added competition for water and nutrients from the wheat (Blew and Jones 1998).

After the fires in July of 1996, soil erosion control was again necessary. A seed mixture of crested wheatgrass (*Agropyron cristatum*), pubescent wheatgrass (*Elytrigia intermedia*), and thickspike wheatgrass (*Elymus lanceolatus*), including oats (*Avena sativa*) to serve as a crop cover, was planted in late summer on approximately 320 acres. Monitoring activities are being conducted to determine the impacts, if any, on long-term recovery of native vegetation in this area.

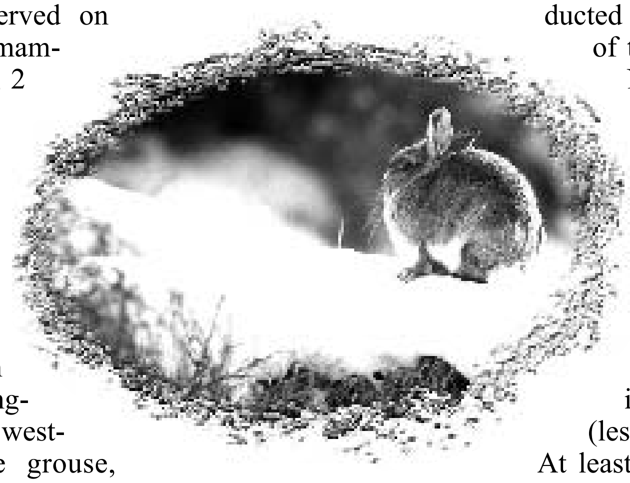
DOE has been conducting additional monitoring of the areas burned in 1994, 1995, and 1996 to measure the recovery of native desert vegetation and provide recommendations for a comprehensive INEEL fire management plan. Preliminary monitoring results indicate that non-native annual plants, such as cheatgrass, had not replaced native plant species in burned areas. Native shrubs, perennial grasses, and forbs recovered rapidly in areas where healthy stands existed prior to the fire (ESRF 1999). Sagebrush, the dominant shrub of these desert (shrub-steppe) areas, is killed by wildfire and is slow to recolonize areas that are completely burned. Most native shrubs, perennial grasses, and forbs regenerate from underground root systems, while most sagebrush species must regenerate from seed.

Although the lush growth of grasses and forbs that typically follows wildfires in sagebrush-steppe areas of the INEEL provides nutritious food for foraging mule deer, pronghorn, and elk (ESRF 1999), those plants do not provide suitable winter habitat and food for sage grouse. Sage grouse are dependent on sagebrush, particularly for important winter habitat (ideal winter habitat consists of healthy, mature stands of big sagebrush).

The INEEL contains one of the largest contiguous areas of protected sagebrush-steppe habitat in the world, and is one of the most important wintering areas for sage grouse in Idaho (ESRF 2000). The wildfires that have burned more than 135,000 acres of sagebrush-steppe on the INEEL since 1994 are certainly cause for concern, particularly in light of sage grouse population declines across the region. DOE is continuing to study the impacts of wildfires on the ecological resources of the site and the region in attempts to better understand the dynamics of that ecosystem and to identify ways of preserving the biodiversity on the INEEL.

4.9.2 WILDLIFE

INEEL supports wildlife typical of shrub-steppe communities. Over 270 vertebrate species have been observed on INEEL, including 46 mammal, 204 bird, 10 reptile, 2 amphibian, and 9 fish species (Arthur et al. 1984; Reynolds et al. 1986). Common wildlife include small mammals (mice, ground squirrels, rabbits, and hares), pronghorn (American antelope), deer, elk, songbirds (sage sparrow and western meadowlark), sage grouse, lizards, and snakes.



INEEL provides year-round habitat for pronghorn, elk, sage grouse, and black-tailed jackrabbits. Migratory birds common on the INEEL include waterfowl and raptors. Predators, such as bobcats ***and*** mountain lions have been observed in the area ***and coyotes are common***.

4.9.3 THREATENED, ENDANGERED, AND SENSITIVE SPECIES

Threatened and endangered species, species of concern, and other unique species known to occur within or near INEEL were identified using the Idaho Department of Fish and Game's list of *Species with Special Status in Idaho* (Idaho CDC 1997). In accordance with Section 7 of the Endangered Species Act, DOE requested a species list from the U.S. Fish and Wildlife Service. The Idaho Conservation Data Center maintains lists of species of concern for the Idaho Department of Fish and Game and the U.S. Fish and Wildlife Service.

Table 4-***21*** shows Federally-listed species, state-listed species, Federal and state species of special concern, and sensitive and unique plant species monitored by the Idaho Native Plant Society. None of these state- or Federally-listed species is known to occur in the INTEC area.

4.9.4 WETLANDS (OR WETLAND-LIKE AREAS)

The U.S. Fish and Wildlife Service conducted a wetland survey of most of the INEEL depicted in the National Wetlands Inventory map. Wetlands or wetland-like areas are primarily associated with the Big Lost River, the Big Lost River spreading areas, and the Big Lost River Sinks, although smaller isolated wetland-like areas (less than 1 acre) also occur. At least one area at the Big Lost River Sinks was found to meet the criteria for jurisdictional wetlands established by the U.S. Army Corps of Engineers. Also, one potential wetland located north of the Test Reactor Area is under evaluation to determine if it meets the definition of a jurisdictional wetland. No wetlands or wetland-like areas occur within the INTEC boundary.

The National Wetland Inventory map identified approximately 20 potential wetlands near INEEL facilities. Most of these potential wetlands are industrial waste and sewage treatment ponds, borrow pits, and gravel pits. The term "potential" is used because it has not been determined whether they exhibit the characteristics that make them jurisdictional wetlands under the Clean Water Act. Some characteristics used to determine jurisdictional wetlands are vegetation, soil type, and period of inundation. Other potential wetlands include portions of the Big Lost River channel near INTEC and the Birch Creek Playa encompassing the Test Area North. These scattered man-made ponds and intermittent waters (see Figure 4-***8***) serve as a water resource for wildlife, including mammals, songbirds, and waterfowl.

4.9.5 RADIOECOLOGY

The objective of radioecology is to determine radiological effects on ecological resources, with the long-term objective of understanding environmental cycles and the potential impacts

Table 4-21. Listed Threatened and Endangered Species, Species of Concern, and other unique species that occur, or possibly occur, on Idaho National Engineering and Environmental Laboratory.[a]

	Species	Classification: Federal	Classification: State	Occurrence on the INEEL
Birds	American peregrine falcon (*Falco peregrinus anatum*)	LE	E	Winter visitor
	Bald eagle *(Haliaeetus leucocephalus)*	LT	E	Winter visitor, most years
	Ferruginous hawk *(Buteo regalis)*	W	P	Widespread summer resident
	Boreal owl (*Aegolius funereus*)	W	SC	Recorded, but not confirmed
	Flammulated owl *(Otus flammeolus*)	W	SC	Recorded, but not confirmed
	Long-billed curlew *(Numenius americanus)*	SC	P	Limited summer distribution
Mammals	Gray wolf *(Canis Lupus)*	LE/XN	E	Several sightings since 1993
	Long-eared myotis *(Myotis evotis)*	W	–	Limited onsite distribution
	Townsend's big-eared bat *(Corynorhinus townsendii)*	SC	SC	Year round resident
	Pygmy rabbit *(Brachylagus idahoensis)*	W	SC	Limited onsite distribution
Plants	Ute's ladies tresses *(Spiranthes diluvialis)*	LT	INPS-GP2	Found near, but not on, INEEL
	Speal-tooth dodder *(Cuscuta denticulata)*		INPS-1	Found near, but not on, INEEL
	Spreading gilia (*Ipomopsis [Gilia] polycladon*)		INPS-2	Common in western foothills
	Lemhi milkvetch *(Astragalus aquilonius)*		INPS-GP3	Limited distribution
	Winged-seed evening primrose *(Camissonia pterosperma)*		INPS-S	Rare and limited

a. Source: Idaho CDC (1997).

Federal
LT Listed Threatened
LE Listed Endangered
XN Experimental Population
SC Special Concern
W Watch

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

to humans and the environment. Potential radiological effects on plants and animals are measured at the population, community, or ecosystem level. Measurable results of radionuclides on plants and animals have been observed in individuals on areas adjacent to INEEL facilities, but effects have not been observed at the population, community, or ecosystem level.

The environment surrounding INTEC has been contaminated with a variety of fission products and transuranic elements. Studies of radioactive contamination have been conducted in soil, vegetation, rabbits, pronghorn, mourning doves, sage grouse, waterfowl, and in fish from the Big Lost River near INTEC (Morris 1993).

Potentially-contaminated soils in the Windblown Area, an operable unit associated with Waste ***Area*** Group 3 but outside of INTEC, were sampled in 1993 as part of a Phase I radionuclide contaminated soil investigation (Rodriguez et al. 1997). The maximum concentration of cesium-137 in soil was 16.2 pCi/g, which was above the background concentration of 0.82 pCi/g. Other radionuclides (strontium-90, plutonium-238 and plutonium-239, uranium-234, and uranium-238) were reported as nondetectable or their concentrations were not significantly higher than background concentration. The Baseline Risk Assessment for the Windblown Area concluded that these contaminated soils did not pose an unacceptable risk to the ecolog***y of the area***.

Iodine-129 was released during the fuel dissolution process at INTEC and was transported relatively long distances by atmospheric processes. Studies of vegetation and rabbit thyroids have reported levels of iodine-129 in excess of background concentrations out to 17 miles from INTEC. Iodine-129 has been detected above background concentrations in pronghorn tissues site-wide and as far offsite as Craters of the Moon National Monument and Monida Pass (Morris 1993).

4.10 Traffic and Transportation

This section discusses existing traffic volumes, transportation routes, transportation accidents, and waste and materials transportation at INEEL, including historical waste and materials transportation and baseline radiological exposures from waste and materials transportation. It also discusses noise levels at INEEL associated with the various modes of transportation. The information in this section has been summarized from Lehto (1993) and Anderson (1998) and is tiered from Volume 2 of the SNF & INEL EIS (DOE 1995).

4.10.1 ROADWAYS

4.10.1.1 Infrastructure – Regional and Site Systems

Table 4-***22*** shows the baseline traffic for several access routes based on the 1996 Rural Traffic Flow Map (State of Idaho 1996). The level of service of these segments is currently designated "free flow," which is defined as "operation of vehicles is virtually unaffected by the presence of other vehicles." The existing regional highway system is shown in Figure 4-***18***. Two interstate highways serve the regional area. Interstate 15, a north-south route that connects several cities along the Snake River, is approximately 25 miles east of INEEL. Interstate 86 intersects Interstate 15 approximately 40 miles south of INEEL and provides a primary linkage from Interstate 15 to points west. Interstate 15 and U.S. Highway 91 are the primary access routes to the Shoshone-Bannock reservation. U.S. Highways 20 and 26 are the main access routes to the southern portion of INEEL. Idaho State Routes 22, 28, and 33 pass through the northern portion of INEEL, with State Route 33 providing access to the northern INEEL facilities.

The INEEL contains an onsite road system of approximately 87 miles of paved surface, including about 18 miles of paved service roads that are closed to the public (DOE 1995). Most of the roads are adequate for the current level of normal transportation activity and could handle some increased traffic volume. The onsite road system at INEEL undergoes continuous maintenance.

Table 4-22. Baseline traffic for selected highway segments in the vicinity of the Idaho National Engineering and Environmental Laboratory.[a]

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

a. Source: State of Idaho (1996).
b. Estimated as 15 percent of average daily traffic.

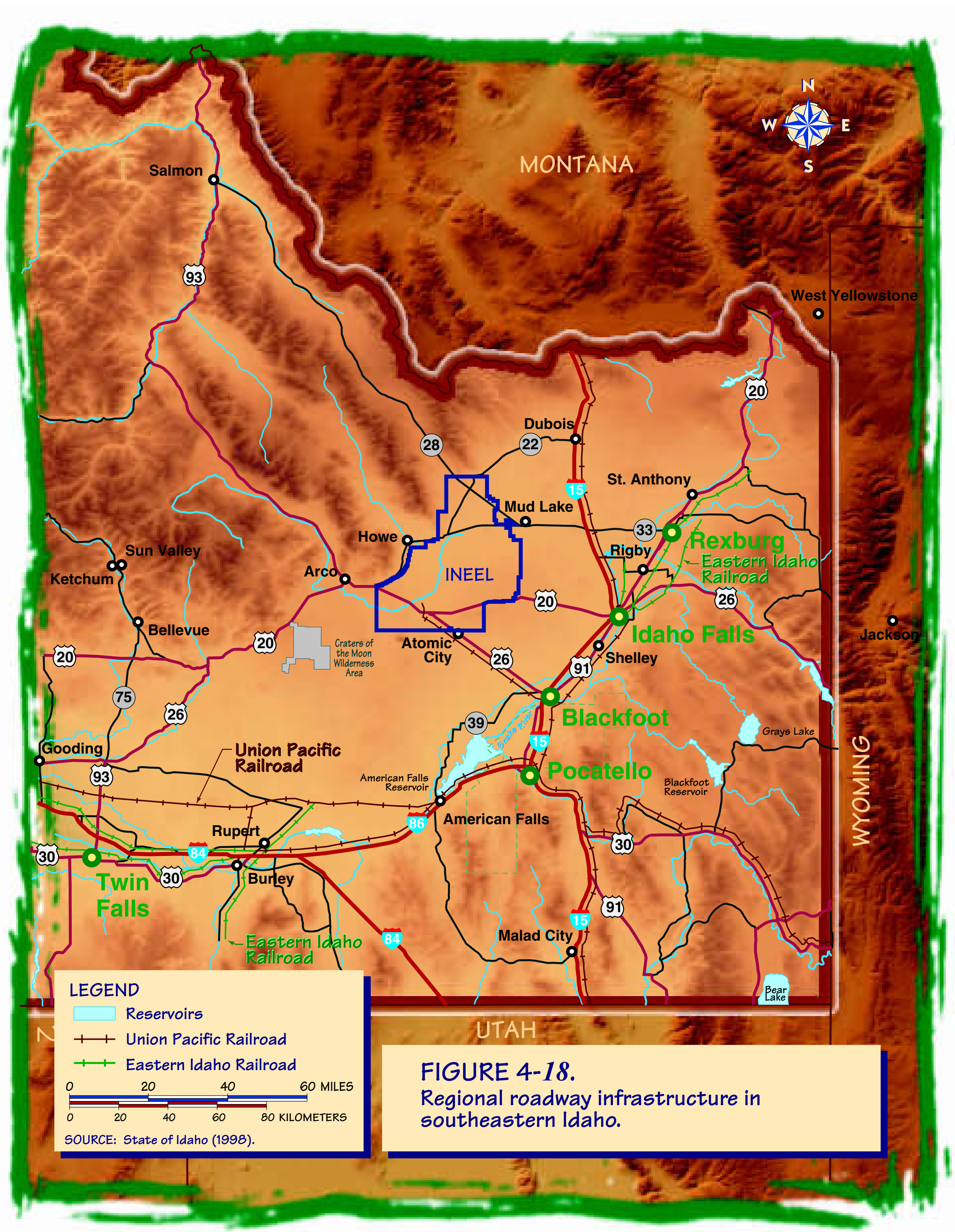


FIGURE 4-18. Regional roadway infrastructure in southeastern Idaho.

4.10.1.2 Infrastructure – Idaho Falls

Approximately 4,000 DOE and DOE contractor personnel administer and support INEEL work through offices in Idaho Falls (DOE 1995). DOE shuttle vans provide hourly transport between in-town facilities. Currently, one of the busiest intersections is at Science Center Drive and Fremont Avenue, which serves the Willow Creek Building, Engineering Research Office Building, INEEL Electronic Technology Center, and DOE office buildings. It is congested during peak weekday hours, but the intersection is designed for the current traffic.

4.10.1.3 Transit Modes

Four major modes of transit use the regional highways, community streets, and INEEL roads to transport people and commodities: DOE buses and shuttle vans, DOE motor pool vehicles, commercial vehicles, and personal vehicles. Table 4-2*3* summarizes the baseline miles for INEEL-related traffic.

4.10.2 RAILROADS

Union Pacific Railroad's main line to the Pacific Northwest follows the Snake River across southern Idaho. This line handles as many as 30 trains a day. Union Pacific Railroad has a total of 1,096 miles of track in Idaho (State of Idaho 1998). Union Pacific Railroad lines in southeastern Idaho are shown on Figure 4-*18*. 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, which crosses the southern portion of INEEL, provides rail service to INEEL. This branch connects with a DOE-owned spur line at 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. From 1993 through 1997, three rail shipments of non-hazardous bulk commodities were sent to the INEEL (Morris 1998). From 1993 through 1997, 128 rail shipments of spent nuclear fuel were sent to the INEEL (Beckett 1998). The Settlement Agreement/Consent Order limits the number of shipments of naval spent nuclear fuel to INEEL to 20 shipments (each Spent Nuclear Fuel cask is considered a shipment) per year from 1997 through 2035. Nineteen shipments were made in 1997 (Anderson 1998).

4.10.3 AIR TRAFFIC

Non-DOE air traffic over INEEL is limited to altitudes greater than 1,000 feet over buildings and populated areas, and non-DOE aircraft are not permitted to use the site. The primary air traffic over INEEL is occasional high-altitude commercial jet traffic, since DOE no longer operates helicopters at INEEL.

4.10.4 ACCIDENTS

The fatal collision rate for Idaho in 1996 was 1.8 collisions per 100 million vehicle miles, and the injury collision rate was 69 collisions per 100 million vehicle miles. The total collision rate (injury, fatal, and non-injury) for Idaho in 1996

Table 4-2*3*. Baseline annual vehicle miles traveled for traffic related to the Idaho National Engineering and Environmental Laboratory.

Mode of travel and transportation	Vehicle miles traveled[a]
DOE buses	3,200,000
Other DOE vehicles	5,800,000
Personal vehicles on highways to INEEL	40,000,000[b]
Commercial vehicles	800,000
Total	49,800,000

a. Berry (1998); Beck (1998).
b. Based on 1,600 personal vehicles per day driven to the INEEL.

was 180 collisions per 100 million vehicle miles (ITD 1997). These data are for all vehicles (e.g., cars and trucks). The accident rates for highway combination trucks in Idaho are listed in Table 4-2*4*. For railroads in Idaho, the mainline accident rate is 6.4 accidents per 100 million railcar miles (Saricks and Tompkins 1999).

For ***2001***, the average motor vehicle accident rate was ***1.3*** accidents per million vehicle miles for INEEL vehicles (***Pruitt 2002a***), which compares with an accident rate of 2.4 accidents per million vehicle miles for all DOE complex vehicles (Lehto 1993). No air accidents associated with INEEL have been recorded.

Collisions between wildlife and trains or motor vehicles have occurred at INEEL. Wildlife, such as pronghorn (antelope), often bed down on the train tracks and use the tracks for migration routes when snow is abundant. Train collisions with wildlife can involve large numbers of animals and have a large impact on the local population. For example, one large documented train/antelope accident near Aberdeen, Idaho in the winter of 1976 resulted in a total population loss of 160 antelope (Compton 1994). Accidents involving motor vehicles and wildlife generally involve individual animals and can occur during any season.

4.10.5 TRANSPORTATION OF WASTE AND MATERIALS

Hazardous, radioactive, industrial, commercial, and recyclable wastes are transported on INEEL. Hazardous materials include commercial chemical products and hazardous wastes that are nonradioactive and are regulated and controlled based on their chemical toxicity. Table 4-2*5* summarizes shipments associated with INEEL for the period 199*8* through ***2001*** based on data from the ***Enterprise Transportation Analysis*** System. These shipments range from express mail packages to radioactive waste shipments to

Table 4-2*4*. Highway combination-truck accident, injury, and fatality rates for Idaho.[a]

Accident Rate	Interstate	Primary[b]	Other[c]
Involvement (accidents/kilometer)	3.0×10^{-7}	2.8×10^{-7}	4.6×10^{-7}
Injury (injuries/kilometer)	2.3×10^{-7}	2.2×10^{-7}	3.3×10^{-7}
Fatality (fatalities/kilometer)	9.6×10^{-9}	1.8×10^{-8}	1.7×10^{-8}

a. Source: Saricks and Tompkins (1999). ***Multiply by 1.6 for rates per mile.***
b. Primary: other principal highways (generally, other components of the national highway system).
c. Other: other roads (i.e., country highways, farm-to-market roads, local streets).

Table 4-2*5*. Annual average shipments to and from the Idaho National Engineering and Environmental Laboratory (*1998-2001*).[a]

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

a. ***Source: Enterprise Transportation Analysis System (Pruitt 2002a).***
b. Commercial motor carriers.
c. Freight forwarder, private motor carrier, government vehicles, or parcel carriers.

spent nuclear fuel shipments. Nonhazardous materials shipments accounted for over 95 percent of INEEL shipments. Radioactive materials and hazardous materials shipments accounted for 1.2 percent and 3.***2*** percent of the shipments, respectively. Nonhazardous air shipments were the largest single category of shipments, 7***6*** percent, largely due to low-cost General Services Administration negotiated rates for letters and parcels. Commercial motor carrier shipments accounted for 2***0*** percent of the INEEL shipments. The remaining category of shipments, denoted "Other" in Table 4-2***5***, is composed of shipments made by freight forwarder, private motor carrier, government vehicles, or parcel carriers. This category accounted for less than 3 percent of the INEEL shipments.

DOE establishes baseline radiological doses from transportation of waste and materials for onsite and offsite transportation. The baseline for onsite, incident-free radioactive materials transportation at INEEL consists of onsite shipments of DOE spent nuclear fuel, naval spent nuclear fuel, and radioactive waste shipments evaluated in the SNF & INEL EIS. The results of the analyses in the SNF & INEL EIS are presented in Table 4-2***6*** in terms of estimated annual collective doses and latent cancer fatalities.

To establish a baseline for offsite, incident-free radioactive materials transportation, data from Weiner et al. (1991a,b) were used. Weiner et al. (1991a) evaluated eight categories of radioactive material shipments by truck: (a) industrial, (b) radiography, (c) medical, (d) fuel cycle, (e) research and development, (f) unknown, (g) waste, and (h) other. Based on a median external exposure rate, an annual collective worker dose of 1,400 person-rem and an annual collective general population dose of 1,400 person-rem were estimated. These collective doses correspond to 0.56 and 0.70 latent cancer fatalities for workers and the general population, respectively.

Weiner et al. (1991b) also evaluated six categories of radioactive material shipments by airplane: (a) industrial, (b) radiography, (c) medical, (d) research and development, (e) unknown, and (f) waste. Based on a median external exposure rate, an annual collective worker dose of 290 person-rem and an annual collective general population dose of 450 person-rem were estimated. These collective doses correspond to 0.12 and 0.23 latent cancer fatalities for workers and the general population, respectively.

Table 4-2*6*. Estimated annual doses and fatalities from onsite incident-free shipments at the Idaho National Engineering and Environmental Laboratory.[a]

	Estimated collective dose (person-rem)	Estimated latent cancer fatalities	Estimated nonradiological fatalities[b]
Occupational			
DOE spent nuclear fuel	0.09	3.6×10^{-5}	0
Naval spent nuclear fuel	0.01	4.0×10^{-6}	0
Radioactive waste	0.76	3.0×10^{-4}	0
Total	0.86	3.4×10^{-4}	0
General Population			
DOE spent nuclear fuel	2.2×10^{-3}	1.1×10^{-6}	0
Naval spent nuclear fuel	3.8×10^{-4}	1.9×10^{-7}	0
Radioactive waste	0.02	1.0×10^{-5}	0
Total	0.02	1.1×10^{-5}	0

a. Source: DOE (1995).
b. There are no nonradiological accident-free fatalities for onsite shipments. These fatalities are only applicable to urban areas, and the INEEL is a rural area.

4.10.6 TRANSPORTATION NOISE

INEEL-related noises that affect the public are dominated primarily by transportation sources such as buses, private vehicles, delivery trucks, construction trucks, aircraft, and freight trains. During a normal workweek, a majority of the 4,000 to 5,000 employees at the INEEL site are transported daily from surrounding communities to various work areas at INEEL by a fleet of buses covering ***72*** routes. Approximately 1,***2***00 private vehicles also travel to and from INEEL daily (***Pruitt 2002b***).

Noise from an occasional commercial aircraft crossing INEEL at high altitudes is indistinguishable from the natural background noise of the site. Therefore, public exposure to aircraft nuisance noise is insignificant. Rail transport noises originate from diesel engines, wheel/track contact, and whistle warnings at rail crossings. Normally no more than one train per day, and usually fewer than one train per week, service INEEL via the Scoville spur.

The noise level at INEEL ranges from 10 dBA (decibels A-weighted; i.e., referenced to the A scale, approximating human hearing response for the rustling of grass and leaves, to as much as 115 dBA, the upper limit for unprotected hearing exposure established by the Occupational Safety and Health Administration from the combined sources of industrial operations, construction activities, and vehicular traffic. The natural environment of INEEL has relatively low ambient noise levels ranging from 35 to 40 dBA (Leonard 1993). INEEL complies with Occupational Safety and Health Administration regulations (29 CFR 1910.95), which state that personnel exposed to an 8-hour time-weighted average of 85 dBA or greater must be issued hearing protection. Also, exposure to impulse or impact noise should be limited to 140 dBA peak sound pressure level.

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

Noise Measurement

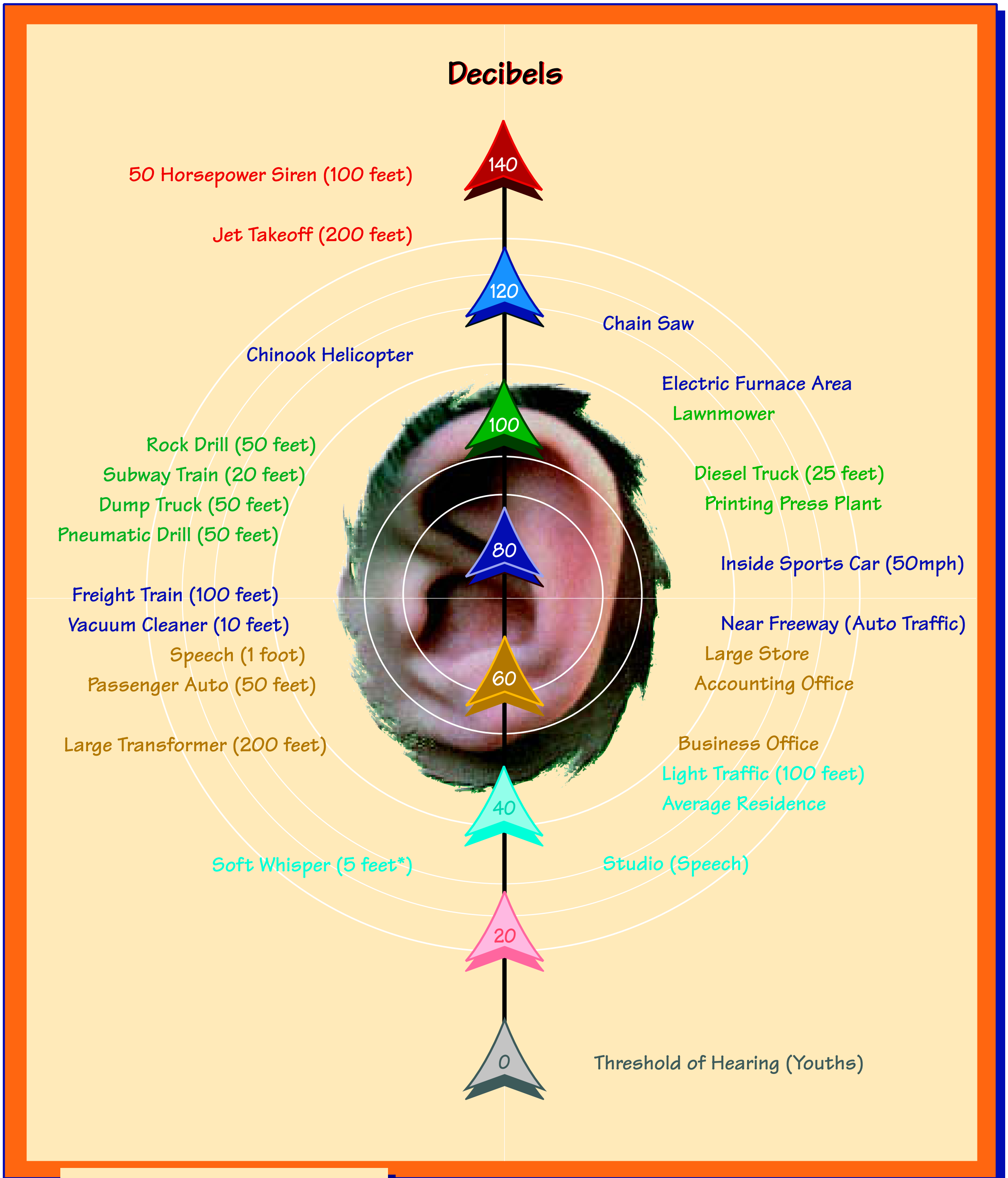
What are sound and noise?

When an object vibrates it possesses energy, some of which transfers to the air, causing the air molecules to vibrate. The disturbance in the air travels to the eardrum, causing it to vibrate at the same frequency. The ear and brain translate the vibration of the eardrum to what we call sound. Noise is simply unwanted sound.

How is sound measured?

The human ear responds to sound pressures over an extremely large range of values. The range of sounds people normally experience extends from low to high pressures by a factor of 1 million. Accordingly, scientists have devised a special scale to measure sound. The term decibel (abbreviated dB), borrowed from electrical engineering, is the unit commonly used.

*Another common sound measurement is the A-weighted sound level, denoted as dBA. The A-weighted scale accounts for the fact that the human ear is more sensitive to some pitches than to others. Higher pitches receive less weighting than lower ones. Most of the sound levels provided in this EIS are A-weighted; however, some are in decibels due to a lack of information on the frequency spectrum of the sound. The scale in Figure 4-**19** provides common references to sound on the A-weighted sound level scale.*



LEGEND
* Operator's Position

SOURCE: Adapted from Glorig (1965) and Golden *et al.* (1980).

FIGURE 4-*19*.
Typical A-Weighted Sound Levels.