4.6 Geology and Soils

This section describes the geological, mineral resources, seismic, and volcanic characteristics of INEEL, INTEC, and surrounding areas. A more detailed description of geology at INEEL can be reviewed in the SNF & INEL EIS, Volume 2, Part A, Section 4.6 (DOE 1995).

4.6.1 GENERAL GEOLOGY

INEEL occupies a relatively flat area on the northwestern edge of the Eastern Snake River Plain. Figure 4-*4* shows important geological features of the INEEL area. The area consists of a broad plain that has been built up from the eruptions of multiple flows of basaltic lava, which is shown on Figure 4-*5*. The flows at the surface range in age from 1.2 million to 2,100 years. The Plain is bounded on the north and south by the north-to-northwest-trending mountains and valleys of the Basin and Range Provinces, comprised of folded and faulted rocks that are more than 70 million years old. The Plain is bounded on the northeast by the Yellowstone Plateau.

The seismic characteristics of the Plain and the adjacent Basin and Range Province are different. Earthquakes and active faulting are associated with Basin and Range tectonic activity. The Plain, however, has historically experienced infrequent small-magnitude earthquakes (King et al. 1987; Pelton et al. 1990; Jackson et al. 1993; WCFS 1996). The major episode of Basin and Range faulting began 20 to 30 million years ago and continues today, most recently with the October 28, 1983 Borah Peak earthquake, which was located approximately 50 miles to the northwest of INEEL. The earthquake had a moment magnitude of 6.9 with a ground acceleration of 0.022 to 0.078*g* at INEEL (Jackson 1985). No significant damage occurred at the INEEL (Guenzler and Gorman 1985).

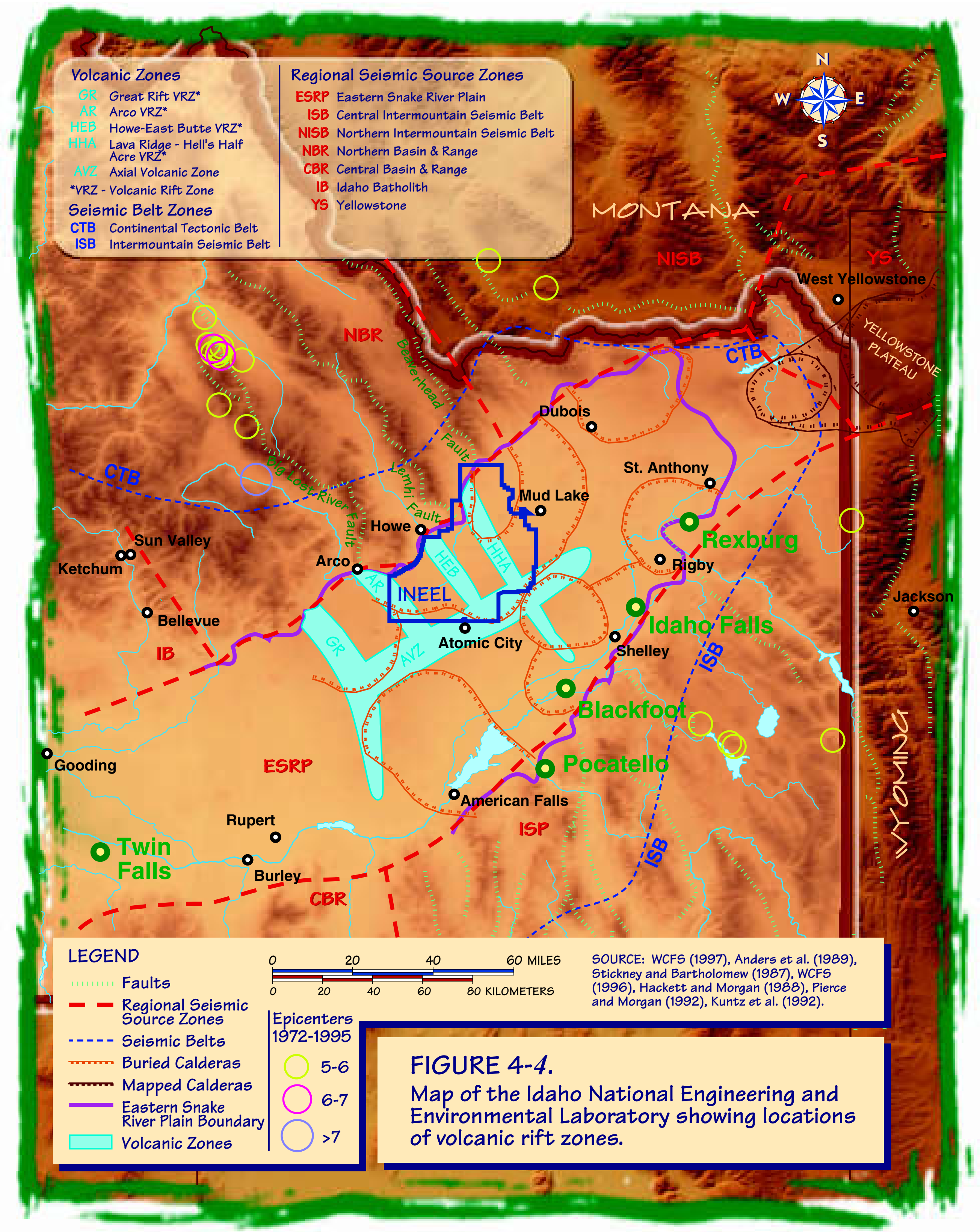
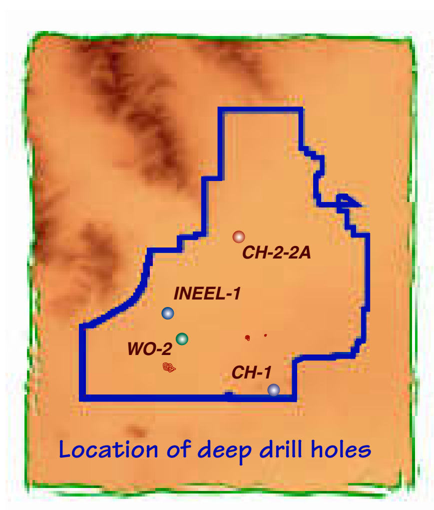
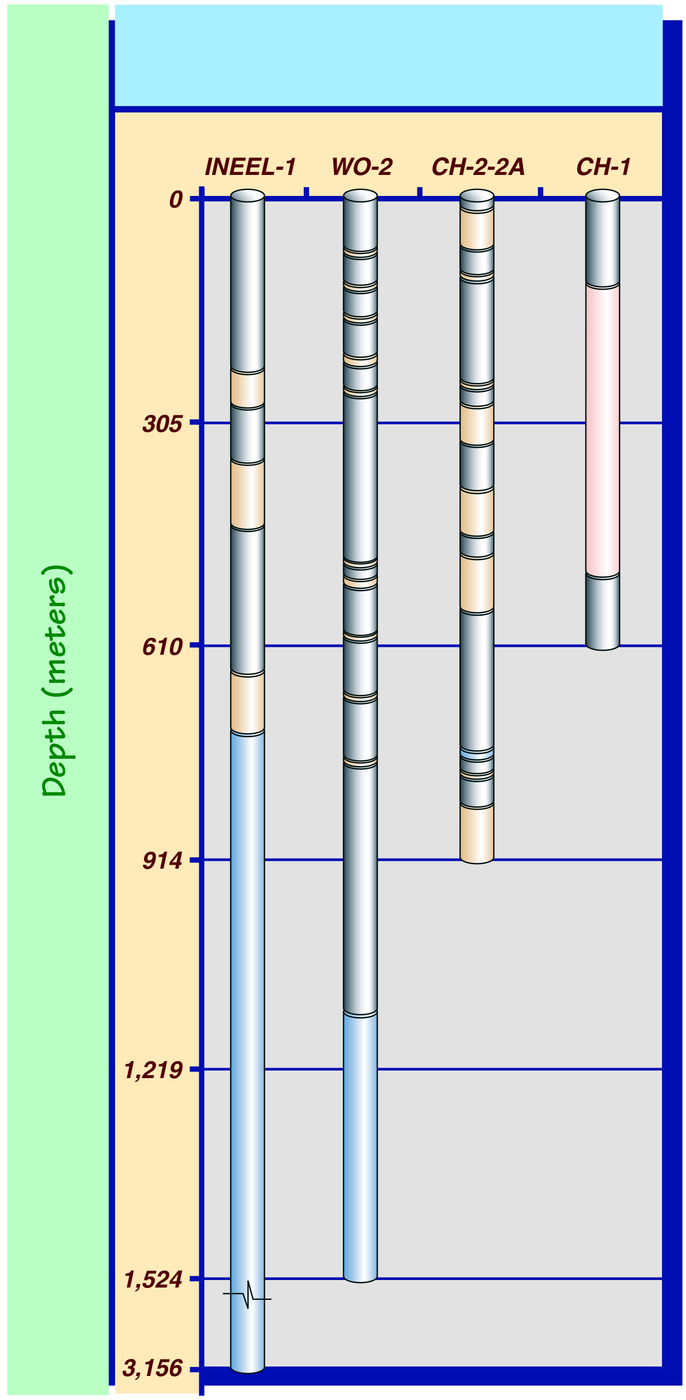


FIGURE 4-4.
Map of the Idaho National Engineering and Environmental Laboratory showing locations of volcanic rift zones.





LEGEND

- Quaternary basalt
- Major sedimentary interbed
- Quaternary rhyolite
- Tertiary rhyolite

SOURCE: Doherty (1979a,b), Doherty et al. (1979), and Hackett and Smith (1992).

FIGURE 4-5.
Lithologic logs of deep drill holes on INEEL.

Four northwest-trending volcanic rift zones are known to cut across the Plain at or near INEEL; they have been attributed to basaltic eruptions that occurred 4 million to 2,100 years ago (Hackett and Smith 1992, 1994; Kuntz et al. 1994).

INEEL surficial sediments are derived from rocks from nearby highlands. In the southern part of INEEL, the sediments are gravelly to rocky and generally shallow. The northern portion is composed mostly of unconsolidated clay, silt, and sand.

INTEC is situated adjacent to the Big Lost River in relatively flat terrain. Surface sediments are alluvial deposits of the Big Lost River composed of gravel-sand-silt mixtures 25 to 65 feet thick locally interbedded with silt and clay deposits ***up*** to 9.5 feet thick. The average elevation of INTEC is approximately 4,917 feet above mean sea level. Detailed stratigraphic information can be found in the *Comprehensive RI/FS for the Idaho Chemical Processing Plant OU3-13 at the INEEL - Part A RI/BRA Report* (Rodriguez et al. 1997).

As a result of past practices, radioactive and hazardous materials have been released to surface soils at the INTEC. Best management practices such as monitoring and spill control programs have been implemented to prevent future releases. Soil sampling including the remedial investigation sampling in 1995, was used to support the Operable Unit 3-13 Remedial Investigation/Baseline Risk Assessment and is documented in the *Comprehensive RI/FS for the Idaho Chemical Processing Plant OU3-13 at the INEEL - Part A RI/BRA Report* (Rodriguez et al. 1997). Contaminants found in the soil at INTEC include metals, organic compounds, and radionuclides. Results from Comprehensive Environmental Response, Compensation, and Liability Act risk assessment investigations at INTEC indicate that radionuclides are the most significant soil contaminants. Table 4-8 estimates the existing radionuclide activity and mass of non-radionuclide contaminants of concern in soils at INTEC.

4.6.2 NATURAL RESOURCES

INEEL mineral resources include sand, gravel, pumice, silt, clay, and aggregate. These resources are extracted at several quarries or pits at INEEL and used for road construction and maintenance, new facility construction and maintenance, waste burial activities, and ornamental landscaping. INTEC uses mineral materials extracted from the Test Reactor Area gravel pit 1 mile west of INTEC and the Lincoln Boulevard gravel pit approximately 7 miles north of INTEC. The geologic history of the ***Eastern Snake River*** Plain makes the potential for petroleum production at INEEL very low. The potential for geothermal energy exists at INEEL; however, a study conducted in 1979 identified no economic geothermal resources (Mitchell et al. 1980).

4.6.3 SEISMIC HAZARDS

The ***Eastern*** Snake River Plain has a relatively low rate of seismicity, whereas the surrounding Basin and Range has a fairly high rate of seismicity (WCFS 1996). The primary seismic hazards from earthquakes to INEEL facilities consist of the effects from ground shaking and surface deformation (surface faulting, tilting). Other potential seismic hazards such as avalanches, landslides, mudslides, and soil liquefaction are not likely to occur at INEEL because the local geologic conditions and terrain are not conducive to these types of hazards. Based on the seismic history and the geologic conditions, earthquakes greater than moment magnitude of 5.5 and associated strong ground shaking and surface fault rupture are not likely to occur within the Plain, but have been evaluated as part of a probabilistic seismic hazard analysis (WCC 1990; WCFS 1996). However, moderate to strong ground shaking from earthquakes in the Basin and Range ***could affect INEEL***.

Patterns of seismicity and locations of mapped faults are used to assess potential sources of

Table 4-8. Estimated activity of radionuclide and mass of non-radionuclide contaminants of concern in soils at INTEC.[a, b]

Radionuclide contaminant	Total activity (curies)	Non-radionuclide contaminant	Total mass (pounds)
Americium-241	110	Arsenic	1,000
Cesium-137	30,000	Chromium	300
Cobalt-60	170	Mercury	1,400
Iodine-129	0.13		
Neptunium-237	1.4		
Total Plutonium	1200		
Strontium-90	19,000		

a. Total volume of contaminated soil is approximately 240,000 cubic yards. Depth of contaminated soils ranges from surface to nearly 50 feet.

b. Source: Data from Rodriguez et al. (1997), Table 5-42. Includes soil contamination, known releases and service waste discharges (excluding injection well discharges).

future earthquakes and to estimate levels of ground motion at the INEEL, and specifically at INTEC. The principal sources of earthquakes that could produce ground motion at INEEL facilities are (WCC 1990; WCFS 1996):

- ***Faults*** – The three major range-front faults northwest of INEEL (see Figure 4-***4***):
  - Beaverhead Fault
  - Lost River Fault
  - Lemhi Fault
- ***Volcanic Zones*** – The Volcanic Zones on and around INEEL (see Figure 4-***4***):
  - Arco Volcanic Rift Zone
  - Axial Volcanic Zone
  - Great Rift Volcanic Rift Zone
  - Lava Ridge-Hell's Half Acre Volcanic Rift Zone
  - Howe-East Butte Volcanic Rift Zone
- ***Source Zones*** – Other regional source zones that could potentially produce earthquakes affecting INEEL:
  - Eastern Snake River Plain background seismicity
  - Northern Intermountain Seismic Belt 15 miles north northeast of INEEL
  - Northern Basin and Range adjacent to and northwest of INEEL
  - Central Basin and Range 50 miles southwest of INEEL
  - Idaho Batholith 50 miles west of INEEL
  - Yellowstone 70 miles northeast of INEEL

INEEL seismic design basis events are determined by the INEEL Natural Phenomena Committee and incorporated into the INEEL Architectural and Engineering Standards based on seismic studies (WCC 1990). New facilities and facility upgrades are designed in accordance with the requirements specified in the DOE-ID Architectural and Engineering Standards (DOE 1998), DOE Order 420.1, and *DOE Standard Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities* (DOE ***2002***). The mean peak ground acceleration, determined by the INEEL Natural Phenomena ***Hazards*** Committee, ***has been*** incorporated into the architectural and engineering standards. Section 5.2.14, Facility Accidents, presents the potential impacts of postulated seismic events.

4.6.4 VOLCANIC HAZARDS

Volcanic hazards include the effects of lava flows, fissures, uplift, subsidence, volcanic earthquakes, and ash flows or airborne ash deposits (Hackett and Smith 1994). Most of the basalt volcanic activity occurred from 4 million to 2,100 years ago in the INEEL area. The most recent and closest volcanic eruption occurred at the Craters of the Moon National Monument 26.8 miles southwest of INTEC's main stack (Kuntz et al. 1992). Based on probability analysis of the volcanic history in and near the south central INEEL area, the Volcanism Working Group (VWG 1990) estimated that the conditional probability that basaltic volcanism would affect a south-central INEEL location is less than once per 100,000 years or longer. The probability is associated primarily with the Axial Volcanic Zone and the Arco Volcanic Rift Zones. INTEC is located in a lesser lava flow hazard area of INEEL, more than 5 miles from the Axial Volcanic Zone and any volcanic vent younger than 400,000 years. The probability that basaltic volcanism would affect a south-central INEEL location is less than 2.5×10^{-5} (once per 40,000 years or longer). Because of the low probability of volcanic activity during the project duration, volcanism is not discussed further in this section.

4.7 Air Resources

This section describes the air resources of INEEL and the surrounding area. The discussion includes the climatology and meteorology of the region, a summary of applicable regulations, descriptions of radiological and nonradiological air contaminant emissions, and a characterization of existing levels of air pollutants. Emphasis is placed on changes in air resource conditions since the characterization performed to support the SNF & INEL EIS, Volume 2, Part A, Section 4.7 (DOE 1995), from which this EIS tiers. Additional background information is presented in Appendix C.2, Air Resources. ***Newly developed information on baseline radiological dose, foreseeable increases in dose, and consumption of Prevention of Significant Deterioration (PSD) increment is presented in Sections 4.7.3 and 4.7.4.***

4.7.1 CLIMATE AND METEOROLOGY

The Eastern Snake River Plain climate exhibits low relative humidity, wide daily temperature swings, and large variations in annual precipitation. Average seasonal temperatures measured onsite range from 18.8°F in winter to 64.8°F in summer, with an annual average temperature of about 42°F (DOE 1995). Temperature extremes range from a summertime maximum of 103°F to a wintertime minimum of -49°F. Annual precipitation is light, averaging 8.7 inches, with monthly extremes of 0 to 5 inches. The maximum 24-hour precipitation is 1.8 inches. The greatest short-term precipitation rates are primarily attributable to thunderstorms, which occur approximately 2 or 3 days per month during the summer. Average annual snowfall at INEEL is 27.6 inches, with extremes of 59.7 inches and 6.8 inches.

Most onsite locations experience the predominant southwest/northeast wind flow of the Eastern Snake River Plain, although terrain features near some locations cause variations from this flow regime. The wind rose diagrams in Figure 4-***6*** show annual wind flow. These diagrams show the frequency of wind direction (i.e., the direction from which the wind blows) and speed at three of the meteorological monitoring sites on INEEL for the period 1988 to 1992. Multi-year wind roses exhibit little variability and are representative of typical patterns. INEEL wind rose diagrams reflect the predominance of southwesterly winds that result during

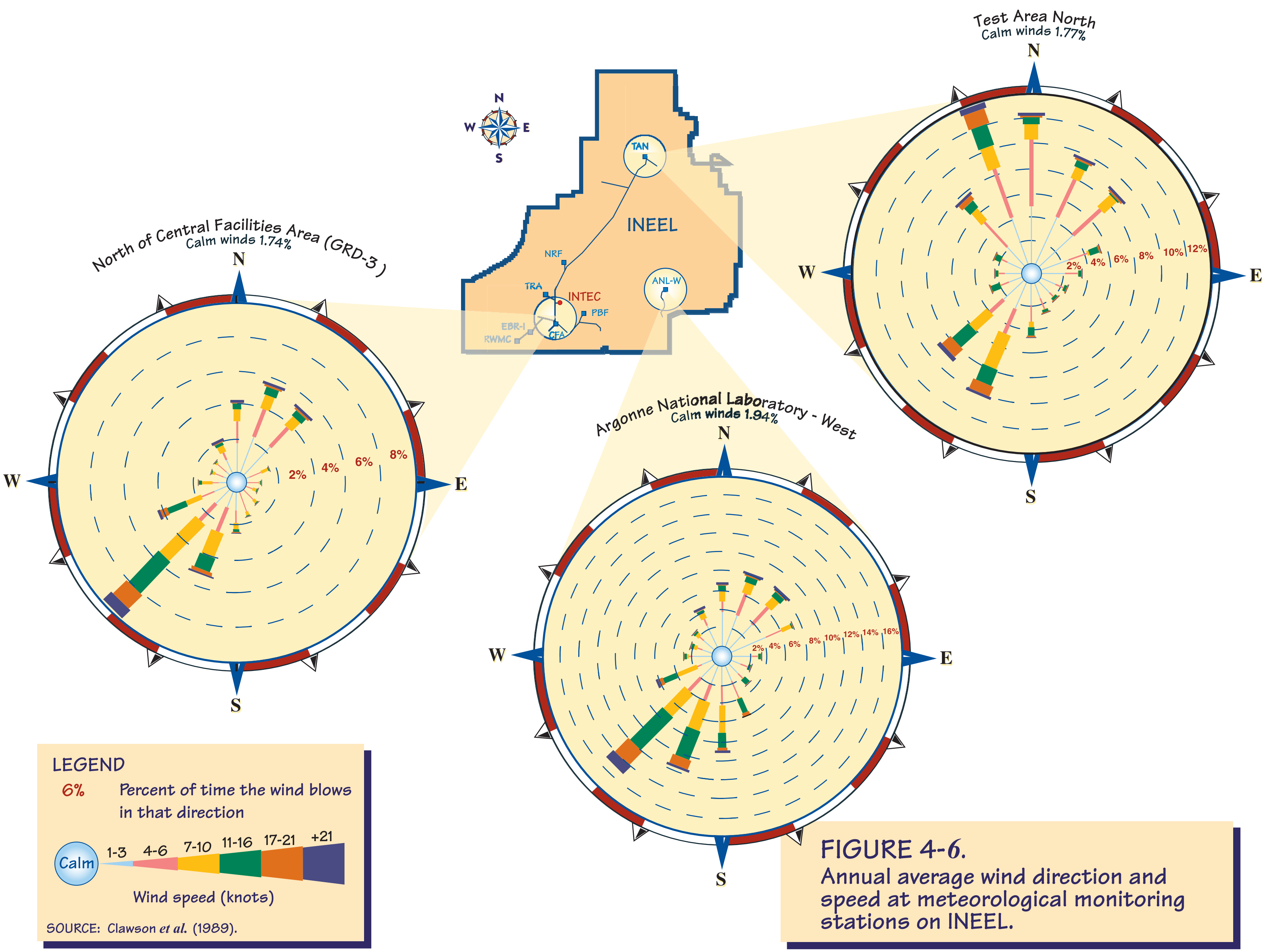


FIGURE 4-6.
Annual average wind direction and speed at meteorological monitoring stations on INEEL.

storm passage and from daily solar heating. Winds from this direction are frequently unstable or neutral, promote effective dispersion, and extend to a considerable depth through the atmosphere. At night, cool, stable air frequently drains down the valley in a shallow layer from the northeast toward the southwest. Under these conditions, dispersion is limited until solar heating the following day mixes the plume. Winds above such stable layers exhibit less variability and provide the transport environment for materials released from INEEL sources.

The highest hourly average near-ground wind speed measured onsite is 51 miles per hour from the west-southwest, with a maximum instantaneous gust of 78 miles per hour (Clawson et al. 1989). Other than thunderstorms, severe weather is uncommon. Five funnel clouds and no tornadoes were reported onsite between 1950 and 1997. Visibility in the region is good because of the low moisture content of the air and minimal sources of visibility-reducing pollutants. At ***the*** Craters of the Moon ***Wilderness Area***, which is approximately 27 miles west-southwest of INTEC, the annual average visual range is 144 miles (visual range at the time the SNF & INEL EIS analyses were performed was 97 miles) (Notar 1998).

4.7.2 STANDARDS AND REGULATIONS

Air quality regulations have been established to protect the public from potential harmful effects of air pollution. These regulations (a) designate acceptable levels of pollution in ambient air, (b) establish limits on radiation doses to members of the public, (c) establish limits on air pollutant emissions and resulting deterioration of air quality due to vehicular and other sources of human origin, (d) require air permits to regulate (control) emissions from stationary (nonvehicular) sources of air pollution, and (e) designate prohibitory rules, such as rules that prohibit open burning.

The Clean Air Act (and amendments) provides the framework to protect the nation's air resources and public health and welfare. In Idaho, the U.S. Environmental Protection Agency (EPA) and the State of Idaho Department of Environmental Quality are jointly responsible for establishing and implementing programs that meet the requirements of the Clean Air Act. INEEL activities are subject to air quality regulations and standards established under the Clean Air Act and by the State of Idaho (***DEQ 2001***) ***as well as*** to internal policies and requirements of DOE.

INEEL occupies portions of ***five*** counties (Butte, Jefferson, Bingham, ***Bonneville, and Clark***) in east-central Idaho that are in attainment or are unclassified for all National Ambient Air Quality Standards. Parts of Bannock County (approximately 30 miles southeast of the INEEL boundary) and Power County (approximately 35 miles south of the INEEL boundary) are designated nonattainment areas for a single criteria pollutant, particulate matter (PM-10). Air quality standards and programs applicable to INEEL operations are summarized in Appendix C.2.

4.7.3 RADIOLOGICAL AIR QUALITY

The population of the Eastern Snake River Plain is exposed to environmental radiation of both natural and human origin. This section summarizes the sources and amounts of radiation exposure in this region, including sources of airborne radionuclide emissions from INEEL.

4.7.3.1 Sources of Radioactivity

The major source of radiation exposure in the Eastern Snake River Plain is natural background radiation. Sources of radioactivity related to INEEL operations contribute a small amount of additional exposure.

Background radiation includes sources such as cosmic rays; radioactivity naturally present in soil, rocks, and the human body; and airborne radionuclides of natural origin (such as radon). Radioactivity still remaining in the environment as a result of worldwide atmospheric testing of nuclear weapons also contributes to the background radiation level, although in very small amounts. The natural background dose for residents of the Eastern Snake River Plain is estimated at about 360 millirem per year, with more than half (about 200 millirem per year) caused by the inhalation of radioactive particles formed by the decay of radon (DOE 1997a).

INEEL operations can release radioactivity to air either directly (such as through stacks or vents) or indirectly (such as by resuspension of radioactivity from contaminated soils). Emissions from INEEL facilities include radioisotopes of the noble gases (argon, krypton, and xenon) and iodine; particulate fission products, such as ruthenium, strontium, and cesium; radionuclides formed by neutron activation, such as tritium (hydrogen-3), carbon-14, and cobalt-60; and heavy elements, such as uranium, thorium, and plutonium, and their decay products. Table 4-9 provides a summary of the principal types of airborne radioactivity emitted during 1995 and 1996 from INEEL facilities. Releases during this period exclude calciner operations. ***Table 4-10 summarizes the airborne radioactivity emitted during 1999 and 2000, which includes calciner operations through May 2000.***

4.7.3.2 Existing Radiological Conditions

Monitoring and assessment activities are conducted to characterize existing radiological conditions at INEEL and the surrounding environment. Results of these activities show that exposures resulting from airborne radionuclide emissions are well within applicable standards and are a small fraction of the dose from background sources. These results are discussed in the following sections for both onsite and offsite environments.

It is important to note that characterizations of existing conditions described in this section do not take into account increases in radionuclide emissions and radiation doses that are projected to occur between the present and the time that the alternatives proposed in this EIS would be implemented. ***Projected*** increases are assessed in combination with existing conditions and impacts associated with the proposed alternatives in Section 5.4, Cumulative Impacts.

Radiation Levels on and Around INEEL

DOE compared radiation levels monitored on and near INEEL with those monitored at distant locations to determine radiological conditions. Figure 4-***7*** shows the offsite dosimeter locations, as well as locations where various food products are collected for radioactivity analysis. Results from onsite and boundary community locations include contributions from background conditions and INEEL emissions. Distant locations represent background conditions beyond the influence of INEEL emissions. These data show that over the most recent 5-year period for which results are available (199***5*** through 199***9***), average radiation exposure levels for the boundary locations were no different than those at distant stations. The average annual dose measured by the Environmental ***Surveillance, Education and Research Program*** during 199***9*** was 12***2*** millirem for distant locations and 124 millirem for boundary community locations. These differences are well within the range of normal variation. On INEEL, dosimeters around some facilities may show slightly elevated levels, since many are intentionally placed to monitor dose rate in areas adjacent to radioactive material storage areas or areas of known soil contamination (***ESERP 2002***).

Additional environmental monitoring is also conducted by the State of Idaho's INEEL Oversight Program. The Oversight Program routinely samples the air, groundwater, soil, and milk on and around INEEL and has also established a network of stations using pressurized ion chambers for real time radiation monitoring around the site. The Oversight Program also conducts special studies in environmental monitoring as needed.

Onsite Doses

The SNF & INEL EIS (Volume 2, Section 4.7) assessed the radiation dose to workers at major INEEL facility areas that results from radionuclide emissions from INEEL facilities. For purposes of radiological assessment, such a person is referred to as a "noninvolved" worker since the worker is not ***working*** directly with the source of the exposure (such as airborne radionuclide releases from adjacent or distant facilities). The SNF & INEL EIS analysis (Section 4.7.3.2.1) indicated that a representative value for maximum dose at any onsite area resulting from existing sources and other sources

Table 4-9. Summary of airborne radionuclide emissions (in curies) for 1995 and 1996 from facility areas at INEEL.[a,b]

	Tritium/ carbon-14		Iodines		Noble gases		Mixed fission and activation products[c]		U/Th/TRU[d]	
Area	1995	1996	1995	1996	1995	1996	1995	1996	1995	1996
Monitored sources										
Argonne National Lab – West	–[e]	8.9	–	–	10	1.0×10^{3}	7.9×10^{-7}	3.5×10^{-6}	3.1×10^{-5}	3.2×10^{-5}
Central Facilities Area	–	–	–	–	–	–	–	–	–	–
INTEC	4.4	140	9.6×10^{-3}	0.06	6.6×10^{-4}	0.03	4.3×10^{-4}	3.4×10^{-4}	1.1×10^{-6}	6.5×10^{-6}
Naval Reactors Facility	–	–	–	–	–	–	–	–	–	–
Power Burst Facility	0.04	0.04	2.7×10^{-5}	2.7×10^{-5}	–	–	–	–	–	–
RWMC[f]	–	–	–	–	–	–	–	–	–	–
Test Area North	–	–	–	–	–	–	–	–	–	–
Test Reactor Area	–	–	–	–	–	–	–	–	–	–
INEEL Total	4.4	150	9.6×10^{-3}	0.06	10	1.0×10^{3}	4.3×10^{-4}	3.4×10^{-4}	3.2×10^{-5}	3.8×10^{-5}
Other release points										
Argonne National Lab – West	0.06	0.02	–	–	–	5.1×10^{-4}	1.2×10^{-5}	7.8×10^{-6}	2.8×10^{-7}	1.3×10^{-7}
Central Facilities Area	–	–	–	–	–	–	3.1×10^{-6}	3.1×10^{-6}	1.2×10^{-5}	1.3×10^{-5}
INTEC	2.1×10^{-4}	2.1×10^{-8}	1.8×10^{-9}	1.8×10^{-9}	–	–	3.6×10^{-4}	4.3×10^{-3}	6.4×10^{-6}	2.0×10^{-6}
Naval Reactors Facility	0.86	1.3	0.01	2.4×10^{-5}	0.45	0.05	8.9×10^{-6}	3.5×10^{-4}	–	4.9×10^{-6}
Power Burst Facility	–	–	–	–	–	–	1.7×10^{-7}	5.8×10^{-7}	4.0×10^{-8}	1.5×10^{-7}
RWMC	–	–	–	–	–	–	1.4×10^{-13}	1.4×10^{-5}	–	2.0×10^{-6}
Test Area North	6.8×10^{-3}	1.4×10^{-4}	–	–	–	–	2.8×10^{-6}	4.5×10^{-6}	1.4×10^{-5}	1.3×10^{-6}
Test Reactor Area	13	13	0.01	2.9×10^{-3}	1.4×10^{3}	1.8×10^{3}	3.4	6.0	2.5×10^{-6}	9.0×10^{-6}
INEEL Total	14	14	0.01	2.9×10^{-3}	1.4×10^{3}	1.8×10^{3}	3.4	6.0	3.5×10^{-5}	3.2×10^{-5}
Fugitive sources										
Argonne National Lab – West	–	–	–	–	–	–	–	–	–	–
Central Facilities Area	6.6	5.6	–	–	–	–	1.9×10^{-5}	1.9×10^{-5}	6.6×10^{-8}	6.4×10^{-8}
INTEC	8.9×10^{-9}	8.9×10^{-9}	3.8×10^{-8}	3.8×10^{-8}	–	–	9.2×10^{-6}	1.6×10^{-6}	5.9×10^{-8}	5.7×10^{-8}
Naval Reactors Facility	–	1.3	–	2.4×10^{-5}	–	–	7.8×10^{-5}	2.8×10^{-4}	–	5.0×10^{-6}
Power Burst Facility	–	0.01	–	–	–	–	5.8×10^{-5}	5.8×10^{-5}	1.5×10^{-7}	1.5×10^{-7}
RWMC	900	700	–	–	–	–	1.4×10^{-5}	1.4×10^{-5}	9.5×10^{-9}	9.5×10^{-9}
Test Area North	0.06	0.06	–	–	–	–	3.5×10^{-6}	1.3×10^{-4}	9.4×10^{-8}	9.4×10^{-8}
Test Reactor Area	80	80	–	–	–	–	0.01	0.1	3.0×10^{-4}	2.9×10^{-4}
INEEL Total	1,000	790	3.8×10^{-8}	2.4×10^{-5}	–	–	0.01	0.1	3.0×10^{-4}	3.0×10^{-4}
Total INEEL releases										
Argonne National Lab.-West	0.06	8.9	–	–	10	1.0×10^{3}	1.3×10^{-5}	1.1×10^{-5}	3.2×10^{-5}	3.2×10^{-5}
Central Facilities Area	6.6	5.6	–	–	–	–	2.2×10^{-5}	2.2×10^{-5}	1.2×10^{-5}	1.3×10^{-5}
INTEC	4.4	140	9.6×10^{-3}	0.06	6.6×10^{-4}	0.03	8.0×10^{-4}	4.6×10^{-3}	7.5×10^{-6}	8.6×10^{-6}
Naval Reactors Facility	0.86	2.6	5.4×10^{-6}	4.8×10^{-5}	0.49	0.05	8.7×10^{-5}	6.3×10^{-4}	–	9.9×10^{-6}
Power Burst Facility	0.04	0.06	2.7×10^{-5}	2.7×10^{-5}	–	–	5.8×10^{-5}	5.9×10^{-5}	1.9×10^{-7}	3.0×10^{-7}
RWMC	900	700	–	–	–	–	1.4×10^{-5}	2.8×10^{-5}	9.5×10^{-9}	2.0×10^{-6}
Test Area North	0.07	0.06	–	–	–	–	6.2×10^{-6}	1.4×10^{-4}	1.4×10^{-5}	1.4×10^{-6}
Test Reactor Area	93	93	0.01	2.9×10^{-3}	1.4×10^{3}	1.8×10^{3}	3.4	6.1	3.0×10^{-4}	3.0×10^{-4}
INEEL Total	1.0×10^{3}	950	0.02	0.06	1.4×10^{3}	2.9×10^{3}	3.4	6.2	3.7×10^{-4}	3.7×10^{-4}

a. Source: DOE (1996, 1997b). Used 1995 and 1996 sources based on most recent years that calciner did not operate because calciner is considered an impact.

b. Emissions are representative of years, in which calcining ***did*** not occur.

c. Mixed fission and activation products that are primarily particulate in nature (e.g., cobalt-60, strontium-90, and cesium-137).

d. U/Th/TRU = Radioisotopes of heavy elements such as uranium, thorium, plutonium, americium, and neptunium.

e. – = Negligibly small or zero.

f. RWMC = Radioactive Waste Management Complex.

Table 4-10. Summary of airborne radionuclide emissions (in curies) for 1999 and 2000 from facility areas at INEEL.[a]

Area	Tritium/ carbon-14		Iodines		Noble gases		Mixed fission and activation products[b]		U/Th/TRU[c]	
	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000
Monitored sources										
Argonne National Lab – West	11	2.5	–[d]	–	1.9×10^{3}	400	–	–	–	–
Central Facilities Area	–	–	–	–	–	–	–	–	–	–
INTEC	8.9	13	2.6×10^{-3}	6.1×10^{-3}	–	–	6.9×10^{-4}	7.2×10^{-4}	2.4×10^{-6}	2.8×10^{-6}
Naval Reactors Facility	–	–	–	–	–	–	–	–	–	–
Power Burst Facility	55	2.6×10^{-4}	4.2×10^{-12}	1.6×10^{-10}	–	–	–	–	2.8×10^{-9}	–
RWMC[e]	–	–	–	–	–	–	–	–	–	–
Test Area North	–	93	–	7.9×10^{-3}	–	920	2.7×10^{-6}	3.4×10^{-7}	–	–
Test Reactor Area	–	–	–	–	–	–	–	–	–	–
INEEL Total	75	110	2.6×10^{-3}	0.014	1.9×10^{3}	1.3×10^{3}	7.0×10^{-4}	7.2×10^{-4}	2.4×10^{-6}	2.8×10^{-6}
Other release points										
Argonne National Lab – West	0.014	0.010	–	–	–	–	–	–	–	–
Central Facilities Area	–	–	–	–	–	–	2.7×10^{-8}	6.6×10^{-8}	3.1×10^{-5}	1.0×10^{-9}
INTEC	1.1×10^{-5}	150	1.6×10^{-7}	6.1×10^{-11}	–	1.2×10^{3}	1.4×10^{-3}	4.4×10^{-3}	2.9×10^{-6}	8.2×10^{-4}
Naval Reactors Facility	0.67	0.69	5.0×10^{-6}	9.0×10^{-6}	0.047	0.68	1.5×10^{-4}	1.1×10^{-4}	–	6.0×10^{-6}
Power Burst Facility	7.1×10^{-5}	0.018	3.3×10^{-10}	1.6×10^{-16}	1.5×10^{-11}	2.8×10^{-13}	7.0×10^{-5}	9.8×10^{-5}	5.6×10^{-9}	4.4×10^{-7}
RWMC	0.021	0.011	–	–	–	–	4.6×10^{-8}	3.1×10^{-7}	1.0×10^{-6}	7.2×10^{-6}
Test Area North	5.3×10^{-4}	1.4×10^{-7}	–	–	–	–	2.7×10^{-7}	4.4×10^{-4}	5.7×10^{-7}	1.1×10^{-6}
Test Reactor Area	170	200	0.13	0.38	1.2×10^{3}	1.5×10^{3}	0.45	2.3	7.4×10^{-6}	1.3×10^{-5}
INEEL Total	170	350	0.13	0.38	1.2×10^{3}	2.7×10^{3}	0.45	2.3	4.3×10^{-5}	8.5×10^{-4}
Fugitive sources										
Argonne National Lab – West	–	–	–	–	–	–	–	–	–	–
Central Facilities Area	3.5	3.7	–	–	–	2.9×10^{-6}	1.9×10^{-5}	2.6×10^{-4}	1.4×10^{-10}	1.5×10^{-5}
INTEC	8.9×10^{-9}	0.092	3.8×10^{-8}	8.0×10^{-3}	–	7.1	9.2×10^{-6}	0.22	5.9×10^{-8}	1.2×10^{-3}
Naval Reactors Facility	–	–	–	–	–	–	–	3.9×10^{-5}	–	4.9×10^{-8}
Power Burst Facility	0.018	–	–	–	–	–	5.6×10^{-5}	5.6×10^{-5}	2.7×10^{-7}	2.8×10^{-7}
RWMC	55	130	–	–	–	–	3.7×10^{-7}	3.7×10^{-7}	9.5×10^{-9}	9.5×10^{-9}
Test Area North	0.060	0.15	–	–	–	–	1.1×10^{-4}	8.8×10^{-4}	9.4×10^{-8}	9.8×10^{-8}
Test Reactor Area	87	100	1.2×10^{-3}	9.3×10^{-3}	5.0×10^{-5}	2.0×10^{-4}	1.0×10^{-3}	1.6×10^{-3}	7.4×10^{-8}	9.9×10^{-6}
INEEL Total	150	230	1.2×10^{-3}	0.017	5.0×10^{-5}	7.1	1.2×10^{-3}	0.22	5.1×10^{-7}	1.2×10^{-3}
Total INEEL releases										
Argonne National Lab.-West	11	2.5	–	–	1.9×10^{3}	400	–	–	–	–
Central Facilities Area	3.5	3.7	–	–	–	2.9×10^{-6}	1.9×10^{-5}	2.6×10^{-4}	3.1×10^{-5}	1.5×10^{-5}
INTEC	8.9	160	2.6×10^{-3}	0.014	–	1.2×10^{3}	2.1×10^{-3}	0.23	5.5×10^{-6}	2.0×10^{-3}
Naval Reactors Facility	0.67	0.69	5.0×10^{-6}	9.0×10^{-6}	0.047	0.68	1.5×10^{-4}	1.5×10^{-4}	–	6.0×10^{-6}
Power Burst Facility	55	0.018	3.3×10^{-10}	1.6×10^{-10}	1.5×10^{-11}	2.8×10^{-13}	1.3×10^{-4}	1.5×10^{-4}	2.8×10^{-7}	7.2×10^{-7}
RWMC	55	130	–	–	–	–	4.2×10^{-7}	6.8×10^{-7}	1.0×10^{-6}	7.2×10^{-6}
Test Area North	0.061	93	–	7.9×10^{-3}	–	920	1.1×10^{-4}	1.3×10^{-3}	6.6×10^{-7}	1.2×10^{-6}
Test Reactor Area	260	300	0.13	0.39	1.2×10^{3}	1.5×10^{3}	0.45	2.3	7.5×10^{-6}	2.3×10^{-5}
INEEL Total	400	690	0.13	0.41	3.1×10^{3}	4.0×10^{3}	0.45	2.5	4.6×10^{-5}	2.1×10^{-3}

a. Source: DOE (2000, 2001).
b. Mixed fission and activation products that are primarily particulate in nature (e.g., cobalt-60, strontium-90, and cesium-137).
c. U/Th/TRU = Radioisotopes of heavy elements such as uranium, thorium, plutonium, americium, and neptunium.
d. – = Negligibly small or zero.
e. RWMC = Radioactive Waste Management Complex.

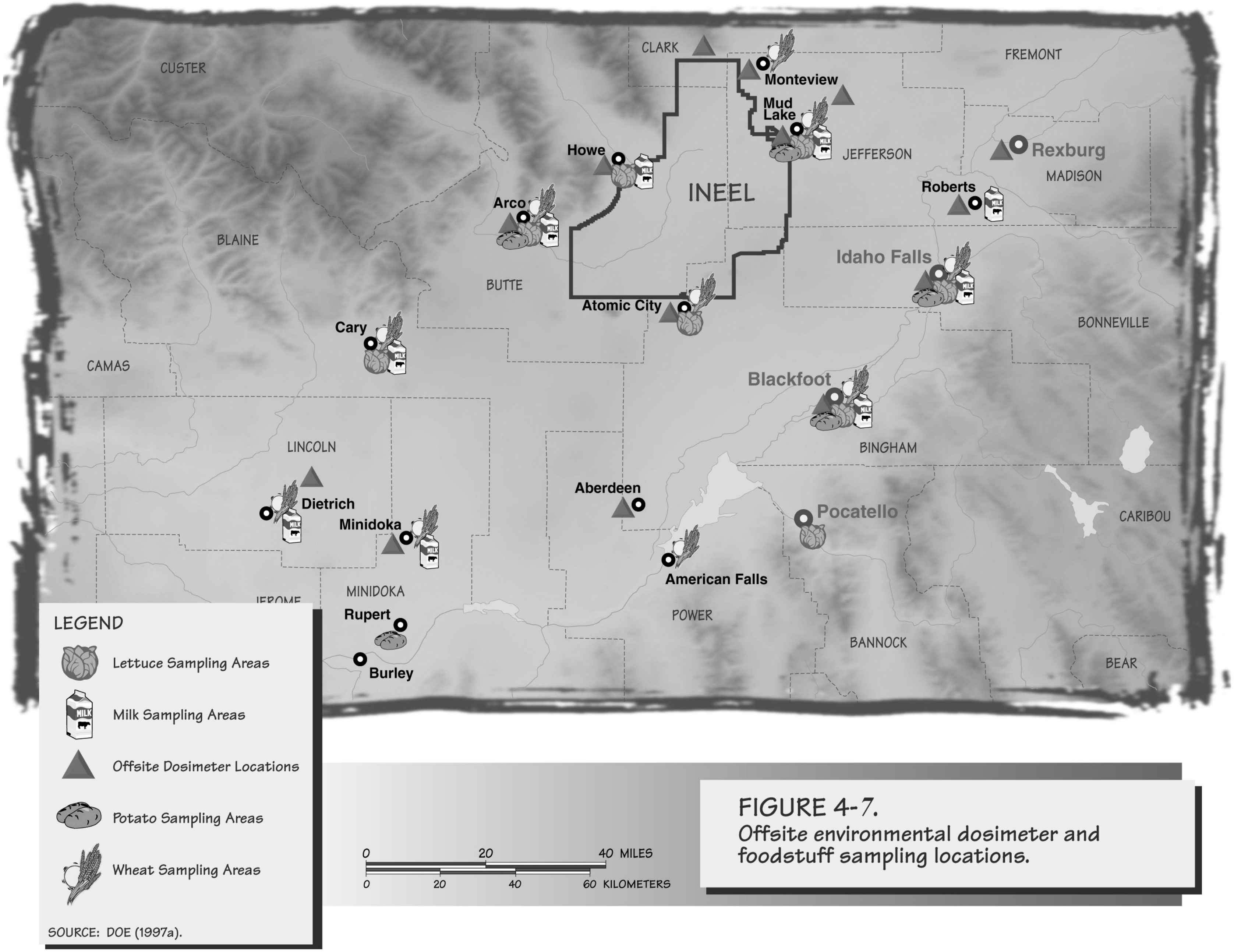


FIGURE 4-7.
Offsite environmental dosimeter and foodstuff sampling locations.

expected (at the time the analysis was performed) to become operational before 1995 was 0.32 millirem per year. However, that projected dose includes contributions from activities (e.g., compacting and sizing activities at the Waste Experimental Reduction Facility) which are not expected to operate over the period covered by this EIS. An update of the maximum onsite dose is described in Appendix C.2; the revised estimate is 0.2*7* millirem per year. This dose is a very small fraction of the DOE-established occupational dose limit (5,000 millirem per year) and below the National Emission Standards for Hazardous Air Pollutants dose limit of 10 millirem per year. This limit applies to the maximally exposed member of the public (not to workers) but is the most restrictive limit for airborne releases and serves as a useful comparison.

Offsite Doses

The offsite population could receive a radiation dose as a result of radiological conditions directly attributable to INEEL operations. The dose associated with radiological emissions is assessed annually to demonstrate compliance with the National Emission Standards for Hazardous Air Pollutants. The effective annual dose equivalent to the maximally exposed individual resulting from radionuclide emissions from INEEL facilities during 1995 and 1996 has been estimated at 0.018 millirem and 0.031 millirem, respectively (DOE 1996, 1997b). These doses are well below both the EPA dose limit (10 millirem per year) and the dose received from background sources (about 360 millirem per year).

The SNF & INEL EIS provides an estimate of the collective dose to the population surrounding INEEL as a result of air emissions from all facilities that were expected (at the time the analysis was performed) to become operational before June 1, 1995. The annual collective dose to the surrounding population, based on 1990 U.S. Census Bureau data, was estimated at 0.3 person-rem. This dose applies to a total population of about 120,000 people (based on 1990 U.S. Census Bureau data), resulting in an average individual dose of less than 3×10^{-3} millirem. For comparison, this population receives an annual collective dose from background sources of about 43,000 person-rem.

It should be noted that the collective dose depends not only on the types and levels of emissions, but also on the size and distribution pattern of the surrounding population. Population data were derived from the Census Bureau TIGER/Line files. When a census tract lay partly with the 50-mile INTEC radius, it was assumed that the fraction of the population within the 50-mile radius was proportional to the area within the radius. The future baseline population dose could increase even if emission rates do not change. If emission rates remained constant, the collective dose would increase by an amount that corresponds directly to the population growth rate. ***Based on the Census 2000 data, the population within the 50-mile INTEC radius has increased to almost 140,000 (Pruitt 2002).***

Foreseeable Increases to Baseline

DOE also considered the dose contributed by other foreseeable INEEL projects (that is, projects other than those associated with waste processing alternatives or facility disposition). Estimated annual doses from foreseeable projects are documented in Appendix C.2, (Table C.2-8). The combined effects of existing and foreseeable sources result in the following annual baseline doses:

- Noninvolved worker - 0.***35*** millirem
- Maximum ***exposed*** individual - 0.16 millirem
- Population - 0.92 person-rem

4.7.3.3 Summary of Radiological Conditions

Radioactivity and radiation levels resulting from INEEL air emissions are very low, well within applicable standards, and negligible when compared to doses received from natural background sources. These levels apply to onsite conditions to which INEEL workers or visitors may be exposed and offsite locations where the general population resides. Health risks associated with maximum potential exposure levels in the onsite and offsite environments are described in Section 4.11, Health and Safety.

4.7.4 NONRADIOLOGICAL CONDITIONS

Persons in the Eastern Snake River Plain are exposed to sources of air pollutants, such as agricultural and industrial activities, residential wood burning, wind-blown dust, and automobile exhaust. Many of the activities at INEEL also emit air pollutants. The types of pollutants assessed include (a) the criteria pollutants regulated under the National and State Ambient Air Quality Standards and (b) other types of pollutants with potentially toxic properties called toxic (or hazardous) air pollutants. Criteria pollutants are nitrogen dioxide, sulfur dioxide, carbon monoxide, lead, ozone, and respirable particulate matter less than or equal to 10 microns in size (particles that are small enough to pass easily into the lower respiratory tract), for which National Ambient Air Quality Standards have been established. Volatile organic compounds and nitrogen oxides are assessed as precursors leading to the development of ozone. Toxic air pollutants include cancer-causing agents, such as arsenic, benzene, carbon tetrachloride, and formaldehyde, as well as substances that pose noncancer health hazards, such as fluorides, ammonia, and hydrochloric and sulfuric acids.

4.7.4.1 Sources of Air Emissions

The types of nonradiological emissions from INEEL facilities and activities are similar to those of other major industrial complexes. Sources such as thermal treatment processes, boilers, and emergency generators emit both criteria and toxic air pollutants. Nonthermal chemical processing operations, waste management activities (other than combustion), and research laboratories ***are potential sources of*** toxic air pollutants. Waste management, construction, and related activities (such as excavation) also generate fugitive particulate matter.

The SNF & INEL EIS (Volume 2, Section 4.7) characterizes baseline emission rates for existing facilities for two separate cases. The actual emissions case represented the collective emission rates of nonradiological pollutants experienced by INEEL facilities during 1991 for criteria pollutants and 1989 for toxic air pollutants. The maximum emissions case represented a scenario in which all permitted sources at INEEL are assumed to operate in such a manner that they emit specific pollutants to the maximum extent allowed by operating permits or applicable regulations. These emissions were also adjusted to take projected increases (through June 1995) into account.

Actual INEEL-wide emissions for 1996 and 1997 are presented in DOE/ID-10594 and DOE/ID-10646, respectively (DOE 1997c; DOE 1998). Table 4-1***1*** presents a comparison of actual criteria pollutant emissions during 1996 and 1997 with levels previously assessed in the SNF & INEL EIS under the maximum emissions case. ***Except for lead, the current (1996 and 1997) critria pollutant emission rates are less than the levels assessed in the SNF & INEL EIS. In the case of lead, the annual average emission rate for 1997 was about eight times the level in the SNF & INEL EIS.*** For volatile organic compounds, the SNF & INEL EIS assessed levels of individual compounds but did not identify the combined emission rate. Appendix C.2 (Table C.2-15) describes the ambient air concentrations of criteria air pollutants, including lead, which are associated with actual 1997 INEEL emissions.

It should also be noted that the New Waste Calcining Facility, which historically has been the single largest source of nitrogen dioxide emissions at the INEEL, did not operate during 1996 (DOE 1997a). In this EIS, DOE analyzes the effects of the New Waste Calcining Facility in conjunction with the specific waste processing alternatives with which this facility is associated.

DOE conducted a screening level risk assessment to evaluate potential adverse human health and environmental effects that could result from the continued operation of the New Waste Calcining Facility. This evaluation included the operation of the calciner, as well as related systems such as the High-Level Liquid Waste Evaporator and Liquid Effluent Treatment and Disposal Facility. The results of this evaluation demonstrate that all the potential excess cancer risk, noncarcinogenic health effects, lead expo-

Table 4-11. Comparison of recent criteria air pollutant emissions estimates for INEEL with the levels assessed under the maximum emissions case in the SNF & INEL EIS.

	SNF & INEL EIS Maximum baseline case		Actual sitewide emissions					
			1996[a]			1997[b]		
Pollutant	Maximum hourly (kg/hr)	Annual average (kg/yr)	Actual hourly (kg/hr)	Maximum hourly (kg/hr)	Annual average (kg/yr)	Actual hourly (kg/hr)	Maximum hourly (kg/hr)	Annual average (kg/yr)
Carbon monoxide	250	2,200,000	73	160	160,000	59	120	450,000
Nitrogen dioxide	780	3,000,000	220	640	220,000	420	450	820,000
Respirable particulates[c]	290	900,000	30	45	180,000	29	43	180,000
Sulfur dioxide	350	1,700,000	68	300	120,000	38	260	91,000
Lead compounds	0.8	68	0.27	1.9	1.5	0.03	***0.82***	560
VOCs[d]	ns[e]	ns	43	59	16,000	24	37	27,000

a. Source: (DOE 1997c).

b. Source: (DOE 1998).

c. The particle size of particulate matter emissions is assumed to be in the respirable range (less than 10 microns).

d. VOCs = volatile organic compounds, excluding methane.

e. ns = not specified; the SNF & INEL EIS (Section 4.7) evaluated emissions of specific types of VOCs from individual facilities, but did not include a total for the maximum baseline case.

sure, and short-term air concentrations are within acceptable EPA or state limits. One compound (1,3-dinitrobenzene) evaluated in the Screening Level Ecological Risk Assessment exceeded its Ecologically-Based Screening Level (EBSL) at its maximum point. The average soil concentration for this contaminant in the area of major depositional impact was less than the EBSL. In addition, actual impacts would be significantly less because of conservatism in emissions calculations (Abbott et al. 1999).

The SNF & INEL EIS identifies 26 toxic air pollutants that were emitted from INEEL facilities in quantities exceeding the screening level established by the State of Idaho. (The health hazard associated with toxic air pollutants emitted in lesser quantities is considered low enough by the State of Idaho not to require detailed assessment.) For a few toxic air pollutants, actual 1996 emissions were greater than the levels assessed in the SNF & INEL EIS. These increases were primarily attributable to decontamination and decommissioning activities.

The specific regulations governing toxic emissions from alternatives ***analyzed*** in this EIS are contained in Sections 585 (for non-carcinogenic toxic air pollutants) and 586 (for carcinogens) of Rules for the Control of Air Pollution in Idaho ***(IDAPA 58.01.01)***. Unlike criteria pollutants, the toxic standards apply only to incremental increases of these pollutants, and not the sum of baseline levels and incremental increases.

4.7.4.2 Existing Conditions

The assessment of nonradiological air quality described in the SNF & INEL EIS was based on the assumption that the available monitoring data are not sufficient to allow a meaningful characterization of existing air quality and that such a characterization must rely on an extensive program of air dispersion modeling. The modeling program applied for this purpose utilized computer codes, methods, and assumptions that are considered acceptable by the EPA and the State of Idaho for regulatory compliance purposes. The methodology applied in the assessments performed for the SNF & INEL EIS is described in Appendix F-3 of that document. The remainder of this section describes the results of the assessments in the SNF & INEL EIS for air quality conditions in the affected environment (i.e., concentrations of pollutants in air within and around INEEL). Potential changes in the affected air environment resulting from changes in INEEL emission levels (compared to those at the time the assessments in the

SNF & INEL EIS were performed) are also discussed.

Onsite Conditions

The SNF & INEL EIS contains an assessment of existing conditions as a result of cumulative toxic air pollutant emissions from sources located within all areas of INEEL. Criteria pollutant levels were assessed only for ambient air locations, (i.e., locations to which the general public has access.) The onsite levels were compared to occupational exposure limits established to protect workers. With one exception, the estimated onsite concentrations were estimated at levels well below the occupational standards. The exception was for ***the*** maximum ***predicted*** short-term benzene concentration, which slightly exceeded the standard within the ***INEEL's*** Central Facilities Area. Those levels result primarily from gasoline and diesel fuel storage tank emissions at the Central Facilities Area-754; however, those tanks were taken out of service in 1995, and current benzene levels are estimated to be below the occupational standard.

Offsite Conditions

Estimated maximum offsite pollutant concentrations were assessed in the SNF & INEL EIS for locations along the INEEL boundary, public roads within the site boundary, and at Craters of the Moon Wilderness Area. The results for baseline criteria pollutant levels (i.e., levels associated with facilities that existed or were projected to operate before mid-1995) are presented in the SNF & INEL EIS. These results, summarized in Table 4-1*2*, indicate that all concentrations are well within the ambient air quality standards.

Highest offsite concentrations of carcinogenic toxics (summarized in Table 4.7-7 of the SNF & INEL EIS) were predicted to occur at the site boundary due south of the Central Facilities Area. All carcinogenic air pollutant levels were below the reference levels. Predicted noncarcinogenic air pollutant levels (Table 4.7-8 of the SNF & INEL EIS) were also well below the reference levels at all site boundary locations. Levels at some public road locations, which are closer to emissions sources, are higher than site boundary locations but still well below the reference levels.

Prevention of Significant Deterioration - In the SNF & INEL EIS, concentrations of criteria pollutants from existing INEEL sources were also compared to PSD criteria (called "increments"), which have been established to ensure that air quality remains good in those areas that are in compliance with ambient air quality standards (see Appendix C.2, Section C.2.2.2 for a description of these regulations). These PSD increments are allowable increases over baseline conditions from sources that have become operational after certain baseline dates. Increments have been established for sulfur dioxide, respirable particulates, and nitrogen dioxide. ***Federal land managers (e.g., Bureau of Land Management or National Park Service) are responsible for the protection of air quality values, including visibility, in land areas under their jurisdiction. The Clean Air Act requires the prevention of any future impairment and the remedying of any existing impairment in Class I federal areas (see Section 4.5, Aesthetic and Scenic Resources for a description of the Visual Resource Management ratings).*** Separate ***PSD*** increments are established for pristine areas, such as national parks or wilderness areas (Class I areas) and for the nation as a whole (Class II areas). Craters of the Moon Wilderness Area is the Class I area nearest INEEL, while the site boundary and public roads are the applicable Class II areas.

The amount of increment consumed by existing sources subject to PSD regulation ***described in*** this EIS ***is based on increment consumption analyses recently performed to support a permit application for installation of new oil-fired boilers in the INTEC CPP-606 boiler facility. For this application, DOE updated source inventory, emission rate, and stack parameter data based on the most recent information, and performed dispersion modeling using both the CALPUFF (Scire et al. 1999) and ISCST3 models.***

Table 4-12. Ambient air concentrations of criteria pollutants from the combined effects of maximum baseline emissions and projected increases.

		Maximum projected concentration ($\mu g/m^3$)[a]				Percent of standard		
Pollutant	Averaging time	Site boundary	Public roads	Craters of the Moon Wilderness Area	Applicable standard[b] ($\mu g/m^3$)	Site boundary	Public roads	Craters of the Moon Wilderness Area
Carbon monoxide	1-hour	530	1,300	140	40,000	1	3	0.3
	8-hour	170	310	30	10,000	2	3	0.3
Nitrogen dioxide	Annual	7.3	11	0.6	100	7	11	1
Sulfur dioxide	3-hour	220	600	62	1,300	17	46	5
	24-hour	53	140	11	370	15	38	3
	Annual	2.5	6.2	0.3	80	3	8	0.4
Respirable particulates[c]	24-hour	20	35	3.2	150	13	24	2
	Annual	0.77	3.5	0.12	50	2	7	0.2
Lead	Quarterly	2.0×10^{-3}	5.0×10^{-3}	1.0×10^{-4}	1.5	0.2	0.3	0.01

a. Includes contribution from existing sources and projected increases (as described in Section 4.7.4.2).

b. All standards are primary air quality standards (designed to protect public health), except for 3-hour sulfur dioxide, which is a secondary standard (designed to protect public welfare).

c. Assumes all particulate matter emissions are of respirable size (i.e., less than 10 microns). Particulate matter concentrations do not include fugitive dust from activities such as construction. Additional standards for smaller sized particles (2.5 microns and less) have been promulgated. Current air quality levels are well within the proposed standards.

The National Park Service recommends using the CALPUFF model to assess conditions at receptor locations greater than 50 kilometers from the emissions source. DOE used CALPUFF in the screening mode of operation to estimate maximum increment consumption at Class I area locations at Craters of the Moon Wilderness Area and Yellowstone and Grand Teton National Parks.

For the Class II area on and around INEEL, and for the eastern portion of the Craters of the Moon Class I area, DOE used the ISCST3 model (Version 99155) with the most current three-year set of INEEL meteorological data (1996-1998). Table 4-13 presents the CALPUFF screening results for distant Class I areas, while Tables 4-14 and 4-15 present the ISCST3 modeling results for the eastern boundary of Craters of the Moon and the Class II area on and around INEEL. These results represent the estimated amount of PSD increment consumed by the combined effects of emissions from existing INEEL sources subject to PSD regulation including the new INTEC CPP-606 boilers, assuming maximum operational capacity and unrestricted usage (8,760 hours per year). Except for nitrogen dioxide, these results are generally consistent with those presented in the Draft EIS, and the amount of increment consumed at all Class I and Class II areas remains well within allowable levels. Nitrogen dioxide results are higher because the New Waste Calcining Facility calciner (historically the largest INEEL source of this pollutant) was included in the baseline determination performed to support the INTEC CPP-606 boiler facility permit application, whereas the Draft EIS evaluated this source as part of the Continued Current Operations Alternative and the Planning Basis, Hot Isostatic Pressed Waste, and Direct Cement Waste Options. Incineration at the Advanced Mixed Waste Treatment Project was included in the Draft EIS baseline but was not included in the CPP-606 permit update; however, projected emissions from that facility are minor and would not add noticeably to increment consumption.

Building on the baseline determination for the CPP-606 permit application, DOE developed a modified baseline for evaluating cumulative impacts for the Final EIS. This modified baseline excludes the CPP-606 boiler emissions (based on maximum operational capacity), because emissions resulting from fossil fuel consumption in support of the proposed action

Table 4-13. Prevention of Significant Deterioration increment consumption at distant Class I areas by sources subject to Prevention of Significant Deterioration regulation.[a]

			Craters of the Moon National Monument[b]		Yellowstone National Park[c]		Grand Teton National Park[d]	
Pollutant	Averaging time	Allowable PSD increment[e] (μg/m³)	Maximum predicted concentration (μg/m³)	Percent of PSD increment consumed	Maximum predicted concentration (μg/m³)	Percent of PSD increment consumed	Maximum predicted concentration (μg/m³)	Percent of PSD increment consumed
Sulfur dioxide[f]	3-hour	25	11	44	2.7	11	4	16
	24-hour	5	3.4	68	0.66	13	0.99	20
	Annual	2	0.23	12	0.026	1.3	0.045	2.3
Respirable particulates	24-hour	8	0.61	7.6	0.22	2.8	0.25	3.1
	Annual	4	0.032	0.8	4.7×10^{-3}	0.12	7.4×10^{-3}	0.19
Nitrogen dioxide	Annual	2.5	0.27	11	6.6×10^{-3}	0.26	0.022	0.88

a. From Rood (2000); modeled using CALPUFF assuming maximum emission rates and full utilization (8760 hours per year) for each source.

b. The results for Craters of the Moon represent the impacts predicted at a distance of 65 kilometers from INTEC, which corresponds to the western portion of Craters of the Moon National Monument, irrespective of direction.

c. The results for Yellowstone National Park represent the impacts predicted at a distance of 160 kilometers from INTEC, which corresponds to the closest (southwestern) boundary of Yellowstone, irrespective of direction.

d. The results for Grand Teton National Park represent the impacts predicted at a distance of 161 kilometers from INTEC, which corresponds to the closest (westernmost) boundary of Grand Teton, irrespective of direction.

e. Increments specified are State of Idaho standards (IDAPA 58.01.01.579-581).

f. Based on fuel sulfur content of 0.3 percent.

PSD = Prevention of Significant Deterioration.

Table 4-14. Prevention of Significant Deterioration increment consumption at the Craters of the Moon Class I area by sources subject to Prevention of Significant Deterioration regulation.[a]

Pollutant	Averaging time	Allowable PSD increment[b] (μg/m^3)	Maximum predicted concentration (μg/m^3)	Percent of PSD increment consumed
Sulfur dioxide[c]	3-hour	25	8.1	32
	24-hour	5	1.9	37
	Annual	2	0.12	6
Respirable particulates	24-hour	8	0.57	7.2
	Annual	4	0.025	0.6
Nitrogen dioxide	Annual	2.5	0.40	16

a. From Lane et al. (2000) ; assumes maximum emission rates and full utilization (8760 hours per year) for each source.
b. Increments specified are State of Idaho standards (IDAPA 58.01.01.579-581).
c. Sulfur dioxide results have been modified from the original results by a factor of 0.6 to reflect a change in fuel sulfur content of 0.5 to 0.3 percent.
PSD = Prevention of Significant Deterioration.

Table 4-15. Prevention of Significant Deterioration increment consumption at Class II areas at Idaho National Engineering and Environmental Laboratory by sources subject to Prevention of Significant Deterioration regulation.

			Maximum predicted concentration[a]			
Pollutant	Averaging time	Allowable PSD increment[b] (μg/m^3)	INEEL boundary (μg/m^3)	Public roads (μg/m^3)	Amount of increment consumed (μg/m^3)	Percent of PSD increment consumed[c]
Sulfur dioxide[d]	3-hour	512	80	120	120	23
	24-hour	91	16	27	27	29
	Annual	20	1.1	3.6	3.6	18
Respirable particulates	24-hour	30	4.9	10	10	34
	Annual	17	0.19	0.53	0.53	3.1
Nitrogen dioxide	Annual	25	3.3	8.8	8.8	35

a. From Lane et al. (2000) ; modeled using ISC3 assuming maximum emission rates and full utilization (8760 hours per year) for each source.
b. Increments specified are State of Idaho standards (IDAPA 58.01.01.579-581).
c. The amount of increment consumed is equal to the highest value of either the site boundary or public road locations.
d. Sulfur dioxide results have been modified from the original results by a factor of 0.6 to reflect a change in fuel sulfur content of 0.5 to 0.3 percent.
PSD = Prevention of Significant Deterioration.

(including operation of the CPP-606 boilers at less than full capacity) are assessed as elements of the waste processing alternatives. In addition, the modified baseline includes contributions from the Advanced Mixed Waste Treatment Project (excluding thermal treatment) and other planned projects (See Section C.2.3.3). This modified baseline is presented in Table 4-16.

4.7.4.3 Summary of Nonradiological Air Quality

The air quality on and around INEEL is good and within applicable guidelines. The area around the INEEL is either in attainment or unclassified for all National Ambient Air Quality Standards. ***Portions of Bannock and Power counties in Idaho, near the region of influence, are in a non-attainment area for particulate matter.*** For toxic emissions, all INEEL boundary and public road levels have been found to be well below reference levels appropriate for comparison. Current emission rates for some toxic pollutants are higher than the baseline levels assessed in the SNF & INEL EIS, but resulting ambient concentrations are expected to remain below reference levels. Similarly, all toxic pollutant levels at onsite locations are expected to remain below occupational limits established for protection of workers.

Table 4-16. Criteria pollutant ambient air quality standards and baseline used to assess cumulative impacts at public access locations.

Pollutant	*Applicable standard [a] (micrograms per cubic meter)*	*Averaging time*	*Contribution of baseline and reasonable foreseeable increases[b] (micrograms per cubic meter)*		
			At or beyond site boundary	*Public roads*	*Craters of the Moon*
Carbon monoxide	*40,000*	*1-hour*	*220*	*330*	*8.5*
	10,000	*8-hour*	*44*	*68*	*3.5*
Nitrogen dioxide	*100*	*Annual*	*1.0*	*2.2*	*0.084*
Sulfur dioxide	*1,300*	*3-hour*	*30*	*140*	*6.2*
	365	*24-hour*	*6.1*	*32*	*1.7*
	80	*Annual*	*0.26*	*4.5*	*0.070*
Respirable particulates	*150*	*24-hour*	*9.0*	*20*	*0.94*
	50	*Annual*	*0.39*	*1.3*	*0.043*
Lead	*1.5*	*Quarterly*	*1.8×10^{-3}*	*5.6×10^{-3}*	*3.9×10^{-4}*

a. Modeled concentrations are compared to the applicable standards provided above (IDAPA 58.01.01.577) (DEQ 2001). Primary standards are designed to protect public health. Secondary standards are designed to protect public welfare. The most stringent standard is used for comparison.

b. Baseline represents the modeled pollutant concentrations based on an actual operating emissions scenario. Sources include existing INEEL facilities with actual 1997 INEEL emissions, plus reasonably foreseeable sources such as the Advanced Mixed Waste Treatment Project. The newly installed CPP-606 steam production boilers are excluded, since they are assessed as elements of the waste processing alternatives (see Section 5.2.6).